WEBVTT

00:00:00.000 --> 00:00:02.429 It's my pleasure to introduce our first

00:00:02.429 --> 00:00:05.376 speaker today for our first lecture, Dr.

00:00:05.376 --> 00:00:07.320 Harlan Krumholtz. Dr.

00:00:07.320 --> 00:00:10.200 Krumholtz is the Harold Hines Junior

00:00:10.200 --> 00:00:12.771 Professor of Medicine and the Founder

00:00:12.771 --> 00:00:15.033 and Director of the Center for

00:00:15.033 --> 00:00:16.745 Outcomes Research and Evaluation

00:00:16.745 --> 00:00:19.678 Corps at the Yale School of Medicine.

00:00:19.680 --> 00:00:22.172 He is one of the most influential

00:00:22.172 --> 00:00:24.192 investigators in outcomes research and

00:00:24.192 --> 00:00:26.868 healthcare delivery and has made significant

00:00:26.868 --> 00:00:28.789 contributions to valuebased care.

00:00:28.790 --> 00:00:30.750 Among his many contributions, Dr.

00:00:30.750 --> 00:00:32.550 Krumholz played a seminal role

NOTE Confidence: 0.9340565

00:00:32.550 --> 00:00:34.350 in nationwide efforts to reduce

NOTE Confidence: 0.9340565

00:00:34.415 --> 00:00:35.870 the door to balloon Time,

NOTE Confidence: 0.9340565

00:00:35.870 --> 00:00:37.410 a hospital performance metric

NOTE Confidence: 0.9340565

00:00:37.410 --> 00:00:39.720 focused on the timely initiation of

NOTE Confidence: 0.9340565

00:00:39.789 --> 00:00:41.628 percutaneous coronary intervention

NOTE Confidence: 0.9340565

00:00:41.628 --> 00:00:43.467 for myocardial infarctions.

NOTE Confidence: 0.9340565

00:00:43.470 --> 00:00:45.168 He has also played an influential

NOTE Confidence: 0.9340565

00:00:45.168 --> 00:00:46.931 role in bringing attention to the

NOTE Confidence: 0.9340565

00:00:46.931 --> 00:00:48.391 high rates of hospital readmissions

NOTE Confidence: 0.9340565

00:00:48.391 --> 00:00:50.119 for conditions such as heart failure,

NOTE Confidence: 0.9340565

00:00:50.120 --> 00:00:52.696 which led to the creation of the

NOTE Confidence: 0.9340565

00:00:52.696 --> 00:00:54.320 Hospital Readmissions Reduction Program,

NOTE Confidence: 0.9340565

00:00:54.320 --> 00:00:56.430 where hospitals with higher than

NOTE Confidence: 0.9340565

00:00:56.430 --> 00:00:58.540 expected readmission rates can face

NOTE Confidence: 0.9340565

00:00:58.610 --> 00:01:00.598 reductions in Medicare payments.

NOTE Confidence: 0.9340565

00:01:00.600 --> 00:01:02.165 Doctor Krumholz was also the

NOTE Confidence: 0.9340565

00:01:02.165 --> 00:01:03.730 founding governor of the Patient

NOTE Confidence: 0.9340565

00:01:03.781 --> 00:01:05.677 Centered Outcomes Research Institute,

NOTE Confidence: 0.9340565

00:01:05.680 --> 00:01:07.360 established as part of the Affordable

NOTE Confidence: 0.9340565

00:01:07.360 --> 00:01:07.920 Care Act,

NOTE Confidence: 0.9340565

00:01:07.920 --> 00:01:10.092 aim to help patients clinicians make

NOTE Confidence: 0.9340565

00:01:10.092 --> 00:01:12.355 more informed decisions and has also

NOTE Confidence: 0.9340565

00:01:12.355 --> 00:01:14.250 led efforts to develop publicly

NOTE Confidence: 0.9340565

00:01:14.250 --> 00:01:16.165 available outcome measures for the

NOTE Confidence: 0.9340565

00:01:16.165 --> 00:01:18.325 Centers for Medicare and Medicaid Services.

NOTE Confidence: 0.9340565

00:01:18.330 --> 00:01:18.660 Currently,

NOTE Confidence: 0.9340565

00:01:18.660 --> 00:01:20.640 he also hosts a podcast alongside

NOTE Confidence: 0.9340565

00:01:20.640 --> 00:01:22.431 his college like Doctor Howard

NOTE Confidence: 0.9340565

00:01:22.431 --> 00:01:24.286 Foreman called Health and Veritas,

NOTE Confidence: 0.9340565

00:01:24.290 --> 00:01:25.822 which features the most important thing.

NOTE Confidence: 0.9340565

00:01:25.822 --> 00:01:27.555 The most important thing right

NOTE Confidence: 0.9340565

00:01:27.555 --> 00:01:29.925 podcast is called Health and Veritas,

NOTE Confidence: 0.9340565

00:01:29.930 --> 00:01:31.675 which focuses on commentary and

NOTE Confidence: 0.9340565

00:01:31.675 --> 00:01:33.835 guest speakers focus on the latest

NOTE Confidence: 0.9340565

00:01:33.835 --> 00:01:35.610 news and ideas in healthcare.

NOTE Confidence: 0.9340565

00:01:35.610 --> 00:01:37.130 As a practicing cardiologist, Dr.

NOTE Confidence: 0.9340565

00:01:37.130 --> 00:01:38.984 Krumholtz completed his bachelor's at Yale

NOTE Confidence: 0.9340565

00:01:38.984 --> 00:01:41.488 College and D at Harvard Medical School,

NOTE Confidence: 0.9340565

00:01:41.490 --> 00:01:43.890 residency in internal medicine at

NOTE Confidence: 0.9340565

00:01:43.890 --> 00:01:45.702 UCSF and fellowship in cardiology

NOTE Confidence: 0.9340565

00:01:45.702 --> 00:01:47.367 at the Beth Israel Hospital,

NOTE Confidence: 0.9340565

00:01:47.370 --> 00:01:49.155 where he also earned a master's in

NOTE Confidence: 0.9340565

00:01:49.155 --> 00:01:50.613 health policy and management from

NOTE Confidence: 0.9340565

00:01:50.613 --> 00:01:52.527 the Harvard School of Public Health.

NOTE Confidence: 0.9340565

00:01:52.530 --> 00:01:54.528 So very fortunate to have Doctor

NOTE Confidence: 0.9340565

00:01:54.528 --> 00:01:56.940 Kromholtz join us today for his talk

NOTE Confidence: 0.9340565

00:01:56.940 --> 00:01:58.962 titled Medicine in an Information Age,

NOTE Confidence: 0.9340565

00:01:58.970 --> 00:02:00.810 Opportunities to Improve Health

NOTE Confidence: 0.9340565

00:02:00.810 --> 00:02:01.730 and Healthcare.

NOTE Confidence: 0.9340565

00:02:01.730 --> 00:02:02.082 Doctor Kromholtz,

NOTE Confidence: 0.9340565

00:02:02.082 --> 00:02:03.138 thank you so much for taking

NOTE Confidence: 0.9340565

00:02:03.138 --> 00:02:04.168 the time to be with us today,

NOTE Confidence: 0.9340565

00:02:04.170 --> 00:02:05.650 and I will turn it over to you

NOTE Confidence: 0.9340565

00:02:05.650 --> 00:02:06.330 when you're ready.

NOTE Confidence: 0.9281141

00:02:06.450 --> 00:02:07.450 Thanks for inviting me.

NOTE Confidence: 0.9281141

00:02:07.450 --> 00:02:08.450 What a terrific introduction.

NOTE Confidence: 0.9281141

00:02:08.450 --> 00:02:10.530 I really appreciate it.

NOTE Confidence: 0.9281141

00:02:10.530 --> 00:02:12.581 Thank you and hello everybody.

NOTE Confidence: 0.9281141

00:02:12.581 --> 00:02:13.929 So it's it's lunchtime.

NOTE Confidence: 0.9281141

00:02:13.930 --> 00:02:15.428 So I thought this could be just

NOTE Confidence: 0.9281141

00:02:15.428 --> 00:02:17.059 a high level talk and share some

NOTE Confidence: 0.9281141

00:02:17.059 --> 00:02:18.714 ideas and see what you think

NOTE Confidence: 0.9281141

00:02:18.714 --> 00:02:20.370 and well there's like a question

NOTE Confidence: 0.9281141

00:02:20.370 --> 00:02:22.100 answer thing people can put in

NOTE Confidence: 0.9281141

00:02:22.100 --> 00:02:23.370 comments and questions, right,

NOTE Confidence: 0.93284243

00:02:24.250 --> 00:02:26.977 Yes. And I'll maybe towards the end if we

NOTE Confidence: 0.93284243

00:02:26.977 --> 00:02:29.810 get questions accumulated all you know feel

NOTE Confidence: 0.93284243

00:02:29.970 --> 00:02:31.248 that's great, but but even through

NOTE Confidence: 0.93284243

00:02:31.248 --> 00:02:32.953 if people put up something and it

NOTE Confidence: 0.93284243

00:02:32.953 --> 00:02:34.678 seems relevant, I can address it.

NOTE Confidence: 0.93284243

00:02:34.678 --> 00:02:36.805 So don't don't want people to think

NOTE Confidence: 0.93284243

00:02:36.805 --> 00:02:38.751 that this has to be so formal

NOTE Confidence: 0.93284243

00:02:38.751 --> 00:02:40.538 that you can't put in a question

NOTE Confidence: 0.93284243

00:02:40.538 --> 00:02:41.810 or we can't talk about whatever

NOTE Confidence: 0.93284243

00:02:41.861 --> 00:02:43.247 it is that you're interested in.

NOTE Confidence: 0.93284243

00:02:43.250 --> 00:02:45.890 So go ahead. Sorry.

NOTE Confidence: 0.93578243

00:02:49.330 --> 00:02:51.460 So the I titled this first

NOTE Confidence: 0.93578243

00:02:51.460 --> 00:02:53.850 of all honored to be invited.

NOTE Confidence: 0.93578243

00:02:53.850 --> 00:02:55.482 It was really appreciated.

NOTE Confidence: 0.93578243

00:02:55.482 --> 00:02:58.310 The invitation I always love talking to,

NOTE Confidence: 0.93578243

00:02:58.310 --> 00:03:01.050 I guess I think this is medical

NOTE Confidence: 0.93578243

00:03:01.050 --> 00:03:02.650 student invitation and largely

NOTE Confidence: 0.93578243

00:03:02.650 --> 00:03:03.850 medical student audience.

NOTE Confidence: 0.93578243

00:03:03.850 --> 00:03:06.130 And so I really love that in

NOTE Confidence: 0.93578243

00:03:06.130 --> 00:03:08.110 the title of the Medicine and

NOTE Confidence: 0.93578243

00:03:08.110 --> 00:03:09.512 Information age Opportunities to

NOTE Confidence: 0.93578243

00:03:09.512 --> 00:03:10.920 Improve Health and healthcare.

NOTE Confidence: 0.93578243

00:03:10.920 --> 00:03:14.119 Just to start with disclosures for a second.

NOTE Confidence: 0.9276683

00:03:16.600 --> 00:03:17.566 Always good practice.

NOTE Confidence: 0.9276683

00:03:17.566 --> 00:03:21.198 And so let me just say my goals so surprised.

NOTE Confidence: 0.9276683

00:03:21.200 --> 00:03:23.972 A high level overview of medicine in

NOTE Confidence: 0.9276683

00:03:23.972 --> 00:03:26.288 an information age to discuss what

NOTE Confidence: 0.9276683

00:03:26.288 --> 00:03:29.092 clinicians need to know about a I and

NOTE Confidence: 0.9276683

00:03:29.092 --> 00:03:31.084 then to discuss some current research

NOTE Confidence: 0.9276683

00:03:31.084 --> 00:03:32.744 directions maybe to inspire folks

NOTE Confidence: 0.9276683

00:03:32.744 --> 00:03:34.620 to think about now they might play

NOTE Confidence: 0.9276683

00:03:34.620 --> 00:03:36.734 role in what's going to be a very

NOTE Confidence: 0.9276683

00:03:36.734 --> 00:03:38.576 different era of medicine going forward.

NOTE Confidence: 0.9276683

00:03:38.580 --> 00:03:39.504 First thing I want to do is

NOTE Confidence: 0.9276683

00:03:39.504 --> 00:03:39.900 just introduce you.

NOTE Confidence: 0.9276683

00:03:39.900 --> 00:03:41.804 I'm I'm the founder and director of

NOTE Confidence: 0.9276683

00:03:41.804 --> 00:03:43.406 the Center for Outcomes Research

NOTE Confidence: 0.9276683

00:03:43.406 --> 00:03:45.228 and Evaluation and I'm really

NOTE Confidence: 0.9276683

00:03:45.228 --> 00:03:47.436 fortunate to be surrounded by an

NOTE Confidence: 0.9276683

00:03:47.436 --> 00:03:49.472 extraordinary group of very talented

NOTE Confidence: 0.9276683

00:03:49.472 --> 00:03:51.336 individuals that cross disciplines,

NOTE Confidence: 0.94434565

00:03:53.820 --> 00:03:58.156 doctors, nurses, data scientists,

NOTE Confidence: 0.94434565

00:03:58.156 --> 00:03:59.652 project managers.

NOTE Confidence: 0.94434565

00:03:59.652 --> 00:04:01.268 Actually, I couldn't even begin

NOTE Confidence: 0.94434565

00:04:01.268 --> 00:04:02.570 to list all the different skill

NOTE Confidence: 0.94434565

00:04:02.611 --> 00:04:03.835 sets among the people in core,

NOTE Confidence: 0.94434565

00:04:03.840 --> 00:04:07.273 about 130 people and and the the

NOTE Confidence: 0.94434565

00:04:07.273 --> 00:04:08.638 focus is on outcomes research.

NOTE Confidence: 0.94434565

00:04:08.640 --> 00:04:10.377 I just want to take a second to say

NOTE Confidence: 0.94434565

00:04:10.377 --> 00:04:12.078 like you know what is that exactly?

NOTE Confidence: 0.94434565

00:04:12.080 --> 00:04:13.625 People sometimes get confused about

NOTE Confidence: 0.94434565

00:04:13.625 --> 00:04:15.170 outcomes research all states of

NOTE Confidence: 0.94434565

00:04:15.220 --> 00:04:17.030 outcomes what's outcomes research and

NOTE Confidence: 0.94434565

00:04:17.030 --> 00:04:18.873 outcomes research which actually frames

NOTE Confidence: 0.94434565

00:04:18.873 --> 00:04:21.099 my thinking about this issue about

NOTE Confidence: 0.94434565

00:04:21.099 --> 00:04:23.208 medicine and information ages is sort

NOTE Confidence: 0.94434565

00:04:23.208 --> 00:04:25.800 of a field that's focused on the end result.

NOTE Confidence: 0.94434565

00:04:25.800 --> 00:04:27.680 And what we say is at the end of the day,

NOTE Confidence: 0.94434565

00:04:27.680 --> 00:04:31.184 what have we accomplished to to for people,

NOTE Confidence: 0.94434565

00:04:31.190 --> 00:04:31.812 for patients,

NOTE Confidence: 0.94434565

00:04:31.812 --> 00:04:34.830 for society and and how can we do better.

NOTE Confidence: 0.94434565

00:04:34.830 --> 00:04:36.426 So if it really is saying net,

NOTE Confidence: 0.94434565

00:04:36.430 --> 00:04:38.670 net, what's what's the output,

NOTE Confidence: 0.94434565

00:04:38.670 --> 00:04:40.966 not how many programs have been produced or

NOTE Confidence: 0.94434565

00:04:40.966 --> 00:04:43.588 how many cool a I innovations have been made.

NOTE Confidence: 0.94434565

00:04:43.590 --> 00:04:45.710 But but really when you look at it,

NOTE Confidence: 0.94434565

00:04:45.710 --> 00:04:46.790 at the end of the day,

NOTE Confidence: 0.94434565

00:04:46.790 --> 00:04:48.570 what's happened and have we

NOTE Confidence: 0.94434565

00:04:48.570 --> 00:04:50.350 actually made things any better.

NOTE Confidence: 0.94434565

00:04:50.350 --> 00:04:51.606 And of course when you look at the

NOTE Confidence: 0.94434565

00:04:51.606 --> 00:04:52.549 United States healthcare system,

NOTE Confidence: 0.94434565

00:04:52.550 --> 00:04:54.510 all you see is that we spend more

NOTE Confidence: 0.94434565

00:04:54.510 --> 00:04:56.144 money every year and if anything life

NOTE Confidence: 0.94434565

00:04:56.144 --> 00:04:57.440 expectancy in the last couple years,

NOTE Confidence: 0.94434565

00:04:57.440 --> 00:04:58.457 not even counting.

NOTE Confidence: 0.94434565

00:04:58.457 --> 00:05:00.830 The pandemic has has that the improvements

NOTE Confidence: 0.94434565

00:05:00.886 --> 00:05:02.716 have stagnated and even reversed.

NOTE Confidence: 0.94434565

00:05:02.720 --> 00:05:04.718 And if you look at areas like health status,

NOTE Confidence: 0.94434565

00:05:04.720 --> 00:05:05.542 functional status,

NOTE Confidence: 0.94434565

00:05:05.542 --> 00:05:05.953 multimorbidity,

NOTE Confidence: 0.94434565

00:05:05.953 --> 00:05:07.893 a whole range of outcomes,

NOTE Confidence: 0.94434565

00:05:07.893 --> 00:05:09.358 we're not actually doing better.

NOTE Confidence: 0.94434565

00:05:09.360 --> 00:05:11.390 So in some ways an indictment of

NOTE Confidence: 0.94434565

00:05:11.390 --> 00:05:13.421 the work that I've done because

NOTE Confidence: 0.94434565

00:05:13.421 --> 00:05:15.236 I've been unable to actually

NOTE Confidence: 0.94434565

00:05:15.240 --> 00:05:16.532 translate this into improvements.

NOTE Confidence: 0.94434565

00:05:16.532 --> 00:05:18.732 But this is our aspiration to say

NOTE Confidence: 0.94434565

00:05:18.732 --> 00:05:20.420 that we've got to be applying our

NOTE Confidence: 0.94434565

00:05:20.420 --> 00:05:22.400 resources in ways and applying our

NOTE Confidence: 0.94434565

00:05:22.400 --> 00:05:24.439 our energy in ways that actually

NOTE Confidence: 0.94434565

00:05:24.439 --> 00:05:27.490 produce tangible benefits for people.

NOTE Confidence: 0.94434565

00:05:27.490 --> 00:05:29.922 And our goal is really not just to

NOTE Confidence: 0.94434565

00:05:29.922 --> 00:05:31.690 describe issues within healthcare,

NOTE Confidence: 0.94434565

00:05:31.690 --> 00:05:34.146 but it really is to to be solution oriented.

NOTE Confidence: 0.94434565

00:05:34.146 --> 00:05:36.292 And so the goal is to create knowledge

NOTE Confidence: 0.94434565

00:05:36.292 --> 00:05:38.524 that produces health outcomes for discovery,

NOTE Confidence: 0.94434565

00:05:38.530 --> 00:05:39.364 accountability and improvement

NOTE Confidence: 0.94434565

00:05:39.364 --> 00:05:41.647 with a focus on on maybe if you

NOTE Confidence: 0.94434565

00:05:41.647 --> 00:05:43.047 talk about healthcare at large,

NOTE Confidence: 0.94434565

00:05:43.050 --> 00:05:44.850 talk about effectiveness and efficiency,

NOTE Confidence: 0.94434565

00:05:44.850 --> 00:05:45.756 certainly equity,

NOTE Confidence: 0.94434565

00:05:45.756 --> 00:05:47.568 patient centeredness or putting

NOTE Confidence: 0.94434565

00:05:47.568 --> 00:05:50.202 our patients and and and people

NOTE Confidence: 0.94434565

00:05:50.202 --> 00:05:52.077 in stronger positions or tipping

NOTE Confidence: 0.94434565

00:05:52.077 --> 00:05:54.416 the balance of power toward them,

12

NOTE Confidence: 0.94434565

00:05:54.416 --> 00:05:54.824 safety,

NOTE Confidence: 0.94434565

00:05:54.824 --> 00:05:57.272 timeliness and then just population health.

NOTE Confidence: 0.94434565

00:05:57.280 --> 00:05:59.168 How are we helping people to avoid the

NOTE Confidence: 0.94434565

00:05:59.168 --> 00:06:01.258 need for healthcare and to be able to

NOTE Confidence: 0.94434565

00:06:01.258 --> 00:06:03.160 stay healthy for longer periods of time,

NOTE Confidence: 0.94434565

00:06:03.160 --> 00:06:03.964 compress morbidity.

NOTE Confidence: 0.94434565

00:06:03.964 --> 00:06:06.376 And these are the kind of

NOTE Confidence: 0.94434565

00:06:06.376 --> 00:06:08.520 themes that that pervade this.

NOTE Confidence: 0.94434565

00:06:08.520 --> 00:06:09.800 And in our thesis,

NOTE Confidence: 0.94434565

00:06:09.800 --> 00:06:12.223 I think over the last decade has

NOTE Confidence: 0.94434565

00:06:12.223 --> 00:06:14.368 been that medicine is primarily

NOTE Confidence: 0.94434565

00:06:14.368 --> 00:06:16.084 now in information science.

NOTE Confidence: 0.94434565

00:06:16.090 --> 00:06:18.186 And I think this is really important for

NOTE Confidence: 0.94434565

00:06:18.186 --> 00:06:19.908 medical students as you go through to

NOTE Confidence: 0.94434565

00:06:19.908 --> 00:06:21.364 sort of recognize that you're sitting

NOTE Confidence: 0.94434565

13

00:06:21.364 --> 00:06:23.444 at this cusp of immense change in medicine,

NOTE Confidence: 0.94434565

00:06:23.450 --> 00:06:25.570 maybe we we sort of always talk about,

NOTE Confidence: 0.94434565

00:06:25.570 --> 00:06:25.874 yeah,

NOTE Confidence: 0.94434565

00:06:25.874 --> 00:06:27.090 that's exciting that changes,

NOTE Confidence: 0.94434565

00:06:27.090 --> 00:06:29.760 breakthrough is shifting.

NOTE Confidence: 0.94434565

00:06:29.760 --> 00:06:32.850 But but this time I really think it's true.

NOTE Confidence: 0.94434565

00:06:32.850 --> 00:06:33.482 I mean,

NOTE Confidence: 0.94434565

00:06:33.482 --> 00:06:34.114 you know,

NOTE Confidence: 0.94434565

00:06:34.114 --> 00:06:36.010 it's as true as the moment

NOTE Confidence: 0.93453395

00:06:36.084 --> 00:06:38.178 in history when we, you know,

NOTE Confidence: 0.93453395

00:06:38.178 --> 00:06:39.634 when we started understanding

NOTE Confidence: 0.93453395

00:06:39.634 --> 00:06:41.090 microbes is causing disease.

NOTE Confidence: 0.93453395

00:06:41.090 --> 00:06:42.272 I mean there, there've been junctures

NOTE Confidence: 0.93453395

00:06:42.272 --> 00:06:43.962 where all of a sudden new understanding

NOTE Confidence: 0.93453395

00:06:43.962 --> 00:06:45.204 and new capabilities fundamentally

NOTE Confidence: 0.93453395

00:06:45.204 --> 00:06:47.508 transformed our ability to to get

14

NOTE Confidence: 0.93453395

00:06:47.508 --> 00:06:49.818 things done and to to help people.

NOTE Confidence: 0.93453395

00:06:49.820 --> 00:06:52.860 And I think we stand at that that moment now.

NOTE Confidence: 0.93453395

00:06:52.860 --> 00:06:54.644 I mean when I look at the Lascar

NOTE Confidence: 0.93453395

00:06:54.644 --> 00:06:56.660 awards that just came out, you know,

NOTE Confidence: 0.93453395

00:06:56.660 --> 00:06:59.060 Lascar sort of American nobles and

NOTE Confidence: 0.93453395

00:06:59.060 --> 00:07:00.932 very important awards that that you

NOTE Confidence: 0.93453395

00:07:00.932 --> 00:07:03.140 know sort of highlight the sort of

NOTE Confidence: 0.93453395

00:07:03.140 --> 00:07:04.934 very best discovery and basic science.

NOTE Confidence: 0.93453395

00:07:04.940 --> 00:07:07.154 What they gave it to this year was alpha

NOTE Confidence: 0.93453395

00:07:07.154 --> 00:07:09.255 fold which is about how proteins fold.

NOTE Confidence: 0.93453395

00:07:09.260 --> 00:07:10.780 Basically being able to take

NOTE Confidence: 0.93453395

00:07:10.780 --> 00:07:12.300 one-dimensional information about a protein,

NOTE Confidence: 0.93453395

00:07:12.300 --> 00:07:14.008 the amino acid sequence and predict how

NOTE Confidence: 0.93453395

00:07:14.008 --> 00:07:15.939 it looks in three-dimensional space.

NOTE Confidence: 0.93453395

00:07:15.940 --> 00:07:17.956 Which turns out to be a pretty

NOTE Confidence: 0.93453395

00:07:17.956 --> 00:07:19.399 difficult problem because you know

NOTE Confidence: 0.93453395

00:07:19.399 --> 00:07:21.233 you've got this long string of amino

NOTE Confidence: 0.93453395

00:07:21.233 --> 00:07:23.125 acids But the way they can interact

NOTE Confidence: 0.93453395

00:07:23.125 --> 00:07:25.275 with each other which in bonding and

NOTE Confidence: 0.93453395

00:07:25.275 --> 00:07:28.228 and you know the the folding can be

NOTE Confidence: 0.93453395

00:07:28.228 --> 00:07:30.060 quite a challenge to figure out.

NOTE Confidence: 0.93453395

00:07:30.060 --> 00:07:31.914 And we've done it historically by

NOTE Confidence: 0.93453395

00:07:31.914 --> 00:07:33.460 crystallography or you know what,

NOTE Confidence: 0.93453395

00:07:33.460 --> 00:07:35.539 a wide range of really labor intensive,

NOTE Confidence: 0.93453395

00:07:35.540 --> 00:07:37.605 difficult areas and maybe we've

NOTE Confidence: 0.93453395

00:07:37.605 --> 00:07:39.570 solved 200,000 of what would be

NOTE Confidence: 0.93453395

00:07:39.570 --> 00:07:41.120 8,000,000 proteins and alpha fold

NOTE Confidence: 0.93453395

00:07:41.178 --> 00:07:42.570 with a I figures this out.

NOTE Confidence: 0.93453395

00:07:42.570 --> 00:07:43.890 But the cool thing too

NOTE Confidence: 0.93453395

00:07:43.890 --> 00:07:45.210 was one of the winners.

NOTE Confidence: 0.93453395

00:07:45.210 --> 00:07:46.620 So this really prestigious award

NOTE Confidence: 0.93453395

00:07:46.620 --> 00:07:48.030 which really represents kind of

NOTE Confidence: 0.93453395

00:07:48.081 --> 00:07:49.446 a landmark in people's careers,

NOTE Confidence: 0.93453395

00:07:49.450 --> 00:07:52.970 he just graduated from his PhD in 2017.

NOTE Confidence: 0.93453395

00:07:52.970 --> 00:07:55.794 I mean this is what this world now

NOTE Confidence: 0.93453395

00:07:55.794 --> 00:07:58.418 has enabled which is marked advances

NOTE Confidence: 0.93453395

00:07:58.420 --> 00:08:00.219 by people at your stage of career.

NOTE Confidence: 0.93453395

00:08:00.220 --> 00:08:02.425 It's at stages of people who are

NOTE Confidence: 0.93453395

00:08:02.425 --> 00:08:03.055 quite younger.

NOTE Confidence: 0.93453395

00:08:03.060 --> 00:08:04.663 It's you don't need Gray hair to

NOTE Confidence: 0.93453395

00:08:04.663 --> 00:08:06.685 be able to be making immense

NOTE Confidence: 0.93453395

00:08:06.685 --> 00:08:07.537 contributions anymore.

NOTE Confidence: 0.93453395

00:08:07.540 --> 00:08:09.804 And and what we've done is in on

NOTE Confidence: 0.93453395

00:08:09.804 --> 00:08:11.727 the clinical side is we've digitized

NOTE Confidence: 0.93453395

00:08:11.727 --> 00:08:14.280 all the data but we've still now

NOTE Confidence: 0.93453395

00:08:14.280 --> 00:08:16.255 failed to actually bridge the

NOTE Confidence: 0.93453395

00:08:16.255 --> 00:08:18.730 potential of all that digital data

NOTE Confidence: 0.93453395

00:08:18.730 --> 00:08:20.740 into tangible benefit for patients.

NOTE Confidence: 0.93453395

00:08:20.740 --> 00:08:22.996 And and that's the problem now

NOTE Confidence: 0.93453395

00:08:22.996 --> 00:08:25.880 I wrote this piece in 2014,

NOTE Confidence: 0.93453395

00:08:25.880 --> 00:08:30.106 I think and you know I'd sort of hope

NOTE Confidence: 0.93453395

00:08:30.106 --> 00:08:31.608 that we would move a little faster

NOTE Confidence: 0.93453395

00:08:31.608 --> 00:08:33.320 maybe that's almost a decade ago that

NOTE Confidence: 0.93453395

00:08:33.320 --> 00:08:35.560 big data and new knowledge in medicine,

NOTE Confidence: 0.93453395

00:08:35.560 --> 00:08:36.270 the thinking,

NOTE Confidence: 0.93453395

00:08:36.270 --> 00:08:37.690 training tools needed for

NOTE Confidence: 0.93453395

00:08:37.690 --> 00:08:38.755 learning healthcare system.

NOTE Confidence: 0.93453395

00:08:38.760 --> 00:08:40.240 And it was sort of like a laying

NOTE Confidence: 0.93453395

00:08:40.240 --> 00:08:41.627 out of this issue about when

NOTE Confidence: 0.93453395

00:08:41.627 --> 00:08:43.079 I I've talked about big data,

NOTE Confidence: 0.93453395

00:08:43.080 --> 00:08:45.240 it's really about data science,

NOTE Confidence: 0.93453395

00:08:45.240 --> 00:08:45.898 information science.

NOTE Confidence: 0.93453395

00:08:45.898 --> 00:08:47.872 It's not just about the data

NOTE Confidence: 0.93453395

00:08:47.872 --> 00:08:50.073 itself but it's how are you going

NOTE Confidence: 0.93453395

00:08:50.073 --> 00:08:51.553 to parlay this new capabilities

NOTE Confidence: 0.93453395

00:08:51.616 --> 00:08:53.320 that we have with digital data.

NOTE Confidence: 0.93453395

00:08:53.320 --> 00:08:56.704 And and I wrote that a big data in

NOTE Confidence: 0.93453395

00:08:56.704 --> 00:08:59.113 medicine massive quantities of of

NOTE Confidence: 0.93453395

00:08:59.113 --> 00:09:00.877 healthcare data accumulating from

NOTE Confidence: 0.93453395

00:09:00.877 --> 00:09:02.974 patients and populations and advanced

NOTE Confidence: 0.93453395

00:09:02.974 --> 00:09:05.092 analytics that can give those data

NOTE Confidence: 0.93453395

00:09:05.092 --> 00:09:07.414 meaning hold the prospect of becoming

NOTE Confidence: 0.93453395

00:09:07.414 --> 00:09:09.354 an engine for knowledge generation

NOTE Confidence: 0.93453395

00:09:09.354 --> 00:09:10.850 that's necessary to address the

NOTE Confidence: 0.93453395

00:09:10.850 --> 00:09:12.225 unmet information needs of patients,

NOTE Confidence: 0.93453395

00:09:12.230 --> 00:09:12.756 clinicians,

NOTE Confidence: 0.93453395

00:09:12.756 --> 00:09:14.334 administrative researchers and

NOTE Confidence: 0.93453395

00:09:14.334 --> 00:09:15.386 health policymakers.

NOTE Confidence: 0.93453395

00:09:15.390 --> 00:09:18.230 And and what I further went on to

NOTE Confidence: 0.9365971

00:09:18.230 --> 00:09:21.550 conclude was that and I'll just read this,

NOTE Confidence: 0.9365971

00:09:21.550 --> 00:09:24.392 but I still think it stands. You know,

NOTE Confidence: 0.9365971

00:09:24.392 --> 00:09:26.499 this is a historic moment in medicine.

NOTE Confidence: 0.9365971

00:09:26.500 --> 00:09:28.155 There's a remarkable opportunity to

NOTE Confidence: 0.9365971

00:09:28.155 --> 00:09:29.585 promote medicine as an information

NOTE Confidence: 0.9365971

00:09:29.585 --> 00:09:30.860 science and strengthen the foundations

NOTE Confidence: 0.9365971

00:09:30.860 --> 00:09:32.380 of a learning health system.

NOTE Confidence: 0.9365971

00:09:32.380 --> 00:09:34.599 To find by the Institute of Medicine

NOTE Confidence: 0.9365971

00:09:34.599 --> 00:09:36.738 is designed to generate and apply

NOTE Confidence: 0.9365971

00:09:36.740 --> 00:09:38.610 the best evidence for collaborative

NOTE Confidence: 0.9365971

00:09:38.610 --> 00:09:40.480 healthcare choices of each patient

NOTE Confidence: 0.9365971

00:09:40.537 --> 00:09:42.301 provided to drive the process of

NOTE Confidence: 0.9365971

00:09:42.301 --> 00:09:44.214 discovery as a natural outgrowth of

NOTE Confidence: 0.9365971

00:09:44.214 --> 00:09:46.260 patient care and to ensure innovation,

NOTE Confidence: 0.9365971

00:09:46.260 --> 00:09:47.940 quality, safety and value in healthcare.

NOTE Confidence: 0.9365971

00:09:47.940 --> 00:09:50.412 So the idea is that it's not like

NOTE Confidence: 0.9365971

00:09:50.412 --> 00:09:52.316 research sits over here and and

NOTE Confidence: 0.9365971

00:09:52.316 --> 00:09:54.146 clinical care sits over here,

NOTE Confidence: 0.9365971

00:09:54.150 --> 00:09:55.755 but there becomes an integration

NOTE Confidence: 0.9365971

00:09:55.755 --> 00:09:58.089 of the act of providing care with

NOTE Confidence: 0.9365971

00:09:58.089 --> 00:09:59.754 the generation of new insights

NOTE Confidence: 0.9365971

00:09:59.754 --> 00:10:02.158 and knowledge and that there's an

NOTE Confidence: 0.9365971

00:10:02.158 --> 00:10:03.505 actionable insights everywhere.

NOTE Confidence: 0.9365971

00:10:03.510 --> 00:10:06.350 And and sort of one way that I have been

NOTE Confidence: 0.9365971

00:10:06.350 --> 00:10:08.303 known to talk about this is to say look,

NOTE Confidence: 0.9365971

00:10:08.310 --> 00:10:09.710 if you look at Amazon,

NOTE Confidence: 0.9365971

00:10:09.710 --> 00:10:11.590 Google and Tesla as prototypes,

NOTE Confidence: 0.9365971

00:10:11.590 --> 00:10:13.585 you say with every purchase on Amazon,

NOTE Confidence: 0.9365971

00:10:13.590 --> 00:10:14.630 with every search on Google,

NOTE Confidence: 0.9365971

00:10:14.630 --> 00:10:16.550 with every mile driven on Tesla,

NOTE Confidence: 0.9365971

00:10:16.550 --> 00:10:17.627 they get smarter.

NOTE Confidence: 0.9365971

00:10:17.627 --> 00:10:20.470 But but actually with every patient we see,

NOTE Confidence: 0.9365971

00:10:20.470 --> 00:10:21.750 we don't get smarter.

NOTE Confidence: 0.9365971

00:10:21.750 --> 00:10:23.056 You know, the the,

NOTE Confidence: 0.9365971

00:10:23.056 --> 00:10:24.388 the knowledge, the experience,

NOTE Confidence: 0.9365971

00:10:24.390 --> 00:10:26.064 it gets sequestered within the people

NOTE Confidence: 0.9365971

00:10:26.064 --> 00:10:27.710 that were involved in that care.

NOTE Confidence: 0.9365971

00:10:27.710 --> 00:10:30.898 It's not systematically analyzed

NOTE Confidence: 0.9365971

00:10:30.898 --> 00:10:33.226 and leveraged in ways that produces

NOTE Confidence: 0.9365971

00:10:33.226 --> 00:10:34.390 a better system.

NOTE Confidence: 0.9365971

00:10:34.390 --> 00:10:36.826 Now then we conduct sort of slower,

NOTE Confidence: 0.9365971

00:10:36.830 --> 00:10:38.182 more cumbersome labor intensive

NOTE Confidence: 0.9365971

00:10:38.182 --> 00:10:40.621 research way over here and when that

NOTE Confidence: 0.9365971

00:10:40.621 --> 00:10:42.362 produces some output, you know,

NOTE Confidence: 0.9365971

00:10:42.362 --> 00:10:45.512 we try to get it translated into the

NOTE Confidence: 0.9365971

00:10:45.512 --> 00:10:48.846 clinical ecosystem and usually you know,

NOTE Confidence: 0.9365971

00:10:48.846 --> 00:10:50.407 it takes a long time and and

NOTE Confidence: 0.9365971

00:10:50.407 --> 00:10:51.120 there's distrust.

NOTE Confidence: 0.9365971

00:10:51.120 --> 00:10:51.852 You know the,

NOTE Confidence: 0.9365971

00:10:51.852 --> 00:10:52.096 the,

NOTE Confidence: 0.9365971

00:10:52.096 --> 00:10:53.316 the clinicians think the researchers

NOTE Confidence: 0.9365971

00:10:53.316 --> 00:10:54.875 don't really understand the problems on

NOTE Confidence: 0.9365971

00:10:54.875 --> 00:10:57.608 the clinical side and they're they're

NOTE Confidence: 0.9365971

00:10:57.608 --> 00:10:59.560 studying very special populations.

NOTE Confidence: 0.9365971

00:10:59.560 --> 00:11:00.200 You know,

NOTE Confidence: 0.9365971

00:11:00.200 --> 00:11:01.800 the inclusion exclusion criteria make

NOTE Confidence: 0.9365971

00:11:01.800 --> 00:11:03.608 it so that the studies are about

NOTE Confidence: 0.9365971

00:11:03.608 --> 00:11:05.191 people that aren't like the people

NOTE Confidence: 0.9365971

00:11:05.191 --> 00:11:06.919 that you're seeing in everyday practice.

NOTE Confidence: 0.9365971

00:11:06.920 --> 00:11:08.719 So it's sort of ends up being

NOTE Confidence: 0.9365971

23

00:11:08.719 --> 00:11:10.686 hard to translate but but you know

NOTE Confidence: 0.9365971

00:11:10.686 --> 00:11:12.390 Google that that algorithm is being

NOTE Confidence: 0.9365971

00:11:12.454 --> 00:11:13.438 used all the time.

NOTE Confidence: 0.9365971

00:11:13.440 --> 00:11:15.440 So with every use that, you know,

NOTE Confidence: 0.9365971

00:11:15.440 --> 00:11:17.200 it's getting better and the

NOTE Confidence: 0.9365971

00:11:17.200 --> 00:11:18.880 the idea is that that could,

NOTE Confidence: 0.9365971

00:11:18.880 --> 00:11:20.875 that could be what we could have.

NOTE Confidence: 0.9365971

00:11:20.880 --> 00:11:22.399 And then I do want to say,

NOTE Confidence: 0.9365971

00:11:22.400 --> 00:11:23.016 you know,

NOTE Confidence: 0.9365971

00:11:23.016 --> 00:11:24.556 there are always are these

NOTE Confidence: 0.9365971

00:11:24.556 --> 00:11:25.890 concerns about how technology

NOTE Confidence: 0.9365971

00:11:25.890 --> 00:11:27.960 will find its way into medicine.

NOTE Confidence: 0.9365971

00:11:27.960 --> 00:11:29.824 And I'm going to talk about this in

NOTE Confidence: 0.9365971

00:11:29.824 --> 00:11:32.303 a minute about some of the untoward

NOTE Confidence: 0.9365971

00:11:32.303 --> 00:11:33.476 unintended adverse consequences.

NOTE Confidence: 0.9365971

00:11:33.480 --> 00:11:35.040 But there still is this aspiration

24

NOTE Confidence: 0.9365971

00:11:35.040 --> 00:11:36.880 that wrote this paper with Rob Kales,

NOTE Confidence: 0.9365971

00:11:36.880 --> 00:11:38.840 now Commissioner of FDA and Haider Warwick,

NOTE Confidence: 0.9365971

00:11:38.840 --> 00:11:41.834 who's actually now in special

NOTE Confidence: 0.9365971

00:11:41.834 --> 00:11:43.530 advisor to the Commissioner.

NOTE Confidence: 0.9365971

00:11:43.530 --> 00:11:43.984 But we,

NOTE Confidence: 0.9365971

00:11:43.984 --> 00:11:45.573 we were sort of trying to brainstorm

NOTE Confidence: 0.9365971

00:11:45.573 --> 00:11:47.210 about this and saying you know

NOTE Confidence: 0.9365971

00:11:47.210 --> 00:11:48.298 this digital transformation has

NOTE Confidence: 0.9365971

00:11:48.298 --> 00:11:49.768 the potential to make healthcare

NOTE Confidence: 0.9365971

00:11:49.768 --> 00:11:51.484 more humane and personalized as we

NOTE Confidence: 0.9365971

00:11:51.490 --> 00:11:53.050 understand more about our patients.

NOTE Confidence: 0.9365971

00:11:53.050 --> 00:11:53.550 Look,

NOTE Confidence: 0.9365971

00:11:53.550 --> 00:11:57.050 a lot of industries are using technology,

NOTE Confidence: 0.9365971

00:11:57.050 --> 00:11:57.864 you know,

NOTE Confidence: 0.9365971

00:11:57.864 --> 00:11:59.492 customer based software like

NOTE Confidence: 0.9365971

00:11:59.492 --> 00:12:01.120 you know the CRM

NOTE Confidence: 0.9305736

00:12:01.195 --> 00:12:03.490 stuff that Salesforce is using.

NOTE Confidence: 0.9305736

00:12:03.490 --> 00:12:05.050 I mean helps us, you know,

NOTE Confidence: 0.9305736

00:12:05.050 --> 00:12:06.646 sales people know how to use this,

NOTE Confidence: 0.9305736

00:12:06.650 --> 00:12:07.470 make people feel comfortable.

NOTE Confidence: 0.9305736

00:12:07.470 --> 00:12:09.602 I know about you, I can help you.

NOTE Confidence: 0.9305736

00:12:09.602 --> 00:12:11.242 It's very specific to you.

NOTE Confidence: 0.9305736

00:12:11.250 --> 00:12:12.354 But you know medicine we have

NOTE Confidence: 0.9305736

00:12:12.354 --> 00:12:13.910 yet to get there, but it's,

NOTE Confidence: 0.9305736

00:12:13.910 --> 00:12:16.370 it could be on the horizon.

NOTE Confidence: 0.9305736

00:12:16.370 --> 00:12:18.260 So here's a question that I

NOTE Confidence: 0.9305736

00:12:18.260 --> 00:12:19.930 just wanted to pose also.

NOTE Confidence: 0.9305736

00:12:19.930 --> 00:12:21.330 I mean especially if you're in training now,

NOTE Confidence: 0.9305736

00:12:21.330 --> 00:12:22.610 you sort of think, well,

NOTE Confidence: 0.9305736

00:12:22.610 --> 00:12:25.850 what do I need to know about a I to be

NOTE Confidence: 0.9305736

00:12:25.850 --> 00:12:27.446 a really good clinician in the future.

NOTE Confidence: 0.9305736

00:12:27.450 --> 00:12:29.970 Now some of you I hope will actually be

NOTE Confidence: 0.9305736

00:12:29.970 --> 00:12:31.651 interested in becoming data scientists

NOTE Confidence: 0.9305736

00:12:31.651 --> 00:12:33.667 and and actually I hope outcomes

NOTE Confidence: 0.9305736

00:12:33.724 --> 00:12:35.460 research slash data scientists.

NOTE Confidence: 0.9305736

00:12:35.460 --> 00:12:37.056 And the reason I say the outcomes

NOTE Confidence: 0.9305736

00:12:37.056 --> 00:12:38.824 research side is because you care about

NOTE Confidence: 0.9305736

00:12:38.824 --> 00:12:40.179 consequence that you you actually

NOTE Confidence: 0.9305736

00:12:40.179 --> 00:12:41.658 want to become data scientists.

NOTE Confidence: 0.9305736

00:12:41.660 --> 00:12:43.214 We're going to produce knowledge that

NOTE Confidence: 0.9305736

00:12:43.214 --> 00:12:45.486 you can be able to track to how it's

NOTE Confidence: 0.9305736

00:12:45.486 --> 00:12:46.534 actually improving people's health,

NOTE Confidence: 0.9305736

00:12:46.540 --> 00:12:48.260 how people are better off because of it,

NOTE Confidence: 0.9305736

00:12:48.260 --> 00:12:49.244 how you relieve suffering.

NOTE Confidence: 0.9305736

00:12:49.244 --> 00:12:51.471 I mean that that you sort of see that

NOTE Confidence: 0.9305736

00:12:51.471 --> 00:12:53.095 it's not just about the data science,

NOTE Confidence: 0.9305736

00:12:53.100 --> 00:12:54.702 but it's about what that data

NOTE Confidence: 0.9305736

00:12:54.702 --> 00:12:56.589 science is going to do for people.

NOTE Confidence: 0.9305736

00:12:56.590 --> 00:12:57.790 But but you, you know,

NOTE Confidence: 0.9305736

00:12:57.790 --> 00:12:59.350 there's also is a fair question

NOTE Confidence: 0.9305736

00:12:59.350 --> 00:13:01.614 to say what are clinicians if you

NOTE Confidence: 0.9305736

00:13:01.614 --> 00:13:02.896 aren't interested in becoming,

NOTE Confidence: 0.9305736

00:13:02.896 --> 00:13:04.414 you know, deeply involved in in

NOTE Confidence: 0.9305736

00:13:04.414 --> 00:13:05.749 that in this revolution,

NOTE Confidence: 0.9305736

00:13:05.750 --> 00:13:06.440 which is exciting.

NOTE Confidence: 0.9305736

00:13:06.440 --> 00:13:07.590 I hope to you know,

NOTE Confidence: 0.9305736

00:13:07.590 --> 00:13:09.210 continue to excite people about

NOTE Confidence: 0.9305736

00:13:09.210 --> 00:13:11.190 this as being a career path.

NOTE Confidence: 0.9305736

00:13:11.190 --> 00:13:13.066 But it won't be for everybody and

NOTE Confidence: 0.9305736

00:13:13.066 --> 00:13:15.309 and in fact most people will choose

NOTE Confidence: 0.9305736

00:13:15.310 --> 00:13:17.543 you know to to take advantage of

NOTE Confidence: 0.9305736

00:13:17.543 --> 00:13:19.662 what it's going to produce rather

NOTE Confidence: 0.9305736

00:13:19.662 --> 00:13:21.570 than be part of the generators

NOTE Confidence: 0.9305736

00:13:21.570 --> 00:13:23.110 of what it will produce.

NOTE Confidence: 0.9305736

00:13:23.110 --> 00:13:24.574 But but you know what do you need

NOTE Confidence: 0.9305736

00:13:24.574 --> 00:13:26.040 to know And and so well there's

NOTE Confidence: 0.9305736

00:13:26.040 --> 00:13:27.612 a whole range of things we could

NOTE Confidence: 0.9305736

00:13:27.612 --> 00:13:29.034 talk about that would be worth

NOTE Confidence: 0.9305736

00:13:29.034 --> 00:13:30.078 knowing about what are the types

NOTE Confidence: 0.9305736

00:13:30.078 --> 00:13:31.470 of a I and how are they applied.

NOTE Confidence: 0.9305736

00:13:31.470 --> 00:13:33.747 What are the benefits and limitations of a I.

NOTE Confidence: 0.9305736

00:13:33.750 --> 00:13:35.654 What about a I ethics A I regulation

NOTE Confidence: 0.9305736

00:13:35.654 --> 00:13:37.454 There's a whole field that's emerging

NOTE Confidence: 0.9305736

00:13:37.454 --> 00:13:39.350 about how should we regulate this

NOTE Confidence: 0.9305736

00:13:39.409 --> 00:13:41.313 what's how should the FDA be involved

NOTE Confidence: 0.9305736

00:13:41.313 --> 00:13:42.710 what how do we protect ourselves.

NOTE Confidence: 0.9305736

00:13:42.710 --> 00:13:44.718 Of course this is even short of all

NOTE Confidence: 0.9305736

00:13:44.718 --> 00:13:46.314 the talk about the LLM's destroying

NOTE Confidence: 0.9305736

00:13:46.314 --> 00:13:48.797 the world and what do we do you know

NOTE Confidence: 0.9305736

00:13:48.797 --> 00:13:51.650 to protect ourselves from the new

NOTE Confidence: 0.9305736

00:13:51.650 --> 00:13:53.384 Terminator type of you know scenarios

NOTE Confidence: 0.9305736

00:13:53.384 --> 00:13:55.249 that would come out of sentience.

NOTE Confidence: 0.9370923

00:13:58.090 --> 00:14:00.170 I know beings out of the LOM's and a I

NOTE Confidence: 0.9370923

00:14:00.226 --> 00:14:02.546 but but I'm just saying you know within

NOTE Confidence: 0.9370923

00:14:02.546 --> 00:14:04.584 medicine what what should be regulated

NOTE Confidence: 0.9370923

00:14:04.584 --> 00:14:07.072 How about evidence based practice using a

NOTE Confidence: 0.9370923

00:14:07.072 --> 00:14:09.364 I tools and integration into workflows.

NOTE Confidence: 0.9370923

00:14:09.370 --> 00:14:11.652 I mean, we could be doing long

NOTE Confidence: 0.9370923

00:14:11.652 --> 00:14:14.156 courses on this and and trying to

NOTE Confidence: 0.9370923

00:14:14.156 --> 00:14:16.328 make sure that people know about,

NOTE Confidence: 0.9370923

00:14:16.330 --> 00:14:17.890 you know, natural language processing,

NOTE Confidence: 0.9370923

00:14:17.890 --> 00:14:19.426 machine learning, robotics,

NOTE Confidence: 0.9370923

00:14:19.426 --> 00:14:20.930 expert systems, neural networks.

NOTE Confidence: 0.9370923

00:14:20.930 --> 00:14:22.626 You know what, what are the differences

NOTE Confidence: 0.9370923

00:14:22.626 --> 00:14:23.846 and similarities between all this?

NOTE Confidence: 0.9370923

00:14:23.850 --> 00:14:26.646 What are people coming out with?

NOTE Confidence: 0.9370923

00:14:26.650 --> 00:14:27.861 You know, what is it that people

NOTE Confidence: 0.9370923

00:14:27.861 --> 00:14:28.570 don't even know yet?

NOTE Confidence: 0.9370923

00:14:28.570 --> 00:14:30.826 Like take some of the LLM's large language

NOTE Confidence: 0.9370923

00:14:30.826 --> 00:14:32.350 models like ChatGPT where honestly

NOTE Confidence: 0.9370923

00:14:32.350 --> 00:14:34.450 the people built it still don't quite

NOTE Confidence: 0.9370923

00:14:34.506 --> 00:14:36.606 understand what's going on under the hood.

NOTE Confidence: 0.9370923

00:14:36.610 --> 00:14:38.290 So you know, how is that possible?

NOTE Confidence: 0.9370923

00:14:38.290 --> 00:14:39.586 You know, we could be talking

NOTE Confidence: 0.9370923

00:14:39.586 --> 00:14:40.810 about all the types of a I.

NOTE Confidence: 0.9370923

00:14:40.810 --> 00:14:42.862 We could be talking about benefits

NOTE Confidence: 0.9370923

00:14:42.862 --> 00:14:45.168 and limitations of a I in medicine,

NOTE Confidence: 0.9370923

00:14:45.170 --> 00:14:47.560 about how clinicians should understand

NOTE Confidence: 0.9370923

00:14:47.560 --> 00:14:49.582 the potential benefits such as

NOTE Confidence: 0.9370923

00:14:49.582 --> 00:14:51.037 improved accuracy and efficiency and

NOTE Confidence: 0.9370923

00:14:51.037 --> 00:14:52.999 the risks such as bias and concerns.

NOTE Confidence: 0.9370923

00:14:53.000 --> 00:14:53.585 But, you know,

NOTE Confidence: 0.9370923

00:14:53.585 --> 00:14:55.359 we could spend a lot of time on that.

NOTE Confidence: 0.9370923

00:14:55.360 --> 00:14:57.403 We could spend time on on ethics and their

NOTE Confidence: 0.9370923

00:14:57.403 --> 00:14:59.435 whole fields of ethics that are growing up.

NOTE Confidence: 0.9370923

00:14:59.440 --> 00:15:01.080 Jennifer Miller at our place,

NOTE Confidence: 0.9370923

00:15:01.080 --> 00:15:02.200 one of the world's experts,

NOTE Confidence: 0.9370923

00:15:02.200 --> 00:15:04.050 she's turning her attention to

NOTE Confidence: 0.9370923

00:15:04.050 --> 00:15:06.320 some of these issues as well.

NOTE Confidence: 0.9370923

00:15:06.320 --> 00:15:08.036 And like I said, you know,

NOTE Confidence: 0.9370923

00:15:08.040 --> 00:15:09.690 there should be courses on regulation

NOTE Confidence: 0.9370923

00:15:09.690 --> 00:15:11.600 because we still haven't figured this out.

NOTE Confidence: 0.9370923

00:15:11.600 --> 00:15:14.120 And no matter how good the A I is,

NOTE Confidence: 0.9370923

00:15:14.120 --> 00:15:16.112 if we don't figure out the

NOTE Confidence: 0.9370923

00:15:16.112 --> 00:15:17.680 implementation science side of it,

NOTE Confidence: 0.9370923

00:15:17.680 --> 00:15:20.080 which is sort of how do we actually

NOTE Confidence: 0.9370923

00:15:20.080 --> 00:15:21.712 integrate this into workflows in

NOTE Confidence: 0.9370923

00:15:21.712 --> 00:15:24.194 ways that that delight people as they use it,

NOTE Confidence: 0.9370923

00:15:24.200 --> 00:15:24.730 You know,

NOTE Confidence: 0.9370923

00:15:24.730 --> 00:15:26.320 it's just not going to work.

NOTE Confidence: 0.9370923

00:15:26.320 --> 00:15:27.148 And you know,

NOTE Confidence: 0.9370923

00:15:27.148 --> 00:15:29.934 how do you even evaluate these A I algorithms

NOTE Confidence: 0.9370923

00:15:29.934 --> 00:15:32.316 when they're put into clinical practice?

NOTE Confidence: 0.9370923

00:15:32.320 --> 00:15:33.214 What represents evidence?

NOTE Confidence: 0.9370923

00:15:33.214 --> 00:15:35.002 Can you use them to generate

NOTE Confidence: 0.9370923

00:15:35.002 --> 00:15:36.619 evidence when it's not statistical

NOTE Confidence: 0.9370923

00:15:36.619 --> 00:15:38.199 inference but it's something else?

NOTE Confidence: 0.9370923

00:15:38.200 --> 00:15:41.236 One could you use predictive models?

NOTE Confidence: 0.9370923

00:15:41.240 --> 00:15:43.400 So all of this stuff,

NOTE Confidence: 0.9370923

00:15:43.400 --> 00:15:43.920 you know,

NOTE Confidence: 0.9370923

00:15:43.920 --> 00:15:46.000 we could be teaching people and and let

NOTE Confidence: 0.9370923

00:15:46.063 --> 00:15:48.212 me just pause on the data part for a minute.

NOTE Confidence: 0.9370923

00:15:48.212 --> 00:15:48.580 You know,

NOTE Confidence: 0.9370923

00:15:48.580 --> 00:15:50.568 so even in the data we could

NOTE Confidence: 0.9370923

00:15:50.568 --> 00:15:52.298 be spending a lot of time,

NOTE Confidence: 0.9370923

00:15:52.300 --> 00:15:54.760 you know that this new world

NOTE Confidence: 0.9370923

00:15:54.760 --> 00:15:57.446 is highly dependent on on the

NOTE Confidence: 0.9370923

00:15:57.446 --> 00:15:59.856 acquisition and refinement of data.

NOTE Confidence: 0.9370923

00:15:59.860 --> 00:16:01.540 There are new sources of data,

NOTE Confidence: 0.9370923

00:16:01.540 --> 00:16:03.615 but there's lack of standards

NOTE Confidence: 0.9370923

00:16:03.615 --> 00:16:04.860 and immense fragmentation.

NOTE Confidence: 0.9370923

00:16:04.860 --> 00:16:07.520 So I've seen a lot of these

NOTE Confidence: 0.9370923

00:16:07.520 --> 00:16:09.339 large scale aggregators of data,

NOTE Confidence: 0.9370923

00:16:09.340 --> 00:16:11.740 Komodo or Verdigm trinetics.

NOTE Confidence: 0.9370923

00:16:11.740 --> 00:16:13.906 I mean, there's a whole,

NOTE Confidence: 0.9370923

00:16:13.906 --> 00:16:14.550 you know,

NOTE Confidence: 0.9370923

00:16:14.550 --> 00:16:17.350 even Epic is now trying to develop

NOTE Confidence: 0.9370923

00:16:17.350 --> 00:16:18.990 like repositories of data.

NOTE Confidence: 0.9370923

00:16:18.990 --> 00:16:20.582 But the problem is,

NOTE Confidence: 0.9370923

00:16:20.582 --> 00:16:22.174 because people move between

NOTE Confidence: 0.9370923

00:16:22.174 --> 00:16:23.741 healthcare systems and their

NOTE Confidence: 0.9370923

00:16:23.741 --> 00:16:25.506 records sit in different areas,

NOTE Confidence: 0.9370923

00:16:25.510 --> 00:16:26.686 it becomes hard to actually be

NOTE Confidence: 0.9370923

00:16:26.686 --> 00:16:28.110 able to follow the course of a

NOTE Confidence: 0.9370923

00:16:28.110 --> 00:16:29.310 single patient over the course of

NOTE Confidence: 0.9370923

00:16:29.310 --> 00:16:30.708 time and to know what people have.

NOTE Confidence: 0.9370923

00:16:30.710 --> 00:16:33.190 And when you go to many of these data sets,

NOTE Confidence: 0.93267983

00:16:33.190 --> 00:16:36.830 you you can't tell what they don't have.

NOTE Confidence: 0.93267983

00:16:36.830 --> 00:16:39.910 So you know, they're they're telling

NOTE Confidence: 0.93267983

00:16:39.910 --> 00:16:41.050 you what's within their purview,

NOTE Confidence: 0.93267983

00:16:41.050 --> 00:16:43.168 but it's not a comprehensive set

NOTE Confidence: 0.93267983

00:16:43.168 --> 00:16:45.490 of data that spans all systems.

NOTE Confidence: 0.93267983

00:16:45.490 --> 00:16:48.220 And so you end up having that

NOTE Confidence: 0.93267983

00:16:48.220 --> 00:16:50.075 problem plus there are a lot of

NOTE Confidence: 0.93267983

00:16:50.075 --> 00:16:51.566 errors in the system as well.

NOTE Confidence: 0.93267983

00:16:51.570 --> 00:16:52.650 So it, you know,

NOTE Confidence: 0.93267983

00:16:52.650 --> 00:16:54.930 becomes a a bit of a problem.

NOTE Confidence: 0.93267983

00:16:54.930 --> 00:16:56.477 Now there was a paper that came

NOTE Confidence: 0.93267983

00:16:56.477 --> 00:16:57.981 out that just I thought was

NOTE Confidence: 0.93267983

00:16:57.981 --> 00:16:59.610 emblematic of this neurologic and

NOTE Confidence: 0.93267983

00:16:59.610 --> 00:17:01.290 psychiatric risk trajectories after

NOTE Confidence: 0.93267983

00:17:01.290 --> 00:17:03.922 SARS CL V2 infection analysis to

NOTE Confidence: 0.93267983

00:17:03.922 --> 00:17:06.226 your retrospective of one point

NOTE Confidence: 0.93267983

00:17:06.226 --> 00:17:08.586 to almost 1.3 million patients.

NOTE Confidence: 0.93267983

00:17:08.590 --> 00:17:09.310 So you know,

NOTE Confidence: 0.93267983

00:17:09.310 --> 00:17:10.750 I mean the journal editors get

NOTE Confidence: 0.93267983

00:17:10.750 --> 00:17:12.330 impressed once you present you know

NOTE Confidence: 0.93267983

00:17:12.330 --> 00:17:13.921 you submit something that's got this

NOTE Confidence: 0.93267983

00:17:13.921 --> 00:17:15.802 many patients and and it's it's got

NOTE Confidence: 0.93267983

00:17:15.802 --> 00:17:17.880 a lot of fancy analysis but but

NOTE Confidence: 0.93267983

00:17:17.880 --> 00:17:19.914 here's what what the appendix said,

NOTE Confidence: 0.93267983

00:17:19.914 --> 00:17:21.669 the supplemental appendix said this

NOTE Confidence: 0.93267983

00:17:21.669 --> 00:17:23.278 network this the network that's

NOTE Confidence: 0.93267983

00:17:23.278 --> 00:17:25.072 based on this paper contains data

NOTE Confidence: 0.93267983

00:17:25.128 --> 00:17:26.640 provided by participating healthcare

NOTE Confidence: 0.93267983

00:17:26.640 --> 00:17:28.908 organizations so long as their name

NOTE Confidence: 0.93267983

00:17:28.910 --> 00:17:30.866 remains anonymous as a data source.

NOTE Confidence: 0.93267983

00:17:30.870 --> 00:17:34.748 So this was a company that that

NOTE Confidence: 0.93267983

00:17:34.750 --> 00:17:37.270 collaborated with a bunch of researchers.

NOTE Confidence: 0.93267983

00:17:37.270 --> 00:17:38.470 But but by the way,

NOTE Confidence: 0.93267983

00:17:38.470 --> 00:17:39.510 the researchers have no idea

NOTE Confidence: 0.93267983

00:17:39.510 --> 00:17:40.790 where did the data come from,

NOTE Confidence: 0.93267983

00:17:40.790 --> 00:17:41.846 how complete was it,

NOTE Confidence: 0.93267983

00:17:41.846 --> 00:17:44.030 what it was just like a data set.

NOTE Confidence: 0.93267983

00:17:44.030 --> 00:17:46.333 And and I'm concerned that this is

NOTE Confidence: 0.93267983

00:17:46.333 --> 00:17:48.790 CNN was just reporting yesterday,

NOTE Confidence: 0.93267983

00:17:48.790 --> 00:17:49.420 I was talking,

NOTE Confidence: 0.93267983

00:17:49.420 --> 00:17:50.890 going back and forth to them about

NOTE Confidence: 0.93267983

00:17:50.940 --> 00:17:52.230 some of the antiobesity drugs.

NOTE Confidence: 0.93267983

00:17:52.230 --> 00:17:53.550 EPIC had produced a report.

NOTE Confidence: 0.93267983

00:17:53.550 --> 00:17:55.310 They were reporting it nationally.

NOTE Confidence: 0.93267983

00:17:55.310 --> 00:17:56.254 I said to them,

NOTE Confidence: 0.93267983

00:17:56.254 --> 00:17:57.670 so how complete are these data?

NOTE Confidence: 0.93267983

00:17:57.670 --> 00:17:58.474 How what?

NOTE Confidence: 0.93267983

00:17:58.474 --> 00:18:00.886 What happens if people were using

NOTE Confidence: 0.93267983

00:18:00.886 --> 00:18:02.548 a telemedicine thing like Weight

NOTE Confidence: 0.93267983

00:18:02.548 --> 00:18:04.550 Watchers to fill their an anti obesity

38

NOTE Confidence: 0.93267983

00:18:04.603 --> 00:18:06.388 medicine or you know was being done

NOTE Confidence: 0.93267983

00:18:06.388 --> 00:18:08.130 outside of the healthcare system?

NOTE Confidence: 0.93267983

00:18:08.130 --> 00:18:09.070 How do you know?

NOTE Confidence: 0.93267983

00:18:09.070 --> 00:18:10.871 How does EPIC know what they captured

NOTE Confidence: 0.93267983

00:18:10.871 --> 00:18:12.526 and what they didn't capture?

NOTE Confidence: 0.93267983

00:18:12.530 --> 00:18:13.910 And what's their denominator?

NOTE Confidence: 0.93267983

00:18:13.910 --> 00:18:16.330 And the answer was they didn't know.

NOTE Confidence: 0.93267983

00:18:16.330 --> 00:18:16.810 They didn't know.

NOTE Confidence: 0.93267983

00:18:16.810 --> 00:18:18.448 But you know, I said well then you can.

NOTE Confidence: 0.93267983

00:18:18.450 --> 00:18:20.770 You should write articles that say epic says,

NOTE Confidence: 0.93267983

00:18:20.770 --> 00:18:22.930 but you shouldn't present as fact

NOTE Confidence: 0.93267983

00:18:22.930 --> 00:18:25.039 analyses that are based on on

NOTE Confidence: 0.93267983

00:18:25.039 --> 00:18:26.857 data sets that can't be clearly

NOTE Confidence: 0.93267983

00:18:26.857 --> 00:18:29.158 defined in methods that aren't

NOTE Confidence: 0.93267983

00:18:29.158 --> 00:18:30.940 clearly inexplicitly stated.

NOTE Confidence: 0.93267983

00:18:30.940 --> 00:18:32.660 And yet, you know, this is a state.

NOTE Confidence: 0.93267983

00:18:32.660 --> 00:18:33.293 Those are reporters.

NOTE Confidence: 0.93267983

00:18:33.293 --> 00:18:34.137 But I'm just saying,

NOTE Confidence: 0.93267983

00:18:34.140 --> 00:18:36.138 even in in the journal articles,

NOTE Confidence: 0.93267983

00:18:36.140 --> 00:18:36.950 you're seeing that.

NOTE Confidence: 0.93267983

00:18:36.950 --> 00:18:38.570 So the journal accepted this paper

NOTE Confidence: 0.93267983

00:18:38.570 --> 00:18:40.176 even though that no one can tell

NOTE Confidence: 0.93267983

00:18:40.176 --> 00:18:41.540 them where the data came from.

NOTE Confidence: 0.93267983

00:18:41.540 --> 00:18:43.255 And you know, is that a problem?

NOTE Confidence: 0.93267983

00:18:43.260 --> 00:18:48.140 Maybe. Maybe. So let me keep going.

NOTE Confidence: 0.93267983

00:18:48.140 --> 00:18:50.300 So another issue about the data,

NOTE Confidence: 0.93267983

00:18:50.300 --> 00:18:52.658 just to to stay with data for a minute,

NOTE Confidence: 0.93267983

00:18:52.660 --> 00:18:54.100 is of course bias. You got.

NOTE Confidence: 0.93267983

00:18:54.100 --> 00:18:56.655 I'm sure most all of you have

NOTE Confidence: 0.93267983

00:18:56.655 --> 00:18:58.719 heard about these issues about

NOTE Confidence: 0.93267983

00:18:58.719 --> 00:19:00.222 bias within data system.

NOTE Confidence: 0.93267983

00:19:00.222 --> 00:19:03.140 If you train on on our own current

NOTE Confidence: 0.93267983

00:19:03.140 --> 00:19:05.896 habits and if they have embedded in

NOTE Confidence: 0.93267983

00:19:05.896 --> 00:19:08.488 bias or structural racism has has

NOTE Confidence: 0.93267983

00:19:08.488 --> 00:19:10.020 influenced the patterns of care.

NOTE Confidence: 0.93267983

00:19:10.020 --> 00:19:11.120 Like even who dies.

NOTE Confidence: 0.93267983

00:19:11.120 --> 00:19:12.770 You know that because some people

NOTE Confidence: 0.93267983

00:19:12.770 --> 00:19:13.870 die earlier than maybe

NOTE Confidence: 0.9354506

00:19:13.925 --> 00:19:15.425 they necessarily needed to because

NOTE Confidence: 0.9354506

00:19:15.425 --> 00:19:17.478 they didn't have access to the right

NOTE Confidence: 0.9354506

00:19:17.478 --> 00:19:19.235 care or or because of other factors.

NOTE Confidence: 0.9354506

00:19:19.240 --> 00:19:20.956 When you start creating predictive models,

NOTE Confidence: 0.9354506

00:19:20.960 --> 00:19:23.970 it becomes a self fulfilling prophecy that

NOTE Confidence: 0.9354506

00:19:23.970 --> 00:19:26.584 embeds within those models problems that

NOTE Confidence: 0.9354506

00:19:26.584 --> 00:19:29.503 we currently have within our care system.

NOTE Confidence: 0.9354506

00:19:29.510 --> 00:19:31.130 So we have to be thinking about like you

NOTE Confidence: 0.9354506

00:19:31.130 --> 00:19:32.470 know, So what is it we're trying to do?

NOTE Confidence: 0.9354506

00:19:32.470 --> 00:19:34.030 This happened with the Brigham.

NOTE Confidence: 0.9354506

00:19:34.030 --> 00:19:35.976 There's a study that was done where

NOTE Confidence: 0.9354506

00:19:35.976 --> 00:19:38.188 they were trying to predict healthcare

NOTE Confidence: 0.9354506

00:19:38.188 --> 00:19:40.412 utilization and it turned out that that

NOTE Confidence: 0.9354506

00:19:40.412 --> 00:19:42.441 that white patients were more likely

NOTE Confidence: 0.9354506

00:19:42.441 --> 00:19:44.386 to have higher healthcare utilization

NOTE Confidence: 0.9354506

00:19:44.386 --> 00:19:46.470 after discharge in black patients.

NOTE Confidence: 0.9354506

00:19:46.470 --> 00:19:48.652 And so then they use that to say, well,

NOTE Confidence: 0.9354506

00:19:48.652 --> 00:19:50.704 these people need more attention because

NOTE Confidence: 0.9354506

00:19:50.704 --> 00:19:52.644 they're consuming more resources as a

NOTE Confidence: 0.9354506

00:19:52.644 --> 00:19:54.653 proxy for their health outcomes were worse,

NOTE Confidence: 0.9354506

00:19:54.660 --> 00:19:56.236 but it actually wasn't clear in the end

NOTE Confidence: 0.9354506

00:19:56.236 --> 00:19:57.738 that their health outcomes were worse.

NOTE Confidence: 0.9354506

00:19:57.740 --> 00:19:59.524 And the reason that black patients may not

NOTE Confidence: 0.9354506

00:19:59.524 --> 00:20:01.354 have been utilizing as much may not have

NOTE Confidence: 0.9354506

00:20:01.354 --> 00:20:02.979 been because they had better recovery,

NOTE Confidence: 0.9354506

00:20:02.980 --> 00:20:05.218 but because they had less access.

NOTE Confidence: 0.9354506

00:20:05.220 --> 00:20:07.500 And so if you embed within the system,

NOTE Confidence: 0.9354506

00:20:07.500 --> 00:20:09.523 hey, we want to identify the highest

NOTE Confidence: 0.9354506

00:20:09.523 --> 00:20:11.105 risk patients based on healthcare

NOTE Confidence: 0.9354506

00:20:11.105 --> 00:20:13.085 utilization that that may have been

NOTE Confidence: 0.9354506

00:20:13.085 --> 00:20:14.991 biased against people who had barriers

NOTE Confidence: 0.9354506

00:20:14.991 --> 00:20:17.780 to access and actually the the lack of

NOTE Confidence: 0.9354506

00:20:17.780 --> 00:20:19.380 healthcare utilization was actually

NOTE Confidence: 0.9354506

00:20:19.380 --> 00:20:21.119 a signal of a problem.

NOTE Confidence: 0.9354506

00:20:21.120 --> 00:20:22.540 Rather than actually that they

NOTE Confidence: 0.9354506

00:20:22.540 --> 00:20:23.676 had been doing better.

NOTE Confidence: 0.9354506

00:20:23.680 --> 00:20:25.580 So these are just examples

NOTE Confidence: 0.9354506

00:20:25.580 --> 00:20:27.800 of where you've got to be,

NOTE Confidence: 0.9354506

00:20:27.800 --> 00:20:29.270 got to be careful and there are

NOTE Confidence: 0.9354506

00:20:29.270 --> 00:20:30.789 other kinds of bias too where you've

NOTE Confidence: 0.9354506

00:20:30.789 --> 00:20:32.622 got a I systems that are king off

NOTE Confidence: 0.9354506

00:20:32.622 --> 00:20:34.674 of information that that may not

NOTE Confidence: 0.9354506

00:20:34.674 --> 00:20:36.560 be intrinsic to the patient.

NOTE Confidence: 0.9354506

00:20:36.560 --> 00:20:38.720 And and that's not what I'm talking about.

NOTE Confidence: 0.9354506

00:20:38.720 --> 00:20:39.306 I mean,

NOTE Confidence: 0.9354506

00:20:39.306 --> 00:20:40.765 that's an example where people

NOTE Confidence: 0.9354506

00:20:40.765 --> 00:20:42.190 were trying to determine images

NOTE Confidence: 0.9354506

00:20:42.190 --> 00:20:44.079 and whether it was cancer or not.

NOTE Confidence: 0.9354506

00:20:44.080 --> 00:20:45.840 And if there was a marker in the

NOTE Confidence: 0.9354506

00:20:45.840 --> 00:20:47.828 image that was suggesting they were

NOTE Confidence: 0.9354506

00:20:47.828 --> 00:20:49.474 getting radiation therapy, you know,

NOTE Confidence: 0.9354506

00:20:49.474 --> 00:20:51.308 was king off of that instead of

NOTE Confidence: 0.9354506

00:20:51.308 --> 00:20:52.986 actually what the lesion look like.

NOTE Confidence: 0.9354506

00:20:52.990 --> 00:20:54.649 And that that's another kind of bias

NOTE Confidence: 0.9354506

00:20:54.649 --> 00:20:56.589 where you're kind of so the interpretability,

NOTE Confidence: 0.9354506

00:20:56.590 --> 00:20:57.550 what's driving it?

NOTE Confidence: 0.9354506

00:20:57.550 --> 00:20:58.830 Does it make sense?

NOTE Confidence: 0.9354506

00:20:58.830 --> 00:21:00.990 Is it aligned with with Justice?

NOTE Confidence: 0.9354506

00:21:00.990 --> 00:21:01.586 I mean,

NOTE Confidence: 0.9354506

00:21:01.586 --> 00:21:03.672 is it treating people the right proper

NOTE Confidence: 0.9354506

00:21:03.672 --> 00:21:05.905 ways And these are all the all issues

NOTE Confidence: 0.9354506

00:21:05.910 --> 00:21:07.639 and then you know that they're issues

NOTE Confidence: 0.9354506

00:21:07.639 --> 00:21:09.430 with regard to performance of these,

NOTE Confidence: 0.9354506

00:21:09.430 --> 00:21:11.566 the many of these things that

NOTE Confidence: 0.9354506

00:21:11.566 --> 00:21:13.230 we're using in a I.

NOTE Confidence: 0.9354506

00:21:13.230 --> 00:21:13.810 And again,

NOTE Confidence: 0.9354506

00:21:13.810 --> 00:21:15.550 there's a lunchtime conversation with you.

NOTE Confidence: 0.9354506

00:21:15.550 --> 00:21:17.251 I'm just sort of throwing out things

NOTE Confidence: 0.9354506

00:21:17.251 --> 00:21:19.260 that may give you different ideas,

NOTE Confidence: 0.9354506

00:21:19.260 --> 00:21:22.014 but some some of you may have seen this.

NOTE Confidence: 0.9354506

00:21:22.020 --> 00:21:22.794 But you know,

NOTE Confidence: 0.9354506

00:21:22.794 --> 00:21:24.084 there's this whole thing about

NOTE Confidence: 0.9354506

00:21:24.084 --> 00:21:26.009 sepsis and whether or not we can

NOTE Confidence: 0.9354506

00:21:26.009 --> 00:21:27.093 be identifying sepsis earlier,

NOTE Confidence: 0.9354506

00:21:27.100 --> 00:21:29.512 intervening faster and saving lives as

NOTE Confidence: 0.9354506

00:21:29.512 --> 00:21:32.619 people come into the emergency department.

NOTE Confidence: 0.9354506

00:21:32.620 --> 00:21:34.608 And so then there are all these

NOTE Confidence: 0.9354506

00:21:34.608 --> 00:21:35.805 national campaigns acting quickly

NOTE Confidence: 0.9354506

00:21:35.805 --> 00:21:37.260 can save lives from sepsis.

NOTE Confidence: 0.9354506

00:21:37.260 --> 00:21:38.520 It's about temperature,

NOTE Confidence: 0.9354506

00:21:38.520 --> 00:21:39.780 infection, mental decline,

NOTE Confidence: 0.9354506

00:21:39.780 --> 00:21:40.821 being extremely ill.

NOTE Confidence: 0.9354506

00:21:40.821 --> 00:21:42.903 But there are people with subtle

NOTE Confidence: 0.9354506

00:21:42.903 --> 00:21:44.218 changes that are missed.

NOTE Confidence: 0.9354506

00:21:44.220 --> 00:21:45.540 And the question is sort of

NOTE Confidence: 0.9354506

00:21:45.540 --> 00:21:46.420 like is there are

NOTE Confidence: 0.9364299

00:21:46.478 --> 00:21:47.802 there ways to create clinical

NOTE Confidence: 0.9364299

00:21:47.802 --> 00:21:49.512 decision support tools that might

NOTE Confidence: 0.9364299

00:21:49.512 --> 00:21:51.840 be able to help us to more rapidly

NOTE Confidence: 0.9364299

00:21:51.840 --> 00:21:53.140 identify with the right people,

NOTE Confidence: 0.9364299

00:21:53.140 --> 00:21:55.898 triage them appropriately and and save lives.

NOTE Confidence: 0.9364299

00:21:55.900 --> 00:21:57.300 And so EPIC, you know,

NOTE Confidence: 0.9364299

00:21:57.300 --> 00:21:59.178 embarked on a development of an

NOTE Confidence: 0.9364299

00:21:59.178 --> 00:22:00.921 algorithm that would be embedded

NOTE Confidence: 0.9364299

00:22:00.921 --> 00:22:02.629 within the electronic medical

NOTE Confidence: 0.9364299

00:22:02.629 --> 00:22:05.500 record and and they instituted it.

NOTE Confidence: 0.9364299

00:22:05.500 --> 00:22:08.139 But you know when people studied it

NOTE Confidence: 0.9364299

00:22:08.140 --> 00:22:10.130 a hospital algorithm designed to

NOTE Confidence: 0.9364299

00:22:10.130 --> 00:22:12.120 predict the deadly condition misses

NOTE Confidence: 0.9364299

00:22:12.184 --> 00:22:14.005 most cases and a new study founds

NOTE Confidence: 0.9364299

00:22:14.005 --> 00:22:15.690 it also had many false alarms.

NOTE Confidence: 0.9364299

00:22:15.690 --> 00:22:17.888 So it it lacked both sensitive and

NOTE Confidence: 0.9364299

00:22:17.888 --> 00:22:20.529 specimen see when being tested independently.

NOTE Confidence: 0.9364299

00:22:20.530 --> 00:22:22.406 But I think the most important thing

NOTE Confidence: 0.9364299

00:22:22.406 --> 00:22:24.289 about this is that EPIC did this.

NOTE Confidence: 0.9364299

00:22:24.290 --> 00:22:26.803 So that meant that it was being

NOTE Confidence: 0.9364299

00:22:26.803 --> 00:22:27.880 disseminated broadly within

NOTE Confidence: 0.9364299

00:22:27.943 --> 00:22:29.767 the electronic medical record.

NOTE Confidence: 0.9364299

00:22:29.770 --> 00:22:32.166 And people may have assumed that if

NOTE Confidence: 0.9364299

00:22:32.166 --> 00:22:33.556 that's true then the performance

NOTE Confidence: 0.9364299

00:22:33.556 --> 00:22:34.810 must be good enough.

NOTE Confidence: 0.9364299

00:22:34.810 --> 00:22:36.434 They may not realize that the FDA

NOTE Confidence: 0.9364299

00:22:36.434 --> 00:22:38.400 didn't have to prove it and and that

NOTE Confidence: 0.9364299

00:22:38.400 --> 00:22:40.290 this was something that was just,

NOTE Confidence: 0.9364299

00:22:40.290 --> 00:22:40.834 you know,

NOTE Confidence: 0.9364299

00:22:40.834 --> 00:22:42.194 it didn't have independent at

NOTE Confidence: 0.9364299

00:22:42.194 --> 00:22:44.076 that time evaluation and it might

NOTE Confidence: 0.9364299

00:22:44.076 --> 00:22:46.080 have given false sense of security

NOTE Confidence: 0.9364299

00:22:46.141 --> 00:22:48.157 when people did have sepsis and it

NOTE Confidence: 0.9364299

00:22:48.157 --> 00:22:49.732 might have been wasted resources

NOTE Confidence: 0.9364299

00:22:49.732 --> 00:22:52.014 for people as it had false alarms.

NOTE Confidence: 0.9364299

00:22:52.020 --> 00:22:54.180 This is the article that appeared

NOTE Confidence: 0.9364299

00:22:54.180 --> 00:22:56.120 in JAMA Internal Medicine external

NOTE Confidence: 0.9364299

00:22:56.120 --> 00:22:58.060 validation of a widely implemented

NOTE Confidence: 0.9364299

00:22:58.118 --> 00:22:59.747 proprietary sepsis prediction

NOTE Confidence: 0.9364299

00:22:59.747 --> 00:23:01.376 model hospitalized patients.

NOTE Confidence: 0.9364299

00:23:01.380 --> 00:23:03.710 I think it's important widely

NOTE Confidence: 0.9364299

00:23:03.710 --> 00:23:06.000 implemented proprietary from a private

NOTE Confidence: 0.9364299

00:23:06.000 --> 00:23:07.820 company sepsis prediction model.

NOTE Confidence: 0.9364299

00:23:07.820 --> 00:23:09.998 You know that many people ended

NOTE Confidence: 0.9364299

00:23:09.998 --> 00:23:12.035 up probably using and when they

NOTE Confidence: 0.9364299

00:23:12.035 --> 00:23:13.610 were looking at its performance

NOTE Confidence: 0.9364299

00:23:13.610 --> 00:23:16.396 it was found to be quite lacking.

NOTE Confidence: 0.9364299

00:23:16.396 --> 00:23:20.150 And so it both missed people who

NOTE Confidence: 0.9364299

00:23:20.150 --> 00:23:22.250 who likely had sepsis and it it

NOTE Confidence: 0.9364299

00:23:22.315 --> 00:23:23.970 found people that that did.

NOTE Confidence: 0.9364299

00:23:23.970 --> 00:23:25.570 So we've been writing a lot about this.

NOTE Confidence: 0.9364299

00:23:25.570 --> 00:23:27.534 This is Makoto Mori,

NOTE Confidence: 0.9364299

00:23:27.534 --> 00:23:30.546 a surgical resident at Yale led a

NOTE Confidence: 0.9364299

00:23:30.546 --> 00:23:33.290 paper while he was getting his PhD.

NOTE Confidence: 0.9364299

00:23:33.290 --> 00:23:33.534 Well,

NOTE Confidence: 0.9364299

00:23:33.534 --> 00:23:34.998 this was opinion piece that we

NOTE Confidence: 0.9364299

00:23:34.998 --> 00:23:37.522 put together about what would be

NOTE Confidence: 0.9364299

00:23:37.522 --> 00:23:39.554 sensible regulation and clinical

NOTE Confidence: 0.9364299

00:23:39.554 --> 00:23:41.189 implementation have clinical decision

NOTE Confidence: 0.9364299

00:23:41.189 --> 00:23:43.427 support software as a medical device.

NOTE Confidence: 0.9364299

00:23:43.430 --> 00:23:45.670 I think to really be into this space.

NOTE Confidence: 0.9364299

00:23:45.670 --> 00:23:47.638 You know what we're at least our group

NOTE Confidence: 0.9364299

00:23:47.638 --> 00:23:49.508 is we're interested in generating new

NOTE Confidence: 0.9364299

00:23:49.508 --> 00:23:51.488 tools but we're also interested in

NOTE Confidence: 0.9364299

00:23:51.544 --> 00:23:53.588 how those tools can be regulated apply,

NOTE Confidence: 0.9364299

00:23:53.590 --> 00:23:54.836 how we can make sure that they're

NOTE Confidence: 0.9364299

00:23:54.836 --> 00:23:56.001 fair and how they ultimately

NOTE Confidence: 0.9364299

00:23:56.001 --> 00:23:57.185 improve outcomes for patients.

NOTE Confidence: 0.9364299

00:23:57.190 --> 00:23:57.430 So.

NOTE Confidence: 0.9364299

00:23:57.430 --> 00:23:59.350 So we feel like we've got to be

NOTE Confidence: 0.9364299

00:23:59.350 --> 00:24:01.642 involved in a stretch from you know

NOTE Confidence: 0.9364299

00:24:01.642 --> 00:24:04.313 beginning to end about how this is

NOTE Confidence: 0.9364299

00:24:04.313 --> 00:24:06.779 implemented because we feel that the

NOTE Confidence: 0.9364299

00:24:06.779 --> 00:24:09.242 technology itself and the tools are

NOTE Confidence: 0.9364299

00:24:09.242 --> 00:24:11.408 important but but singularly they

NOTE Confidence: 0.9364299

00:24:11.408 --> 00:24:14.060 won't change medicine unless it the

NOTE Confidence: 0.9364299

00:24:14.140 --> 00:24:16.840 entire ecosystem is primed for that.

NOTE Confidence: 0.9364299

00:24:16.840 --> 00:24:19.480 There's was another paper that

NOTE Confidence: 0.9364299

00:24:19.480 --> 00:24:21.760 Chinchi Huang in our group led

NOTE Confidence: 0.9364299

00:24:21.760 --> 00:24:25.400 with many folks at core and some

NOTE Confidence: 0.9364299

00:24:25.400 --> 00:24:27.024 external advisors that where we

NOTE Confidence: 0.9364299

00:24:27.024 --> 00:24:28.680 were trying to say like well,

NOTE Confidence: 0.9364299

00:24:28.680 --> 00:24:30.192 so if you're evaluating a lot

NOTE Confidence: 0.9364299

00:24:30.192 --> 00:24:31.200 of these new models,

NOTE Confidence: 0.9364299

00:24:31.200 --> 00:24:33.480 what kind of metrics should we be using?

NOTE Confidence: 0.9364299

00:24:33.480 --> 00:24:35.500 Can we standardize those metrics

NOTE Confidence: 0.9364299

00:24:35.500 --> 00:24:37.843 so people get used to you know

NOTE Confidence: 0.9364299

00:24:37.843 --> 00:24:39.530 looking at whether or not this is

NOTE Confidence: 0.936494066666667

00:24:39.587 --> 00:24:41.122 good enough, can I trust it,

NOTE Confidence: 0.936494066666667

00:24:41.122 --> 00:24:42.460 I mean just like you might

NOTE Confidence: 0.936494066666667

00:24:42.515 --> 00:24:44.105 look at any any other results.

NOTE Confidence: 0.936494066666667

00:24:44.110 --> 00:24:45.825 So this is performance metrics

NOTE Confidence: 0.936494066666667

00:24:45.825 --> 00:24:47.197 for their comparative analysis

NOTE Confidence: 0.936494066666667

00:24:47.197 --> 00:24:49.374 of clinical risk prediction model

NOTE Confidence: 0.936494066666667

00:24:49.374 --> 00:24:50.706 employing machine learning.

NOTE Confidence: 0.936494066666667

00:24:50.710 --> 00:24:53.620 And so there's a lot of just like

NOTE Confidence: 0.936494066666667

00:24:53.620 --> 00:24:55.510 we're comparing drugs head to head,

NOTE Confidence: 0.936494066666667

00:24:55.510 --> 00:24:57.055 you know when somebody comes

NOTE Confidence: 0.936494066666667

00:24:57.055 --> 00:24:58.600 out with something new that

NOTE Confidence: 0.936494066666667

00:24:58.659 --> 00:25:00.150 we're we may use as a tool.

NOTE Confidence: 0.936494066666667

00:25:00.150 --> 00:25:01.770 The question is, you know, So what?

NOTE Confidence: 0.936494066666667

00:25:01.770 --> 00:25:03.390 What is it being compared against,

NOTE Confidence: 0.936494066666667

00:25:03.390 --> 00:25:05.046 what's the performance of

NOTE Confidence: 0.936494066666667

00:25:05.046 --> 00:25:06.300 it and how does it work.

NOTE Confidence: 0.936494066666667

00:25:06.300 --> 00:25:08.765 So again another dimension to

NOTE Confidence: 0.936494066666667

00:25:08.765 --> 00:25:10.256 this is that we've got to figure

NOTE Confidence: 0.936494066666667

00:25:10.256 --> 00:25:11.459 out what we what we can trust.

NOTE Confidence: 0.936494066666667

00:25:11.460 --> 00:25:13.146 So getting back to this issue

NOTE Confidence: 0.936494066666667

00:25:13.146 --> 00:25:15.459 to the what do you need to know

NOTE Confidence: 0.936494066666667

00:25:15.459 --> 00:25:17.175 about a I do you need to know

NOTE Confidence: 0.936494066666667

00:25:17.175 --> 00:25:18.505 about recurrent neural Nets as a

NOTE Confidence: 0.936494066666667

00:25:18.505 --> 00:25:19.620 type of deep learning process,

NOTE Confidence: 0.936494066666667

00:25:19.620 --> 00:25:22.276 sequences of data do you need to know

NOTE Confidence: 0.936494066666667

00:25:22.276 --> 00:25:23.699 about convolutional neural Nets,

NOTE Confidence: 0.936494066666667

00:25:23.700 --> 00:25:25.842 which you know are are whole different

NOTE Confidence: 0.936494066666667

00:25:25.842 --> 00:25:27.900 thing people often using within images.

NOTE Confidence: 0.936494066666667

00:25:27.900 --> 00:25:28.812 You know what what?

NOTE Confidence: 0.936494066666667

00:25:28.812 --> 00:25:30.431 What do you really need to know

NOTE Confidence: 0.936494066666667

00:25:30.431 --> 00:25:32.015 and how deep do you need to go?

NOTE Confidence: 0.936494066666667

00:25:32.020 --> 00:25:34.686 As someone who wants to be an

NOTE Confidence: 0.936494066666667

00:25:34.686 --> 00:25:36.834 expert clinician and to what degree

NOTE Confidence: 0.936494066666667

00:25:36.834 --> 00:25:38.647 does this have to be integrated

NOTE Confidence: 0.936494066666667

00:25:38.647 --> 00:25:39.598 into the curriculum?

NOTE Confidence: 0.936494066666667

00:25:39.598 --> 00:25:41.968 I I will maybe ask the same

00:25:41.968 --> 00:25:43.568 question about basic science.

00:25:43.570 --> 00:25:44.244 You know,

00:25:44.244 --> 00:25:46.603 how deep do you need to go

00:25:46.603 --> 00:25:49.088 into genomics or biochemistry?

00:25:49.090 --> 00:25:50.326 I I know this is heresy,

00:25:50.330 --> 00:25:51.570 especially at this medical school.

00:25:51.570 --> 00:25:53.943 This suggests that there are some of

00:25:53.943 --> 00:25:56.050 these very basic elemental pieces

00:25:56.050 --> 00:25:58.048 of medical education that are essential.

00:25:58.050 --> 00:26:01.002 But but then why is it that if you

00:26:01.010 --> 00:26:02.874 quiz clinicians, expert clinicians,

00:26:02.874 --> 00:26:04.175 amazing clinicians, awards,

00:26:04.175 --> 00:26:06.730 they can no longer remember this education?

00:26:06.730 --> 00:26:08.218 So it it's not something they

00:26:08.218 --> 00:26:09.210 use in everyday life.

00:26:09.210 --> 00:26:10.834 It's actually not something

NOTE Confidence: 0.936494066666667

00:26:10.834 --> 00:26:12.514 that's contributing to their

NOTE Confidence: 0.936494066666667

00:26:12.514 --> 00:26:13.810 performance as clinicians.

NOTE Confidence: 0.936494066666667

00:26:13.810 --> 00:26:16.195 But we insist on it in in ways that

NOTE Confidence: 0.936494066666667

00:26:16.195 --> 00:26:18.368 are historical and traditional.

NOTE Confidence: 0.936494066666667

00:26:18.370 --> 00:26:19.749 Now I'm not saying that you shouldn't

NOTE Confidence: 0.936494066666667

00:26:19.749 --> 00:26:21.010 know anything about a I and I'm

NOTE Confidence: 0.936494066666667

00:26:21.010 --> 00:26:21.964 also not saying you shouldn't know

NOTE Confidence: 0.936494066666667

00:26:21.999 --> 00:26:23.449 anything about genomic survival chemistry.

NOTE Confidence: 0.936494066666667

00:26:23.450 --> 00:26:25.872 The question is what would be good

NOTE Confidence: 0.936494066666667

00:26:25.872 --> 00:26:27.618 to know that would contribute to

NOTE Confidence: 0.936494066666667

00:26:27.618 --> 00:26:28.928 that for people thinking about

NOTE Confidence: 0.936494066666667

00:26:28.928 --> 00:26:29.969 becoming expert clinicians,

NOTE Confidence: 0.936494066666667

00:26:29.970 --> 00:26:31.590 that's different from people who

NOTE Confidence: 0.936494066666667

00:26:31.590 --> 00:26:33.605 are going to actually become deeper

NOTE Confidence: 0.936494066666667

00:26:33.605 --> 00:26:35.290 content experts in these areas.

NOTE Confidence: 0.936494066666667

00:26:35.290 --> 00:26:37.170 And and I will say as an addition,

NOTE Confidence: 0.936494066666667

00:26:37.170 --> 00:26:37.604 I mean,

NOTE Confidence: 0.936494066666667

00:26:37.604 --> 00:26:38.906 I think medical school should have

NOTE Confidence: 0.936494066666667

00:26:38.906 --> 00:26:40.566 a lot more social science in it.

NOTE Confidence: 0.936494066666667

00:26:40.570 --> 00:26:41.404 I mean people,

NOTE Confidence: 0.936494066666667

00:26:41.404 --> 00:26:43.072 we should be knowing more anthropology

NOTE Confidence: 0.936494066666667

00:26:43.072 --> 00:26:43.890 and sociology.

NOTE Confidence: 0.936494066666667

00:26:43.890 --> 00:26:44.454 And honestly,

NOTE Confidence: 0.936494066666667

00:26:44.454 --> 00:26:46.146 you need to know some economics

NOTE Confidence: 0.936494066666667

00:26:46.146 --> 00:26:47.010 because you know,

NOTE Confidence: 0.936494066666667

00:26:47.010 --> 00:26:48.570 that's what medicine is today.

NOTE Confidence: 0.936494066666667

00:26:48.570 --> 00:26:50.680 It's about understanding how we

NOTE Confidence: 0.936494066666667

00:26:50.680 --> 00:26:51.524 bring psychology.

NOTE Confidence: 0.936494066666667

00:26:51.530 --> 00:26:51.892 You know,

NOTE Confidence: 0.936494066666667

00:26:51.892 --> 00:26:53.850 how do we bring to bear as expert clinicians.

NOTE Confidence: 0.936494066666667

00:26:53.850 --> 00:26:55.305 That's what that's what we're

00:26:55.305 --> 00:26:56.484 employing every day, psychology.

00:26:56.484 --> 00:26:58.308 We're trying to help people navigate

00:26:58.308 --> 00:26:59.220 difficult economic circumstances.

00:26:59.220 --> 00:27:00.725 We're we're trying to understand

00:27:00.725 --> 00:27:01.929 cultural differences and trying

00:27:01.929 --> 00:27:03.496 to figure out how we can best.

00:27:03.500 --> 00:27:05.180 If precision medicine isn't

00:27:05.180 --> 00:27:06.860 simply about your genomics,

00:27:06.860 --> 00:27:08.500 it's about who you are.

00:27:08.500 --> 00:27:09.700 And that that needs to be.

00:27:09.700 --> 00:27:11.255 I think that's balancing basic

00:27:11.255 --> 00:27:12.499 science and social science.

00:27:12.500 --> 00:27:14.162 And and I'm saying data science

00:27:14.162 --> 00:27:16.255 can be the piece that brings all

00:27:16.255 --> 00:27:18.086 of this together in the future.

NOTE Confidence: 0.93864906

00:27:18.086 --> 00:27:19.898 So you know that there's this

NOTE Confidence: 0.93864906

00:27:19.898 --> 00:27:21.660 I'm kind of flipping this.

NOTE Confidence: 0.93864906

00:27:21.660 --> 00:27:23.412 You know, also like the clinicians

NOTE Confidence: 0.93864906

00:27:23.412 --> 00:27:24.920 need to know about this.

NOTE Confidence: 0.93864906

00:27:24.920 --> 00:27:27.992 I really think that one of the major

NOTE Confidence: 0.93864906

00:27:27.992 --> 00:27:29.810 points is what are those working in

NOTE Confidence: 0.93864906

00:27:29.810 --> 00:27:31.760 a I need to know about clinicians.

NOTE Confidence: 0.93864906

00:27:31.760 --> 00:27:33.608 And what I say about this is that

NOTE Confidence: 0.93864906

00:27:33.608 --> 00:27:34.785 there's good basic foundational

NOTE Confidence: 0.93864906

00:27:34.785 --> 00:27:37.304 information for you to know and also to

NOTE Confidence: 0.93864906

00:27:37.304 --> 00:27:39.879 understand how you can know what to rely on.

NOTE Confidence: 0.93864906

00:27:39.880 --> 00:27:41.110 But because that in the end

NOTE Confidence: 0.93864906

00:27:41.110 --> 00:27:42.200 becomes the most important thing.

NOTE Confidence: 0.93864906

00:27:42.200 --> 00:27:44.078 But but really the very best

NOTE Confidence: 0.93864906

00:27:44.078 --> 00:27:46.160 a I is almost invisible.

NOTE Confidence: 0.93864906

00:27:46.160 --> 00:27:47.216 I mean it,

NOTE Confidence: 0.93864906

00:27:47.216 --> 00:27:49.328 it makes your life easy without

NOTE Confidence: 0.93864906

00:27:49.328 --> 00:27:50.922 even you knowing it.

NOTE Confidence: 0.93864906

00:27:50.922 --> 00:27:53.820 It it sort of enables connectivity and

NOTE Confidence: 0.93864906

00:27:53.897 --> 00:27:56.445 communication and and inform choices

NOTE Confidence: 0.93864906

00:27:56.445 --> 00:27:58.935 and decision support in ways that

NOTE Confidence: 0.93864906

00:27:58.935 --> 00:28:01.679 that require no effort on your side.

NOTE Confidence: 0.93864906

00:28:01.680 --> 00:28:02.919 And what what you've got to know,

NOTE Confidence: 0.93864906

00:28:02.920 --> 00:28:04.677 if your clinician saying I'm not going

NOTE Confidence: 0.93864906

00:28:04.677 --> 00:28:06.996 to go into this field is all you need

NOTE Confidence: 0.93864906

00:28:06.996 --> 00:28:09.359 to know is whether it works or it doesn't.

NOTE Confidence: 0.93864906

00:28:09.360 --> 00:28:10.410 So you know,

NOTE Confidence: 0.93864906

00:28:10.410 --> 00:28:12.160 and this is an example

NOTE Confidence: 0.93864906

00:28:12.160 --> 00:28:14.359 of the selfdriving cars,

NOTE Confidence: 0.93864906

00:28:14.360 --> 00:28:16.640 I mean for you to to get into

NOTE Confidence: 0.93864906

00:28:16.640 --> 00:28:18.849 a car that's selfdriving,

NOTE Confidence: 0.93864906

00:28:18.850 --> 00:28:21.442 like you don't need to know all the

NOTE Confidence: 0.93864906

00:28:21.442 --> 00:28:23.570 algorithms behind how does that car work.

NOTE Confidence: 0.93864906

00:28:23.570 --> 00:28:25.386 I mean you don't need to take courses

NOTE Confidence: 0.93864906

00:28:25.386 --> 00:28:27.190 in data science to figure out like

NOTE Confidence: 0.93864906

00:28:27.190 --> 00:28:29.090 how do they create those algorithms.

NOTE Confidence: 0.93864906

00:28:29.090 --> 00:28:32.154 What you need to know is, is this safe?

NOTE Confidence: 0.93864906

00:28:32.154 --> 00:28:34.050 I mean, you get on a plane,

NOTE Confidence: 0.93864906

00:28:34.050 --> 00:28:35.490 you don't need to know how to fly the plane.

NOTE Confidence: 0.93864906

00:28:35.490 --> 00:28:36.660 You don't even need to know

NOTE Confidence: 0.93864906

00:28:36.660 --> 00:28:37.050 Bernoulli's principle.

NOTE Confidence: 0.93864906

00:28:37.050 --> 00:28:38.621 You just need to know it.

NOTE Confidence: 0.93864906

00:28:38.621 --> 00:28:39.887 Just have a good safety record.

NOTE Confidence: 0.93864906

00:28:39.890 --> 00:28:40.688 If I get on this plane,

NOTE Confidence: 0.93864906

00:28:40.690 --> 00:28:43.408 am I likely to safely get to my destination?

NOTE Confidence: 0.93864906

00:28:43.410 --> 00:28:44.175 You know it.

NOTE Confidence: 0.93864906

00:28:44.175 --> 00:28:46.292 You need to know like what can you

NOTE Confidence: 0.93864906

00:28:46.292 --> 00:28:48.725 trust and so what's the performance

NOTE Confidence: 0.93864906

00:28:48.725 --> 00:28:50.457 What doesn't really actually

NOTE Confidence: 0.93864906

00:28:50.457 --> 00:28:52.495 advance my ability to do what what

NOTE Confidence: 0.93864906

00:28:52.495 --> 00:28:54.820 I want to do and and by the way

NOTE Confidence: 0.93864906

00:28:54.820 --> 00:28:56.120 clinicians are are not Luddites.

NOTE Confidence: 0.93864906

00:28:56.120 --> 00:28:56.920 Well not all of us.

NOTE Confidence: 0.93864906

00:28:56.920 --> 00:28:59.521 I mean you know every one of you is

NOTE Confidence: 0.93864906

00:28:59.521 --> 00:29:02.436 deep into a I systems every day and the

NOTE Confidence: 0.93864906

00:29:02.436 --> 00:29:05.397 very best ones you don't even know about.

NOTE Confidence: 0.93864906

00:29:05.400 --> 00:29:05.832 So you know,

NOTE Confidence: 0.93864906

00:29:05.832 --> 00:29:05.976 I,

NOTE Confidence: 0.93864906

00:29:05.976 --> 00:29:06.120 I,

NOTE Confidence: 0.93864906

00:29:06.120 --> 00:29:09.162 I should say anyone using a phone is using

NOTE Confidence: 0.93864906

00:29:09.162 --> 00:29:10.922 advanced facial recognition software

NOTE Confidence: 0.93864906

00:29:10.922 --> 00:29:14.079 every single moment of every single day.

NOTE Confidence: 0.93864906

00:29:14.080 --> 00:29:16.607 But you know my mom didn't have

NOTE Confidence: 0.93864906

00:29:16.607 --> 00:29:19.040 to take a course, you know,

NOTE Confidence: 0.93864906

00:29:19.040 --> 00:29:20.000 in facial recognition.

NOTE Confidence: 0.93864906

00:29:20.000 --> 00:29:21.344 You know software development.

NOTE Confidence: 0.93864906

00:29:21.344 --> 00:29:21.680 Like,

NOTE Confidence: 0.93864906

00:29:21.680 --> 00:29:22.090 you know,

NOTE Confidence: 0.93864906

00:29:22.090 --> 00:29:24.012 she all she needs to know is she holds

NOTE Confidence: 0.93864906

00:29:24.012 --> 00:29:25.836 this up and they can open her phone.

NOTE Confidence: 0.93864906

00:29:25.840 --> 00:29:28.280 And and and honestly because

NOTE Confidence: 0.93864906

00:29:28.280 --> 00:29:30.720 that's a quick closed loop,

NOTE Confidence: 0.93864906

00:29:30.720 --> 00:29:32.420 she's going to know rapidly

NOTE Confidence: 0.93864906

00:29:32.420 --> 00:29:33.780 whether that's like worthwhile

NOTE Confidence: 0.93864906

00:29:33.780 --> 00:29:35.880 like because does it work or not.

NOTE Confidence: 0.93864906

00:29:35.880 --> 00:29:37.040 And you know if it works for her,

NOTE Confidence: 0.93864906

00:29:37.040 --> 00:29:38.720 that's great and she doesn't even have

NOTE Confidence: 0.93864906

00:29:38.720 --> 00:29:40.480 to know that that's an A I system.

NOTE Confidence: 0.93502325

00:29:40.480 --> 00:29:42.400 But but it actually makes your life easier.

NOTE Confidence: 0.93502325

00:29:42.400 --> 00:29:44.632 It makes all of her lives easier and it

NOTE Confidence: 0.93502325

00:29:44.632 --> 00:29:47.542 and it works seamlessly. So you know,

NOTE Confidence: 0.93502325

00:29:47.542 --> 00:29:49.970 this is just examples like you know,

NOTE Confidence: 0.93502325

00:29:49.970 --> 00:29:51.950 you take weather maps,

NOTE Confidence: 0.93502325

00:29:51.950 --> 00:29:54.500 you know they're intuitive, you can

NOTE Confidence: 0.93502325

00:29:54.500 --> 00:29:55.925 immediately understand what they mean.

NOTE Confidence: 0.93502325

00:29:55.930 --> 00:29:56.830 But they're high.

NOTE Confidence: 0.93502325

00:29:56.830 --> 00:29:58.330 They're taking high dimensional data.

NOTE Confidence: 0.93502325

00:29:58.330 --> 00:30:00.345 Supercomputers are are sifting through

NOTE Confidence: 0.93502325

00:30:00.345 --> 00:30:02.360 remarkable volumes of complex data

NOTE Confidence: 0.93502325

00:30:02.415 --> 00:30:04.290 and applying high level algorithms

NOTE Confidence: 0.93502325

00:30:04.290 --> 00:30:06.165 to produce predictive models that

NOTE Confidence: 0.93502325

00:30:06.224 --> 00:30:07.794 help us understand whether it's

NOTE Confidence: 0.93502325

00:30:07.794 --> 00:30:09.793 going to rain tomorrow or not.

NOTE Confidence: 0.93502325

00:30:09.793 --> 00:30:11.062 And then it's,

NOTE Confidence: 0.93502325

00:30:11.062 --> 00:30:14.090 it's summarized in ways that you know,

NOTE Confidence: 0.93502325

00:30:14.090 --> 00:30:15.896 I mean I have to take a whole day course on

NOTE Confidence: 0.93502325

00:30:15.896 --> 00:30:17.561 Epic to figure out how to use that software.

NOTE Confidence: 0.93502325

00:30:17.570 --> 00:30:18.170 You know,

NOTE Confidence: 0.93502325

00:30:18.170 --> 00:30:19.970 these things are like just intuitive,

NOTE Confidence: 0.93502325

00:30:19.970 --> 00:30:20.378 like nobody.

NOTE Confidence: 0.93502325

00:30:20.378 --> 00:30:22.010 I didn't take a course on weather maps.

NOTE Confidence: 0.93502325

00:30:22.010 --> 00:30:24.005 Neither did my mom or anyone else.

NOTE Confidence: 0.93502325

00:30:24.010 --> 00:30:25.082 I know, you know,

NOTE Confidence: 0.93502325

00:30:25.082 --> 00:30:26.690 they were built to take complex

NOTE Confidence: 0.93502325

00:30:26.746 --> 00:30:28.450 data and be able to portray it in

NOTE Confidence: 0.93502325

00:30:28.450 --> 00:30:30.115 a way that I immediately understand

NOTE Confidence: 0.93502325

00:30:30.115 --> 00:30:32.410 what it means within a a second

NOTE Confidence: 0.93502325

00:30:32.410 --> 00:30:36.050 And and yet it is taking high,

NOTE Confidence: 0.93502325

00:30:36.050 --> 00:30:37.710 you know, highly high,

NOTE Confidence: 0.93502325

00:30:37.710 --> 00:30:39.370 very high dimensional data.

NOTE Confidence: 0.93502325

00:30:39.370 --> 00:30:41.750 I mean an example of this was

NOTE Confidence: 0.93502325

00:30:41.750 --> 00:30:43.178 and I keep bringing up my mom

NOTE Confidence: 0.93502325

00:30:43.178 --> 00:30:44.230 because she's not you know,

NOTE Confidence: 0.93502325

00:30:44.230 --> 00:30:47.908 a tech sophisticated and and she's,

NOTE Confidence: 0.93502325

00:30:47.910 --> 00:30:49.150 you can imagine I'm older.

NOTE Confidence: 0.93502325

00:30:49.150 --> 00:30:49.856 She's older.

NOTE Confidence: 0.93502325

00:30:49.856 --> 00:30:51.268 She's an older individual.

NOTE Confidence: 0.93502325

00:30:51.270 --> 00:30:53.493 And you know one day she was she lives

NOTE Confidence: 0.93502325

00:30:53.493 --> 00:30:55.966 in Florida and and we were talking

NOTE Confidence: 0.93502325

00:30:55.966 --> 00:30:58.630 about the hurricane season and she says,

NOTE Confidence: 0.93502325

00:30:58.630 --> 00:30:59.036 you know,

NOTE Confidence: 0.93502325

00:30:59.036 --> 00:31:01.034 I saw the map and did you see the

NOTE Confidence: 0.93502325

00:31:01.034 --> 00:31:02.599 European model suggesting that the

NOTE Confidence: 0.93502325

00:31:02.599 --> 00:31:04.933 hurricane may go this way and the US

66

NOTE Confidence: 0.93502325

00:31:04.933 --> 00:31:06.469 model suggesting it goes that way.

NOTE Confidence: 0.93502325

00:31:06.470 --> 00:31:08.486 And I'm just thinking to myself like

NOTE Confidence: 0.93502325

00:31:08.486 --> 00:31:09.846 she's internalized that these are

NOTE Confidence: 0.93502325

00:31:09.846 --> 00:31:11.790 like predictive models and like it's

NOTE Confidence: 0.93502325

00:31:11.790 --> 00:31:13.510 it's actionable information and and

NOTE Confidence: 0.93502325

00:31:13.562 --> 00:31:15.314 and there's a level of uncertainty

NOTE Confidence: 0.93502325

00:31:15.314 --> 00:31:17.310 because there's a cone of uncertainty.

NOTE Confidence: 0.93502325

00:31:17.310 --> 00:31:18.670 She's got the confidence

NOTE Confidence: 0.93502325

00:31:18.670 --> 00:31:20.030 intervals around like what?

NOTE Confidence: 0.93502325

00:31:20.030 --> 00:31:20.534 What's going on?

NOTE Confidence: 0.93502325

00:31:20.534 --> 00:31:20.870 I mean,

NOTE Confidence: 0.93502325

00:31:20.870 --> 00:31:22.268 all of this stuff without her

NOTE Confidence: 0.93502325

00:31:22.268 --> 00:31:23.829 ever having to take a statistics

NOTE Confidence: 0.93502325

00:31:23.830 --> 00:31:24.994 class or understanding it.

NOTE Confidence: 0.93502325

00:31:24.994 --> 00:31:27.190 This is where you need to get to.

NOTE Confidence: 0.93502325

00:31:27.190 --> 00:31:27.588 I mean,

NOTE Confidence: 0.93502325

00:31:27.588 --> 00:31:28.782 I thought this was one of

NOTE Confidence: 0.93502325

00:31:28.782 --> 00:31:29.950 the best examples of it.

NOTE Confidence: 0.93502325

00:31:29.950 --> 00:31:31.070 So and by the way,

NOTE Confidence: 0.93502325

00:31:31.070 --> 00:31:33.240 this is a system where everybody's data

NOTE Confidence: 0.93502325

00:31:33.240 --> 00:31:35.250 is contributing to everyone's benefit.

NOTE Confidence: 0.93502325

00:31:35.250 --> 00:31:36.818 So the people on the road a mile

NOTE Confidence: 0.93502325

00:31:36.818 --> 00:31:38.643 ahead of me are helping me know what's

NOTE Confidence: 0.93502325

00:31:38.643 --> 00:31:40.328 what's going on on the road ahead.

NOTE Confidence: 0.93502325

00:31:40.330 --> 00:31:41.720 And I'm contributing data to

NOTE Confidence: 0.93502325

00:31:41.720 --> 00:31:43.330 the people a mile behind me.

NOTE Confidence: 0.93502325

00:31:43.330 --> 00:31:45.250 By the way, I love that for medicine.

NOTE Confidence: 0.93502325

00:31:45.250 --> 00:31:46.600 It's like the person who's six

NOTE Confidence: 0.93502325

00:31:46.600 --> 00:31:48.348 months ahead of me with a disease

NOTE Confidence: 0.93502325

00:31:48.348 --> 00:31:49.678 is contributing data that's helping

NOTE Confidence: 0.93502325

00:31:49.678 --> 00:31:50.770 me with my disease.

NOTE Confidence: 0.93502325

00:31:50.770 --> 00:31:51.130 Today,

NOTE Confidence: 0.93502325

00:31:51.130 --> 00:31:53.290 in my experience today is contributing

NOTE Confidence: 0.93502325

00:31:53.290 --> 00:31:55.487 to the person a mile behind me

NOTE Confidence: 0.93502325

00:31:55.487 --> 00:31:57.202 who's going to be like the only

NOTE Confidence: 0.93502325

00:31:57.202 --> 00:31:58.378 thing was no one really explicitly

NOTE Confidence: 0.93502325

00:31:58.378 --> 00:31:59.570 asked my permission about it.

NOTE Confidence: 0.93502325

00:31:59.570 --> 00:32:00.850 So that's the only thing.

NOTE Confidence: 0.93502325

00:32:00.850 --> 00:32:02.130 Maybe that's a little different,

NOTE Confidence: 0.93502325

00:32:02.130 --> 00:32:05.450 but but I it is a is a system of

NOTE Confidence: 0.93502325

00:32:05.450 --> 00:32:06.975 generosity where we're saying how

NOTE Confidence: 0.93502325

00:32:06.975 --> 00:32:09.069 fast I'm going and what's going on.

NOTE Confidence: 0.9285882

00:32:09.070 --> 00:32:11.410 And occasionally you know even like

NOTE Confidence: 0.9285882

00:32:11.410 --> 00:32:13.786 inputting data in that's helping to

NOTE Confidence: 0.9285882

00:32:13.786 --> 00:32:16.030 make the system smarter and better.

NOTE Confidence: 0.9285882

00:32:16.030 --> 00:32:17.681 But look how complex this is, right?

NOTE Confidence: 0.9285882

69

00:32:17.681 --> 00:32:19.718 Without ever having to take a course

NOTE Confidence: 0.9285882

00:32:19.718 --> 00:32:21.789 in ways or in any of the systems,

NOTE Confidence: 0.9285882

00:32:21.790 --> 00:32:23.106 you know, the way they use colors,

NOTE Confidence: 0.9285882

00:32:23.110 --> 00:32:25.790 the way you know that they've got icons.

NOTE Confidence: 0.9285882

00:32:25.790 --> 00:32:27.870 The the telling me times.

NOTE Confidence: 0.9285882

00:32:27.870 --> 00:32:29.610 I mean again,

NOTE Confidence: 0.9285882

00:32:29.610 --> 00:32:32.108 conveying very complex data that's

NOTE Confidence: 0.9285882

00:32:32.108 --> 00:32:34.003 coming from high dimensional information

NOTE Confidence: 0.9285882

00:32:34.003 --> 00:32:36.588 that's dynamic and changing minute by minute,

NOTE Confidence: 0.9285882

00:32:36.590 --> 00:32:38.466 you know is is become very useful.

NOTE Confidence: 0.9285882

00:32:38.470 --> 00:32:39.970 And this isn't even like talking

NOTE Confidence: 0.9285882

00:32:39.970 --> 00:32:42.283 about what's going on in in you know

NOTE Confidence: 0.9285882

00:32:42.283 --> 00:32:45.020 planes these days as planes become much

NOTE Confidence: 0.9285882

00:32:45.100 --> 00:32:48.226 safer and and you know there's no pilot.

NOTE Confidence: 0.9285882

00:32:48.230 --> 00:32:50.869 I mean flying is an information science.

NOTE Confidence: 0.9285882

00:32:50.870 --> 00:32:52.067 I mean you know you you've got,

NOTE Confidence: 0.9285882

00:32:52.070 --> 00:32:54.750 you've got to be able to provide the

NOTE Confidence: 0.9285882

00:32:54.750 --> 00:32:56.937 key information and and and improve

NOTE Confidence: 0.9285882

00:32:56.937 --> 00:32:59.470 performance of people in the cockpit and

NOTE Confidence: 0.9285882

00:32:59.470 --> 00:33:01.990 it's made such a difference in aviation.

NOTE Confidence: 0.9285882

00:33:01.990 --> 00:33:03.677 We're yet to really embrace this you

NOTE Confidence: 0.9285882

00:33:03.677 --> 00:33:05.795 know that to the ways in which you

NOTE Confidence: 0.9285882

00:33:05.795 --> 00:33:07.350 can improve our performance and and

NOTE Confidence: 0.9285882

00:33:07.350 --> 00:33:09.030 again this isn't just about the pilot.

NOTE Confidence: 0.9285882

00:33:09.030 --> 00:33:11.030 It's about the pilot and the teams and

NOTE Confidence: 0.9285882

00:33:11.030 --> 00:33:13.250 and the you know every single person

NOTE Confidence: 0.9285882

00:33:13.250 --> 00:33:15.620 hundreds of people contribute to each flight.

NOTE Confidence: 0.9285882

00:33:15.620 --> 00:33:17.643 So it it really is enhancing the

NOTE Confidence: 0.9285882

00:33:17.643 --> 00:33:19.540 communication of the coordination and

NOTE Confidence: 0.9285882

00:33:19.540 --> 00:33:21.460 the insurance that assurance that this

NOTE Confidence: 0.9285882

00:33:21.460 --> 00:33:24.226 is going to be safe and get successfully

NOTE Confidence: 0.9285882

00:33:24.226 --> 00:33:25.971 complete each of the missions.

NOTE Confidence: 0.9285882

00:33:25.980 --> 00:33:27.296 And again within medicine by the way,

NOTE Confidence: 0.9285882

00:33:27.300 --> 00:33:29.532 there's a ton of a I I mean every

NOTE Confidence: 0.9285882

00:33:29.532 --> 00:33:31.841 single radio graphic study that's you

NOTE Confidence: 0.9285882

00:33:31.841 --> 00:33:34.020 know complex and high dimensional is

NOTE Confidence: 0.9285882

00:33:34.020 --> 00:33:35.740 is leveraging you know a I in ways

NOTE Confidence: 0.9285882

00:33:35.740 --> 00:33:37.660 and and we're just at the beginning.

NOTE Confidence: 0.9285882

00:33:37.660 --> 00:33:39.460 I mean we're not even at the point

NOTE Confidence: 0.9285882

00:33:39.460 --> 00:33:40.408 of routine interpretation.

NOTE Confidence: 0.9285882

00:33:40.408 --> 00:33:43.213 But but all this is going on at the

NOTE Confidence: 0.9285882

00:33:43.213 --> 00:33:45.089 same time and in a connected world,

NOTE Confidence: 0.9285882

00:33:45.090 --> 00:33:47.240 you know this is going to be all this.

NOTE Confidence: 0.9285882

00:33:47.240 --> 00:33:49.988 So so anyway part of my my thing about

NOTE Confidence: 0.9285882

00:33:49.988 --> 00:33:52.930 this point is if we're really great with a I,

NOTE Confidence: 0.9285882

00:33:52.930 --> 00:33:54.610 which I hope some of you will

NOTE Confidence: 0.9285882

00:33:54.610 --> 00:33:55.330 be participating in,

NOTE Confidence: 0.9285882

00:33:55.330 --> 00:33:57.120 then actually clinicians won't need

NOTE Confidence: 0.9285882

00:33:57.120 --> 00:33:59.612 to know a lot about a I like what

NOTE Confidence: 0.9285882

00:33:59.612 --> 00:34:01.159 what they'll need to know is what

NOTE Confidence: 0.9285882

00:34:01.159 --> 00:34:02.509 they can trust and somehow we're

NOTE Confidence: 0.9285882

00:34:02.509 --> 00:34:04.453 going to have to be able to convey

NOTE Confidence: 0.9285882

00:34:04.453 --> 00:34:05.803 that trust with the regulations.

NOTE Confidence: 0.9285882

00:34:05.810 --> 00:34:07.202 But it shouldn't be like they're

NOTE Confidence: 0.9285882

00:34:07.202 --> 00:34:08.856 going to have to take courses in

NOTE Confidence: 0.9285882

00:34:08.856 --> 00:34:10.417 a I they're going to be experts

NOTE Confidence: 0.9285882

00:34:10.469 --> 00:34:11.989 in a I like that would be amiss.

NOTE Confidence: 0.9285882

00:34:11.990 --> 00:34:13.880 You know what we want them to be is be

NOTE Confidence: 0.9285882

00:34:13.937 --> 00:34:15.557 experts in interacting with patients

NOTE Confidence: 0.9285882

00:34:15.557 --> 00:34:17.472 and and in clinical decision making

NOTE Confidence: 0.9285882

00:34:17.472 --> 00:34:19.384 and and we want to assist them in

NOTE Confidence: 0.9285882

00:34:19.384 --> 00:34:21.540 pattern recognition and and we want

NOTE Confidence: 0.9285882

73

00:34:21.540 --> 00:34:23.840 to provide help to make sure nothing

NOTE Confidence: 0.9285882

00:34:23.840 --> 00:34:26.234 falls through the cracks and that their

NOTE Confidence: 0.9285882

00:34:26.234 --> 00:34:28.950 days can be as impactful as possible.

NOTE Confidence: 0.9285882

00:34:28.950 --> 00:34:30.846 So you know but what about

NOTE Confidence: 0.9285882

00:34:30.846 --> 00:34:32.350 medical miracles what what it,

NOTE Confidence: 0.9285882

00:34:32.350 --> 00:34:33.798 what is on the horizon and I just

NOTE Confidence: 0.9285882

00:34:33.798 --> 00:34:35.111 say you know we've been talked

NOTE Confidence: 0.9285882

00:34:35.111 --> 00:34:36.461 a lot about bench to bedside

NOTE Confidence: 0.9346018

00:34:36.470 --> 00:34:39.086 but I really think that the this future

NOTE Confidence: 0.9346018

00:34:39.086 --> 00:34:40.972 is calculation to clinic and you

NOTE Confidence: 0.9346018

00:34:40.972 --> 00:34:44.056 know this is going to be a quite an

NOTE Confidence: 0.9346018

00:34:44.056 --> 00:34:47.050 exciting moment I think as we get this.

NOTE Confidence: 0.9346018

00:34:47.050 --> 00:34:49.766 But the problem is, you know, today,

NOTE Confidence: 0.9346018

00:34:49.766 --> 00:34:52.790 you know, this is this famous painting,

NOTE Confidence: 0.9346018

00:34:52.790 --> 00:34:53.566 the Doctor, you know,

NOTE Confidence: 0.9346018

00:34:53.566 --> 00:34:54.730 the time when the doctors didn't

NOTE Confidence: 0.9346018

00:34:54.768 --> 00:34:55.986 have much that they could provide.

NOTE Confidence: 0.9346018

00:34:55.990 --> 00:34:58.307 But it it gave this sense of,

NOTE Confidence: 0.9346018

00:34:58.310 --> 00:34:59.650 you know, really caring doctor

NOTE Confidence: 0.9346018

00:34:59.650 --> 00:35:00.990 focused on the individual and.

NOTE Confidence: 0.9346018

00:35:00.990 --> 00:35:03.186 And what has technology done for us so far?

NOTE Confidence: 0.9346018

00:35:03.190 --> 00:35:05.574 Sort of this, which is, you know,

NOTE Confidence: 0.9346018

00:35:05.574 --> 00:35:07.240 turned our attention, if anything,

NOTE Confidence: 0.9346018

00:35:07.240 --> 00:35:10.500 away from our patients and distracted us.

NOTE Confidence: 0.9346018

00:35:10.500 --> 00:35:13.909 And and Gwande wrote this piece not

NOTE Confidence: 0.9346018

00:35:13.909 --> 00:35:15.643 too long ago, which was basically

NOTE Confidence: 0.9346018

00:35:15.643 --> 00:35:17.260 why doctors hate the computer.

NOTE Confidence: 0.9346018

00:35:17.260 --> 00:35:18.418 I mean, this is so ironic.

NOTE Confidence: 0.9346018

00:35:18.420 --> 00:35:18.988 You know,

NOTE Confidence: 0.9346018

00:35:18.988 --> 00:35:20.976 we're at this moment of immense potential.

NOTE Confidence: 0.9346018

00:35:20.980 --> 00:35:23.092 And the truth is most people

NOTE Confidence: 0.9346018

00:35:23.092 --> 00:35:25.260 on the front lines are like,

NOTE Confidence: 0.9346018

00:35:25.260 --> 00:35:28.032 I don't even want anything that's

NOTE Confidence: 0.9346018

00:35:28.032 --> 00:35:29.880 technological because everything you've

NOTE Confidence: 0.9346018

00:35:29.951 --> 00:35:32.731 given me so far has only made my life worse.

NOTE Confidence: 0.9346018

00:35:32.740 --> 00:35:35.176 And I have no sense that it's largely

NOTE Confidence: 0.9346018

00:35:35.176 --> 00:35:37.677 put me in a position to do a better job

NOTE Confidence: 0.9346018

00:35:37.677 --> 00:35:39.595 for my patients outside of things like,

NOTE Confidence: 0.9346018

00:35:39.600 --> 00:35:40.986 you know, the algorithms that are

NOTE Confidence: 0.9346018

00:35:40.986 --> 00:35:42.478 used to enhance imaging and so forth.

NOTE Confidence: 0.9346018

00:35:42.480 --> 00:35:45.072 But I mean, but largely on the front lines,

NOTE Confidence: 0.9346018

00:35:45.080 --> 00:35:46.520 I don't think that that people

NOTE Confidence: 0.9346018

00:35:46.520 --> 00:35:48.264 feel like they're being, you know,

NOTE Confidence: 0.9346018

00:35:48.264 --> 00:35:49.440 deluged with information.

NOTE Confidence: 0.9346018

00:35:49.440 --> 00:35:50.958 Now emails are coming every day.

NOTE Confidence: 0.9346018

00:35:50.960 --> 00:35:52.905 There's no sifting organization of

NOTE Confidence: 0.9346018

00:35:52.905 --> 00:35:55.210 those emails that they're working into

NOTE Confidence: 0.9346018

00:35:55.210 --> 00:35:56.992 late hours just documenting in ways

NOTE Confidence: 0.9346018

00:35:56.992 --> 00:35:59.839 that no one has ever even takes advantage of.

NOTE Confidence: 0.9346018

00:35:59.840 --> 00:36:01.512 And no one even trusts a lot of

NOTE Confidence: 0.9346018

00:36:01.512 --> 00:36:02.939 the unstructured data within the HR

NOTE Confidence: 0.9346018

00:36:02.939 --> 00:36:04.379 because so much basting and cutting.

NOTE Confidence: 0.9346018

00:36:04.380 --> 00:36:06.252 So it it's like you know people get

NOTE Confidence: 0.9346018

00:36:06.252 --> 00:36:08.415 in this position and go on to say I've

NOTE Confidence: 0.9346018

00:36:08.415 --> 00:36:10.325 come to feel a system that promised

NOTE Confidence: 0.9346018

00:36:10.325 --> 00:36:12.400 to increase my mastery over my work

NOTE Confidence: 0.9346018

00:36:12.400 --> 00:36:14.780 instead increase my works mastery over me.

NOTE Confidence: 0.9346018

00:36:14.780 --> 00:36:17.345 So I I don't blame people on the front

NOTE Confidence: 0.9346018

00:36:17.345 --> 00:36:19.700 lines for being skeptical that this

NOTE Confidence: 0.9346018

00:36:19.700 --> 00:36:22.091 can actually produce benefit And and

NOTE Confidence: 0.9346018

00:36:22.091 --> 00:36:25.144 there's also just a history of of a you know,

NOTE Confidence: 0.9346018

00:36:25.144 --> 00:36:26.017 things taking time.

NOTE Confidence: 0.9346018

00:36:26.020 --> 00:36:28.630 I mean when when Linneke, you know,

NOTE Confidence: 0.9346018

00:36:28.630 --> 00:36:29.830 developed the first stethoscope,

NOTE Confidence: 0.9346018

00:36:29.830 --> 00:36:30.830 but believe it or not,

NOTE Confidence: 0.9346018

00:36:30.830 --> 00:36:32.054 this is like the first stethoscope

NOTE Confidence: 0.9346018

00:36:32.054 --> 00:36:32.870 wasn't like a stethoscope.

NOTE Confidence: 0.9346018

00:36:32.870 --> 00:36:33.536 You see today.

NOTE Confidence: 0.9346018

00:36:33.536 --> 00:36:35.254 It was just a long tube and said that,

NOTE Confidence: 0.9346018

00:36:35.254 --> 00:36:36.777 you know, you could avoid it and it was

NOTE Confidence: 0.9346018

00:36:36.777 --> 00:36:38.430 to avoid putting your ear on people's chest.

NOTE Confidence: 0.9346018

00:36:38.430 --> 00:36:40.774 So in some ways it was for patient

NOTE Confidence: 0.9346018

00:36:40.774 --> 00:36:42.189 dignity and and comfort,

NOTE Confidence: 0.9346018

00:36:42.190 --> 00:36:44.670 but it also amplified this.

NOTE Confidence: 0.9346018

00:36:44.670 --> 00:36:46.238 But it it took a while before

NOTE Confidence: 0.9346018

00:36:46.238 --> 00:36:47.190 people would adopt this.

NOTE Confidence: 0.9346018

00:36:47.190 --> 00:36:47.778 They said no,

NOTE Confidence: 0.9346018

00:36:47.778 --> 00:36:49.435 you no tool is going to be better

NOTE Confidence: 0.9346018

00:36:49.435 --> 00:36:51.024 than me putting my ear on the,

NOTE Confidence: 0.9346018

00:36:51.030 --> 00:36:52.740 you know, someone's back to listen

NOTE Confidence: 0.9346018

00:36:52.740 --> 00:36:54.269 to the sounds and it it,

NOTE Confidence: 0.9346018

00:36:54.270 --> 00:36:54.990 you know, it took a while.

NOTE Confidence: 0.9346018

00:36:54.990 --> 00:36:57.146 But but in our era, by the way,

NOTE Confidence: 0.9346018

00:36:57.146 --> 00:36:58.658 I think this whole thing of

NOTE Confidence: 0.9346018

00:36:58.658 --> 00:37:00.580 a stethoscope is antiquated.

NOTE Confidence: 0.9346018

00:37:00.580 --> 00:37:01.620 I mean, I like it.

NOTE Confidence: 0.9346018

00:37:01.620 --> 00:37:02.720 It's a nice accouture.

NOTE Confidence: 0.9346018

00:37:02.720 --> 00:37:04.095 It's nice thing to wear.

NOTE Confidence: 0.9138254

00:37:04.100 --> 00:37:06.500 It makes me look like I'm a doctor.

NOTE Confidence: 0.9138254

00:37:06.500 --> 00:37:12.225 But asking medical students to pattern

NOTE Confidence: 0.9138254

00:37:12.225 --> 00:37:14.935 recognize sounds instead of using

NOTE Confidence: 0.9138254

00:37:14.935 --> 00:37:16.560 advanced acoustic devices to take

NOTE Confidence: 0.9138254

00:37:16.560 --> 00:37:18.476 those devices that take that raw data,

NOTE Confidence: 0.9138254

00:37:18.480 --> 00:37:20.520 process it and not put out.

NOTE Confidence: 0.9138254

00:37:20.520 --> 00:37:22.760 Like whether you heard Ronchi or Rawls,

NOTE Confidence: 0.9138254

00:37:22.760 --> 00:37:25.544 or whether you heard S1 or a split

NOTE Confidence: 0.9138254

00:37:25.544 --> 00:37:29.080 S2 or murmurs or GALLOPS or rubs

NOTE Confidence: 0.9138254

00:37:29.080 --> 00:37:31.876 interpreting it into an actual diagnosis.

NOTE Confidence: 0.9138254

00:37:31.880 --> 00:37:33.680 60% chance this person's got

NOTE Confidence: 0.9138254

00:37:33.680 --> 00:37:34.760 severe microbird station,

NOTE Confidence: 0.9138254

00:37:34.760 --> 00:37:37.000 30% chance this person's got this or that.

NOTE Confidence: 0.9138254

00:37:37.000 --> 00:37:39.016 I mean it can give me the interpretability

NOTE Confidence: 0.9138254

00:37:39.016 --> 00:37:40.480 of what that was based on.

NOTE Confidence: 0.9138254

00:37:40.480 --> 00:37:41.688 But the truth is,

NOTE Confidence: 0.9138254

00:37:41.688 --> 00:37:43.198 you know people's hearing changes

NOTE Confidence: 0.9138254

00:37:43.198 --> 00:37:45.016 over the course of their career.

NOTE Confidence: 0.9138254

00:37:45.020 --> 00:37:47.619 We have no closed loop and you know

NOTE Confidence: 0.9138254

00:37:47.619 --> 00:37:49.110 no one's telling us here's the gold

NOTE Confidence: 0.9138254

00:37:49.160 --> 00:37:50.938 standard we should continue to train on.

NOTE Confidence: 0.9138254

00:37:50.940 --> 00:37:53.453 And and the skills of physicians largely

NOTE Confidence: 0.9138254

00:37:53.453 --> 00:37:55.744 every time it's tested on auscultation

NOTE Confidence: 0.9138254

00:37:55.744 --> 00:37:58.800 or or or any sort of mostly pattern

NOTE Confidence: 0.9138254

00:37:58.876 --> 00:38:01.554 recognition is is not very good and

NOTE Confidence: 0.9138254

00:38:01.554 --> 00:38:04.700 yet you know we persist in in old ways.

NOTE Confidence: 0.9138254

00:38:04.700 --> 00:38:06.764 I wrote a piece in Wall Street Journal

NOTE Confidence: 0.9138254

00:38:06.764 --> 00:38:08.276 suggesting that that we would move

NOTE Confidence: 0.9138254

00:38:08.276 --> 00:38:10.032 from an error of the stethoscope into

NOTE Confidence: 0.9138254

00:38:10.032 --> 00:38:11.877 a new digital error and I got a whole

NOTE Confidence: 0.9138254

00:38:11.933 --> 00:38:13.711 bunch of emails from people calling me

NOTE Confidence: 0.9138254

00:38:13.711 --> 00:38:15.790 crazy and and you know that that this

NOTE Confidence: 0.9138254

00:38:15.790 --> 00:38:17.720 was so essential to the profession

NOTE Confidence: 0.9138254

00:38:17.720 --> 00:38:19.096 that people learn auscultation.

NOTE Confidence: 0.9138254

00:38:19.096 --> 00:38:21.782 I I'm not saying it's not but but

NOTE Confidence: 0.9138254

00:38:21.782 --> 00:38:23.728 by the way every time we tested

NOTE Confidence: 0.9138254

00:38:23.728 --> 00:38:25.577 people don't learn it anymore and

NOTE Confidence: 0.9138254

00:38:25.577 --> 00:38:27.512 and and maybe they shouldn't and I'll

NOTE Confidence: 0.9138254

00:38:27.512 --> 00:38:28.600 take this to electrocardiograms.

NOTE Confidence: 0.9138254

00:38:28.600 --> 00:38:30.350 I mean you know what we're teaching

NOTE Confidence: 0.9138254

00:38:30.350 --> 00:38:31.798 people to know the raw data.

NOTE Confidence: 0.9138254

00:38:31.800 --> 00:38:33.450 You know what what's the inflections

NOTE Confidence: 0.9138254

00:38:33.450 --> 00:38:34.275 of the waves?

NOTE Confidence: 0.9138254

00:38:34.280 --> 00:38:35.552 What's the P/E, QRST,

NOTE Confidence: 0.9138254

00:38:35.552 --> 00:38:38.429 waves and be able to get the patterns,

NOTE Confidence: 0.9138254

00:38:38.430 --> 00:38:38.642 but,

NOTE Confidence: 0.9138254

00:38:38.642 --> 00:38:40.550 but is this really what we should be doing?

NOTE Confidence: 0.9138254

00:38:40.550 --> 00:38:42.321 My daughter's a medical student and she

NOTE Confidence: 0.9138254

00:38:42.321 --> 00:38:43.638 just finished her cardiology rotation

NOTE Confidence: 0.9138254

00:38:43.638 --> 00:38:45.662 and I said that I think that's great.

NOTE Confidence: 0.9138254

00:38:45.670 --> 00:38:47.866 But I really think in five years you're not,

NOTE Confidence: 0.9138254

00:38:47.870 --> 00:38:48.462 you know,

NOTE Confidence: 0.9138254

00:38:48.462 --> 00:38:49.054 the the,

NOTE Confidence: 0.9138254

00:38:49.054 --> 00:38:51.201 the expert systems are going to be

NOTE Confidence: 0.9138254

00:38:51.201 --> 00:38:53.322 such that instead of asking you to

NOTE Confidence: 0.9138254

00:38:53.322 --> 00:38:56.030 describe the morphology of the ECG,

NOTE Confidence: 0.9138254

00:38:56.030 --> 00:38:57.731 we're going to be so much better

NOTE Confidence: 0.9138254

00:38:57.731 --> 00:38:59.789 being able to infer what does it mean,

NOTE Confidence: 0.9138254

00:38:59.790 --> 00:39:01.230 what does it mean?

NOTE Confidence: 0.9138254

00:39:01.230 --> 00:39:04.150 And so in at our place, Rohan Keira,

NOTE Confidence: 0.9138254

00:39:04.150 --> 00:39:06.008 it's just doing, you know,

NOTE Confidence: 0.9138254

00:39:06.008 --> 00:39:08.162 remarkable work being able to take

NOTE Confidence: 0.9138254

00:39:08.162 --> 00:39:10.951 not only taking the ECG and saying

NOTE Confidence: 0.9138254

00:39:10.951 --> 00:39:13.290 what would an expert cardiologist say,

NOTE Confidence: 0.9138254

00:39:13.290 --> 00:39:15.180 but being able to take the ECG

NOTE Confidence: 0.9138254

00:39:15.180 --> 00:39:17.904 and say what is it that even the

NOTE Confidence: 0.9138254

00:39:17.904 --> 00:39:19.384 expert cardiologist can't quite

NOTE Confidence: 0.9138254

00:39:19.384 --> 00:39:21.746 proceed because these are a cluster

NOTE Confidence: 0.9138254

00:39:21.746 --> 00:39:24.322 of changes that are nuanced and

NOTE Confidence: 0.9138254

00:39:24.322 --> 00:39:26.050 difficult to to recognize.

NOTE Confidence: 0.9138254

00:39:26.050 --> 00:39:27.774 He's not just saying,

NOTE Confidence: 0.9138254

00:39:27.774 --> 00:39:29.929 here's the textbook of electrocardiography.

NOTE Confidence: 0.9138254

00:39:29.930 --> 00:39:31.730 Now how can I automate that?

NOTE Confidence: 0.9138254

00:39:31.730 --> 00:39:34.887 That's 100 years or 150 years of

NOTE Confidence: 0.9138254

00:39:34.890 --> 00:39:39.530 120 years of of knowledge based on

NOTE Confidence: 0.9138254

00:39:39.530 --> 00:39:42.370 patterns correlating with certain,

NOTE Confidence: 0.9138254

00:39:42.370 --> 00:39:43.768 you know more whether it would

NOTE Confidence: 0.9138254

00:39:43.768 --> 00:39:45.786 be in a disease states or or

NOTE Confidence: 0.9138254

00:39:45.786 --> 00:39:48.090 abnormalities or rhythm disorders.

NOTE Confidence: 0.9138254

00:39:48.090 --> 00:39:51.402 And the truth is we can go beyond that,

NOTE Confidence: 0.9138254

00:39:51.410 --> 00:39:51.995 far beyond that.

NOTE Confidence: 0.9138254

00:39:51.995 --> 00:39:52.970 And that's what he's doing.

NOTE Confidence: 0.92696667

00:39:52.970 --> 00:39:54.426 You know, this is an article and it's

NOTE Confidence: 0.92696667

00:39:54.426 --> 00:39:56.195 just an example what he's done in

NOTE Confidence: 0.92696667

00:39:56.195 --> 00:39:58.520 detection of left ventricular systolic

NOTE Confidence: 0.92696667

00:39:58.520 --> 00:39:59.915 dysfunction from electrocardiographic

NOTE Confidence: 0.92696667

00:39:59.915 --> 00:40:01.958 images where we can actually infer.

NOTE Confidence: 0.92696667

00:40:01.960 --> 00:40:05.173 What you would find on an echocardiogram

NOTE Confidence: 0.92696667

00:40:05.173 --> 00:40:06.915 from the electrocardiogram in

NOTE Confidence: 0.92696667

00:40:06.915 --> 00:40:09.080 ways that that no prior ECG based

NOTE Confidence: 0.92696667

00:40:09.080 --> 00:40:10.440 textbook could ever describe.

NOTE Confidence: 0.92696667

00:40:10.440 --> 00:40:12.780 So it's not a matter of saying we can provide

NOTE Confidence: 0.92696667

00:40:12.836 --> 00:40:14.918 an expert cardiologist on your shoulder,

NOTE Confidence: 0.92696667

00:40:14.920 --> 00:40:17.116 but it's like we can actually go beyond that.

NOTE Confidence: 0.92696667

00:40:17.120 --> 00:40:19.307 And so you know he's got really a I

NOTE Confidence: 0.92696667

00:40:19.307 --> 00:40:20.939 enhanced screening of heart disease

NOTE Confidence: 0.92696667

00:40:20.939 --> 00:40:23.214 from ECG images as examples and can

NOTE Confidence: 0.92696667

00:40:23.214 --> 00:40:25.056 show you where it's leveraging that

NOTE Confidence: 0.92696667

00:40:25.056 --> 00:40:26.760 information within the electrocardiogram

NOTE Confidence: 0.92696667

00:40:26.760 --> 00:40:28.398 and and he's doing it on images,

NOTE Confidence: 0.92696667

00:40:28.400 --> 00:40:30.969 others are doing it on raw data.

NOTE Confidence: 0.92696667

00:40:30.970 --> 00:40:34.978 But you know this is this is going to

NOTE Confidence: 0.92696667

00:40:34.978 --> 00:40:39.648 change how we manage all of a medicine.

NOTE Confidence: 0.92696667

00:40:39.650 --> 00:40:42.730 Sanjay Niedia in radiation oncology,

NOTE Confidence: 0.92696667

00:40:42.730 --> 00:40:44.718 I think that we call it therapeutic

NOTE Confidence: 0.92696667

00:40:44.718 --> 00:40:46.474 radiology here that is also working

NOTE Confidence: 0.92696667

00:40:46.474 --> 00:40:48.927 with our group that in in what he's

NOTE Confidence: 0.92696667

00:40:48.927 --> 00:40:51.048 doing is it's same thing for Rohan

NOTE Confidence: 0.92696667

00:40:51.048 --> 00:40:53.609 is really finding digital biomarkers.

NOTE Confidence: 0.92696667

00:40:53.610 --> 00:40:55.887 So what is it that our eyes can't perceive?

NOTE Confidence: 0.92696667

00:40:55.890 --> 00:40:58.482 I mean the the radio graphic in this case,

NOTE Confidence: 0.92696667

00:40:58.490 --> 00:41:01.486 the radio graphic images contain such a

NOTE Confidence: 0.92696667

00:41:01.486 --> 00:41:03.475 depth of information that actually go

NOTE Confidence: 0.92696667

00:41:03.475 --> 00:41:05.490 beyond what we can proceed with our senses,

NOTE Confidence: 0.92696667

00:41:05.490 --> 00:41:06.226 with our,

NOTE Confidence: 0.92696667

00:41:06.226 --> 00:41:08.930 with our eyesight and and and and

NOTE Confidence: 0.92696667

00:41:08.930 --> 00:41:10.530 analyze with our brains.

NOTE Confidence: 0.92696667

00:41:10.530 --> 00:41:12.760 And so the idea is that we can be using

NOTE Confidence: 0.92696667

00:41:12.819 --> 00:41:15.045 these advanced analytics to be able to,

NOTE Confidence: 0.92696667

00:41:15.050 --> 00:41:15.850 for example,

NOTE Confidence: 0.92696667

00:41:15.850 --> 00:41:17.850 find clues that predict recurrences

NOTE Confidence: 0.92696667

00:41:17.850 --> 00:41:20.329 that we would not have been able

NOTE Confidence: 0.92696667

00:41:20.329 --> 00:41:22.410 to detect just by looking at it.

NOTE Confidence: 0.92696667

00:41:22.410 --> 00:41:23.157 Or you know,

NOTE Confidence: 0.92696667

00:41:23.157 --> 00:41:24.402 what happens still even today

NOTE Confidence: 0.92696667

00:41:24.402 --> 00:41:25.849 when we're comparing you know,

NOTE Confidence: 0.92696667

00:41:25.850 --> 00:41:28.720 prior images with current images,

NOTE Confidence: 0.92696667

00:41:28.720 --> 00:41:30.298 you know, you're kind of looking

NOTE Confidence: 0.92696667

00:41:30.298 --> 00:41:31.640 across or sometimes you know,

NOTE Confidence: 0.92696667

00:41:31.640 --> 00:41:32.720 maybe even trying to overlay,

NOTE Confidence: 0.92696667

00:41:32.720 --> 00:41:34.080 but we could be doing so much better.

NOTE Confidence: 0.92696667

00:41:34.080 --> 00:41:35.837 Is it really bigger or is not.

NOTE Confidence: 0.92696667

00:41:35.840 --> 00:41:36.280 You know,

NOTE Confidence: 0.92696667

00:41:36.280 --> 00:41:37.160 I hear radiologists go,

NOTE Confidence: 0.92696667

00:41:37.160 --> 00:41:38.000 I'm looking at this image,

NOTE Confidence: 0.92696667

00:41:38.000 --> 00:41:39.323 I'm looking at this and it looks

NOTE Confidence: 0.92696667

00:41:39.323 --> 00:41:40.620 like it's slightly bigger or they're

NOTE Confidence: 0.92696667

00:41:40.620 --> 00:41:41.760 they're putting calipers on it.

NOTE Confidence: 0.92696667

00:41:41.760 --> 00:41:43.816 I mean this is going to be gone

NOTE Confidence: 0.92696667

00:41:43.816 --> 00:41:45.384 because these kind of analytics

NOTE Confidence: 0.92696667

00:41:45.384 --> 00:41:47.340 can really take advantage of the

NOTE Confidence: 0.92696667

00:41:47.401 --> 00:41:50.216 three-dimensional nature of these images.

NOTE Confidence: 0.92696667

00:41:50.216 --> 00:41:51.720 I mean, you know,

NOTE Confidence: 0.92696667

00:41:51.720 --> 00:41:53.400 because we're looking at slices and

NOTE Confidence: 0.92696667

00:41:53.400 --> 00:41:55.344 then going down slices and trying to

NOTE Confidence: 0.92696667

00:41:55.344 --> 00:41:57.177 integrate in our brain like what it

NOTE Confidence: 0.92696667

00:41:57.177 --> 00:41:58.788 looks like and and all of this stuff

NOTE Confidence: 0.92696667

00:41:58.788 --> 00:41:59.844 is going to improve tremendously

NOTE Confidence: 0.92696667

00:41:59.844 --> 00:42:02.110 because of what we're going to be able to do.

NOTE Confidence: 0.92696667

00:42:02.110 --> 00:42:02.647 And then yeah,

NOTE Confidence: 0.92696667

00:42:02.647 --> 00:42:04.190 what's going on in the on the wards,

NOTE Confidence: 0.92696667

00:42:04.190 --> 00:42:04.722 you know,

NOTE Confidence: 0.92696667

00:42:04.722 --> 00:42:06.318 like when we're trying to decide

NOTE Confidence: 0.92696667

00:42:06.318 --> 00:42:07.506 about anticoagulation for someone

NOTE Confidence: 0.92696667

00:42:07.506 --> 00:42:08.427 with atrial fibrillation,

NOTE Confidence: 0.92696667

00:42:08.430 --> 00:42:10.190 isn't this just kills me.

NOTE Confidence: 0.92696667

00:42:10.190 --> 00:42:10.642 You know,

NOTE Confidence: 0.92696667

00:42:10.642 --> 00:42:12.224 we use things like Chad's vast score,

NOTE Confidence: 0.92696667

00:42:12.230 --> 00:42:13.190 which is, you know, Yes.

NOTE Confidence: 0.92696667

00:42:13.190 --> 00:42:16.082 No congestive heart failure. Yes.

NOTE Confidence: 0.92696667

00:42:16.082 --> 00:42:18.190 No hypertension. Yes. No diabetes.

NOTE Confidence: 0.92696667

00:42:18.190 --> 00:42:20.110 Yes. No vascular disease.

NOTE Confidence: 0.92696667

00:42:20.110 --> 00:42:22.836 I mean this is insane. I mean.

NOTE Confidence: 0.92696667

00:42:22.836 --> 00:42:23.842 Because, yes,

NOTE Confidence: 0.92696667

00:42:23.842 --> 00:42:24.848 no hypertension.

NOTE Confidence: 0.92696667

00:42:24.850 --> 00:42:26.523 I mean there are people who've got

NOTE Confidence: 0.92696667

00:42:26.523 --> 00:42:27.540 severe uncontrolled hypertension or

NOTE Confidence: 0.92696667

00:42:27.540 --> 00:42:28.845 people have died controlled hypertension.

NOTE Confidence: 0.9356118

00:42:28.850 --> 00:42:30.170 We've had a history of hypertension.

NOTE Confidence: 0.9356118

00:42:30.170 --> 00:42:31.688 They don't even have it anymore.

NOTE Confidence: 0.9356118

00:42:31.690 --> 00:42:32.902 But it's, you know,

NOTE Confidence: 0.9356118

00:42:32.902 --> 00:42:34.114 still a legacy comorbidity

NOTE Confidence: 0.9356118

00:42:34.114 --> 00:42:35.984 that they carry you giving all

NOTE Confidence: 0.9356118

00:42:35.984 --> 00:42:37.489 those people the same weight.

NOTE Confidence: 0.9356118

00:42:37.490 --> 00:42:39.436 And and this isn't very precise and

NOTE Confidence: 0.9356118

00:42:39.436 --> 00:42:41.366 it doesn't also take into account

NOTE Confidence: 0.9356118

00:42:41.366 --> 00:42:42.742 some populations have higher

NOTE Confidence: 0.9356118

00:42:42.742 --> 00:42:44.490 risks than other populations.

NOTE Confidence: 0.9356118

00:42:44.490 --> 00:42:46.282 So a score of two means something

NOTE Confidence: 0.9356118

00:42:46.282 --> 00:42:47.992 different in the stroke belt then

NOTE Confidence: 0.9356118

00:42:47.992 --> 00:42:49.768 it might mean within the Northeast.

NOTE Confidence: 0.9356118

00:42:49.770 --> 00:42:51.527 And and none of this is taken

NOTE Confidence: 0.9356118

00:42:51.527 --> 00:42:53.132 into account in these things and

NOTE Confidence: 0.9356118

00:42:53.132 --> 00:42:54.973 there's a need for a whole new

NOTE Confidence: 0.9356118

00:42:55.029 --> 00:42:56.399 range of predictive models that

NOTE Confidence: 0.9356118

00:42:56.399 --> 00:42:58.562 I call it say are digital native.

NOTE Confidence: 0.9356118

00:42:58.562 --> 00:43:00.146 They're not cross walking

NOTE Confidence: 0.9356118

00:43:00.146 --> 00:43:01.730 from registry data over,

NOTE Confidence: 0.9356118

00:43:01.730 --> 00:43:03.440 but they're actually being developed

NOTE Confidence: 0.9356118

00:43:03.440 --> 00:43:05.653 straight from the EHR And then we're

NOTE Confidence: 0.9356118

00:43:05.653 --> 00:43:08.280 doing a lot of work in blood pressure.

NOTE Confidence: 0.9356118

00:43:08.280 --> 00:43:09.799 You and Lou wrote this paper and

NOTE Confidence: 0.9356118

00:43:09.799 --> 00:43:11.667 she's doing a lot really I think

NOTE Confidence: 0.9356118

00:43:11.667 --> 00:43:13.127 novel work leveraging the electronic

NOTE Confidence: 0.9356118

00:43:13.127 --> 00:43:14.349 health records for population

NOTE Confidence: 0.9356118

00:43:14.349 --> 00:43:16.101 health where we can identify people

NOTE Confidence: 0.9356118

00:43:16.101 --> 00:43:17.484 who fall into the cracks,

NOTE Confidence: 0.9356118

00:43:17.484 --> 00:43:18.839 people who are being ignored.

NOTE Confidence: 0.9356118

00:43:18.840 --> 00:43:20.535 People have signatures of of

NOTE Confidence: 0.9356118

00:43:20.535 --> 00:43:21.891 hypertension that suggests they

NOTE Confidence: 0.9356118

00:43:21.891 --> 00:43:23.720 have secondary hypertension but no

NOTE Confidence: 0.9356118

00:43:23.720 --> 00:43:25.907 one's actually looking into that and

NOTE Confidence: 0.9356118

00:43:25.907 --> 00:43:27.842 and putting people into categories

NOTE Confidence: 0.9356118

00:43:27.842 --> 00:43:30.240 based on what's impeding them from

NOTE Confidence: 0.9356118

00:43:30.240 --> 00:43:31.442 achieving their hypertension.

NOTE Confidence: 0.9356118

00:43:31.442 --> 00:43:33.066 We we stop calling.

NOTE Confidence: 0.9356118

00:43:33.070 --> 00:43:34.945 There's this idea of secondary

NOTE Confidence: 0.9356118

00:43:34.945 --> 00:43:36.070 hypertension resistant hypertension

NOTE Confidence: 0.9356118

00:43:36.070 --> 00:43:38.270 which is largely from medical causes.

NOTE Confidence: 0.9356118

00:43:38.270 --> 00:43:40.076 But we start talking about persistent

NOTE Confidence: 0.9356118

00:43:40.076 --> 00:43:41.920 hypertension which can be from social

NOTE Confidence: 0.9356118

00:43:41.920 --> 00:43:43.390 determinants of health as well.

NOTE Confidence: 0.9356118

00:43:43.390 --> 00:43:45.973 And and of course if we can do this

NOTE Confidence: 0.9356118

00:43:45.973 --> 00:43:47.574 kind of systematic evaluation,

NOTE Confidence: 0.9356118

00:43:47.574 --> 00:43:48.790 the entire medical record,

NOTE Confidence: 0.9356118

00:43:48.790 --> 00:43:50.463 we can be doing this for HealthEquity

NOTE Confidence: 0.9356118

00:43:50.463 --> 00:43:51.910 too because people are left behind.

NOTE Confidence: 0.9356118

00:43:51.910 --> 00:43:53.950 People fall through the cracks

NOTE Confidence: 0.9356118

00:43:53.950 --> 00:43:55.582 are often minoritized populations.

NOTE Confidence: 0.9356118

00:43:55.590 --> 00:43:57.150 Populations that are disadvantaged

NOTE Confidence: 0.9356118

00:43:57.150 --> 00:43:59.100 populations have been subject to

NOTE Confidence: 0.9356118

00:43:59.100 --> 00:43:59.890 structural racism.

NOTE Confidence: 0.9356118

00:43:59.890 --> 00:44:01.432 We can actually automate ways to

NOTE Confidence: 0.9356118

00:44:01.432 --> 00:44:03.367 to make sure that people don't fall

NOTE Confidence: 0.9356118

00:44:03.367 --> 00:44:05.065 through the cracks because of the

NOTE Confidence: 0.9356118

00:44:05.065 --> 00:44:06.327 way we've set this up.

NOTE Confidence: 0.9356118

00:44:06.330 --> 00:44:08.928 Our group Lisa Souter in rheumatology

NOTE Confidence: 0.9356118

00:44:08.928 --> 00:44:10.993 and care endorsing Pediatrics and

NOTE Confidence: 0.9356118

00:44:10.993 --> 00:44:12.650 Q Lynn who's been with our group

NOTE Confidence: 0.9356118

00:44:12.650 --> 00:44:13.970 is with the school public health.

NOTE Confidence: 0.9356118

00:44:13.970 --> 00:44:15.860 You know I've been working on

NOTE Confidence: 0.9356118

00:44:15.860 --> 00:44:16.490 measure management.

NOTE Confidence: 0.9356118

00:44:16.490 --> 00:44:18.695 How can we begin to develop quality

NOTE Confidence: 0.9356118

00:44:18.695 --> 00:44:20.639 measures that come straight from the

NOTE Confidence: 0.9356118

00:44:20.639 --> 00:44:22.820 EHR and take into account the care

NOTE Confidence: 0.9356118

00:44:22.820 --> 00:44:24.650 all the characteristics of the individuals.

NOTE Confidence: 0.9356118

00:44:24.650 --> 00:44:26.450 Wade Schultz who was working

NOTE Confidence: 0.9356118

00:44:26.450 --> 00:44:28.390 with CORE for a long time,

00:44:28.390 --> 00:44:29.855 is now working with BIDS.

00:44:29.855 --> 00:44:30.995 He's in laboratory medicine,

00:44:31.000 --> 00:44:32.900 was developing A foundational system

00:44:32.900 --> 00:44:34.420 that the computational health

00:44:34.420 --> 00:44:36.491 platform or CHIP at Yale that was

00:44:36.491 --> 00:44:37.861 creating the possibilities of being

00:44:37.861 --> 00:44:38.956 able to do all this.

00:44:38.960 --> 00:44:41.114 You can't do this without sitting

00:44:41.114 --> 00:44:44.104 on a on a platform that enables

00:44:44.104 --> 00:44:46.416 that data to be secure, private,

00:44:46.416 --> 00:44:49.520 but but be able to be leveraged in

00:44:49.602 --> 00:44:51.517 this highly advanced analytic way.

00:44:51.517 --> 00:44:53.312 And and Wade contributed importantly

00:44:53.312 --> 00:44:55.849 to this work or like I said was very

00:44:55.849 --> 00:44:57.942 much involved with him as he was

00:44:57.942 --> 00:44:59.758 developing the computational health platform.

NOTE Confidence: 0.9356118

00:44:59.758 --> 00:45:01.030 So you know,

NOTE Confidence: 0.9356118

00:45:01.030 --> 00:45:03.641 this is Daphne Kohler who is in

NOTE Confidence: 0.9356118

00:45:03.641 --> 00:45:05.950 the life sciences and and has

NOTE Confidence: 0.9356118

00:45:05.950 --> 00:45:07.270 made tremendous contributions.

NOTE Confidence: 0.9356118

00:45:07.270 --> 00:45:08.789 But but you know it's been working

NOTE Confidence: 0.9356118

00:45:08.789 --> 00:45:09.440 in this bioinformatics

NOTE Confidence: 0.93857217

00:45:09.481 --> 00:45:11.740 space. But I think this is

NOTE Confidence: 0.93857217

00:45:11.740 --> 00:45:13.200 still generalizable to people

NOTE Confidence: 0.93857217

00:45:13.200 --> 00:45:14.950 interested in the clinical side.

NOTE Confidence: 0.93857217

00:45:14.950 --> 00:45:16.762 Machine learning is capable of making

NOTE Confidence: 0.93857217

00:45:16.762 --> 00:45:18.546 sense of immense amounts of high

NOTE Confidence: 0.93857217

00:45:18.546 --> 00:45:20.106 content biological data most of which

NOTE Confidence: 0.93857217

00:45:20.106 --> 00:45:22.530 is too high dimensional for humans to

NOTE Confidence: 0.93857217

00:45:22.530 --> 00:45:24.576 interpret and and I believe that that's

NOTE Confidence: 0.93857217

00:45:24.576 --> 00:45:26.329 true within the clinical domain too.

NOTE Confidence: 0.93857217

00:45:26.330 --> 00:45:28.493 It's it's not our failure it's just

NOTE Confidence: 0.93857217

00:45:28.493 --> 00:45:31.134 that as more and more data become

NOTE Confidence: 0.93857217

00:45:31.134 --> 00:45:32.782 available more high dimensional

NOTE Confidence: 0.93857217

00:45:32.782 --> 00:45:34.500 data become available multi

NOTE Confidence: 0.93857217

00:45:34.500 --> 00:45:36.570 what we call multimodal data.

NOTE Confidence: 0.93857217

00:45:36.570 --> 00:45:38.620 So I consider that social

NOTE Confidence: 0.93857217

00:45:38.620 --> 00:45:39.850 determined health exposures,

NOTE Confidence: 0.93857217

00:45:39.850 --> 00:45:41.610 biological data, clinical data,

NOTE Confidence: 0.93857217

00:45:41.610 --> 00:45:44.256 a whole range of information and all

NOTE Confidence: 0.93857217

00:45:44.256 --> 00:45:46.040 this is to put patients in a stronger

NOTE Confidence: 0.93857217

00:45:46.094 --> 00:45:48.129 position because ultimately their values,

NOTE Confidence: 0.93857217

00:45:48.130 --> 00:45:49.935 preferences and goals should dictate

NOTE Confidence: 0.93857217

00:45:49.935 --> 00:45:51.356 the decisions that they make.

NOTE Confidence: 0.93857217

00:45:51.356 --> 00:45:53.713 But you want it to be made based

NOTE Confidence: 0.93857217

00:45:53.713 --> 00:45:55.137 on really good information,

NOTE Confidence: 0.93857217

00:45:55.140 --> 00:45:56.488 information that's as highly

NOTE Confidence: 0.93857217

00:45:56.488 --> 00:45:58.173 specific to them as possible.

NOTE Confidence: 0.93857217

00:45:58.180 --> 00:45:59.958 And so the options are as clear

NOTE Confidence: 0.93857217

00:45:59.958 --> 00:46:01.708 as possible and that we we make

NOTE Confidence: 0.93857217

00:46:01.708 --> 00:46:03.380 it so that the system works more

NOTE Confidence: 0.93718016

00:46:05.780 --> 00:46:06.216 more seamlessly.

NOTE Confidence: 0.93718016

00:46:06.216 --> 00:46:08.659 So you know the as I get to the end here,

NOTE Confidence: 0.93718016

00:46:08.660 --> 00:46:11.876 it's just basically that what

NOTE Confidence: 0.93718016

00:46:11.876 --> 00:46:13.860 clinicians need are solutions,

NOTE Confidence: 0.93718016

00:46:13.860 --> 00:46:15.132 what they need are tools to

NOTE Confidence: 0.93718016

00:46:15.132 --> 00:46:16.355 improve what they in partnership

NOTE Confidence: 0.93718016

00:46:16.355 --> 00:46:17.975 with their patients can achieve.

NOTE Confidence: 0.93718016

00:46:17.980 --> 00:46:20.283 So that's where we have to start

NOTE Confidence: 0.93718016

00:46:20.283 --> 00:46:22.260 building you know solution based

NOTE Confidence: 0.93718016

00:46:22.260 --> 00:46:24.880 products that that are both

NOTE Confidence: 0.93718016

00:46:24.880 --> 00:46:26.976 helping us with accountability,

NOTE Confidence: 0.93718016

00:46:26.980 --> 00:46:29.344 improvement and discovery and and put

NOTE Confidence: 0.93718016

00:46:29.344 --> 00:46:32.324 us in a stronger position to to help

NOTE Confidence: 0.93718016

00:46:32.324 --> 00:46:34.060 people than we've been in the past.

NOTE Confidence: 0.93718016

00:46:34.060 --> 00:46:35.752 So, you know that's what I

NOTE Confidence: 0.93718016

00:46:35.752 --> 00:46:37.220 think clinicians need to know.

NOTE Confidence: 0.93718016

00:46:37.220 --> 00:46:39.460 They can trust you're going to see a

NOTE Confidence: 0.93718016

00:46:39.460 --> 00:46:41.400 whole new way of happening in and I

NOTE Confidence: 0.93718016

00:46:41.400 --> 00:46:42.900 think these large language models with,

NOTE Confidence: 0.93718016

00:46:42.900 --> 00:46:44.420 you know chat GB T,

NOTE Confidence: 0.93718016

00:46:44.420 --> 00:46:45.698 it's going to make all this

NOTE Confidence: 0.93718016

00:46:45.698 --> 00:46:46.337 much more accessible.

NOTE Confidence: 0.93718016

00:46:46.340 --> 00:46:48.174 And one of the ironies of this

NOTE Confidence: 0.93718016

00:46:48.180 --> 00:46:49.342 is that you're not going to have

NOTE Confidence: 0.93718016

00:46:49.342 --> 00:46:50.739 to be an expert coder anymore.

NOTE Confidence: 0.93718016

00:46:50.740 --> 00:46:52.724 I mean that that may not be exactly

NOTE Confidence: 0.93718016

00:46:52.724 --> 00:46:54.272 true today, but these these systems,

NOTE Confidence: 0.93718016

00:46:54.272 --> 00:46:55.587 the large language models are

NOTE Confidence: 0.93718016

00:46:55.587 --> 00:46:56.777 going to help with coding.

NOTE Confidence: 0.93718016

00:46:56.780 --> 00:46:58.820 They're going to help with application.

NOTE Confidence: 0.93718016

00:46:58.820 --> 00:46:59.948 I I I think they're going

NOTE Confidence: 0.93718016

00:46:59.948 --> 00:47:00.700 to be very important.

NOTE Confidence: 0.93718016

00:47:00.700 --> 00:47:02.898 It's just another dimension of A I

NOTE Confidence: 0.93718016

00:47:02.900 --> 00:47:04.781 where I'm going to be able to take the

NOTE Confidence: 0.93718016

00:47:04.781 --> 00:47:06.217 discharge summary and say to chat GB,

NOTE Confidence: 0.93718016

00:47:06.220 --> 00:47:09.757 T translate this into a a fourth grade level,

NOTE Confidence: 0.93718016

00:47:09.760 --> 00:47:11.160 translate this into an eighth grade level,

NOTE Confidence: 0.93718016

00:47:11.160 --> 00:47:12.705 translate this into a health

NOTE Confidence: 0.93718016

00:47:12.705 --> 00:47:14.440 literacy level of A or B.

NOTE Confidence: 0.93718016

00:47:14.440 --> 00:47:15.966 And we're it's going to help us

NOTE Confidence: 0.93718016

00:47:15.966 --> 00:47:17.040 communicate with our patients.

NOTE Confidence: 0.93718016

00:47:17.040 --> 00:47:18.328 It's going to help us to be

NOTE Confidence: 0.93718016

00:47:18.328 --> 00:47:19.400 able to ask questions,

NOTE Confidence: 0.93718016

00:47:19.400 --> 00:47:21.059 to get answers in ways that we

NOTE Confidence: 0.93718016

00:47:21.059 --> 00:47:22.535 haven't before and it's going to

NOTE Confidence: 0.93718016

00:47:22.535 --> 00:47:24.194 put us in a much stronger position.

NOTE Confidence: 0.93718016

00:47:24.200 --> 00:47:26.440 So the the future's there for us to take it.

NOTE Confidence: 0.93718016

00:47:26.440 --> 00:47:28.630 It's it that of course has

NOTE Confidence: 0.93718016

00:47:28.630 --> 00:47:30.272 potential for good or bad.

NOTE Confidence: 0.93718016

00:47:30.272 --> 00:47:33.680 So it's up to us to steer it towards good

NOTE Confidence: 0.93718016

00:47:33.680 --> 00:47:35.800 and then never to forget the bottom line,

NOTE Confidence: 0.93718016

00:47:35.800 --> 00:47:38.600 which is as we use this technology,

NOTE Confidence: 0.93718016

00:47:38.600 --> 00:47:40.994 it's a very important that we retain

NOTE Confidence: 0.93718016

00:47:40.994 --> 00:47:42.999 the humanity within our profession.

NOTE Confidence: 0.93718016

00:47:43.000 --> 00:47:43.712 Recognize the,

NOTE Confidence: 0.93718016

00:47:43.712 --> 00:47:44.068 the,

NOTE Confidence: 0.93718016

00:47:44.068 --> 00:47:46.204 the deep importance of connecting with

NOTE Confidence: 0.93718016

00:47:46.204 --> 00:47:48.285 our patients and ensuring that net net

NOTE Confidence: 0.93718016

00:47:48.285 --> 00:47:50.959 at the end of the day we've helped them in,

NOTE Confidence: 0.93718016

00:47:50.960 --> 00:47:52.460 in ways that they perceive

NOTE Confidence: 0.93718016

00:47:52.460 --> 00:47:53.960 as aligned with their values,

NOTE Confidence: 0.93718016

00:47:53.960 --> 00:47:55.259 preferences and goals.

NOTE Confidence: 0.93718016

00:47:55.259 --> 00:47:56.558 But you know,

NOTE Confidence: 0.93718016

00:47:56.560 --> 00:47:59.170 I envy the medical students because

NOTE Confidence: 0.93718016

00:47:59.170 --> 00:48:00.928 you're entering one of the most

NOTE Confidence: 0.93718016

00:48:00.928 --> 00:48:02.038 exciting periods ever in medicine.

NOTE Confidence: 0.93718016

00:48:02.040 --> 00:48:03.874 And over the course of your career,

NOTE Confidence: 0.93718016

00:48:03.880 --> 00:48:06.120 it will be amazing what you see.

NOTE Confidence: 0.93718016

00:48:06.120 --> 00:48:08.284 And I hope many of you will be

NOTE Confidence: 0.93718016

00:48:08.284 --> 00:48:10.294 principal participants in the steering

NOTE Confidence: 0.93718016

00:48:10.294 --> 00:48:12.359 of medicine towards a better day.

NOTE Confidence: 0.93718016

00:48:12.360 --> 00:48:13.720 So thank you very much.

NOTE Confidence: 0.93718016

00:48:13.720 --> 00:48:15.535 Appreciate being invited and and

NOTE Confidence: 0.93718016

00:48:15.535 --> 00:48:17.520 having this opportunity to talk to

NOTE Confidence: 0.9408569

00:48:20.760 --> 00:48:21.146 you. Awesome.

NOTE Confidence: 0.9408569

00:48:21.146 --> 00:48:22.510 Thank you so much, Doctor Krumholz.

NOTE Confidence: 0.9408569

00:48:22.510 --> 00:48:24.280 That was a very captivating talk.

NOTE Confidence: 0.9408569

00:48:24.280 --> 00:48:25.435 And I know you can't hear them,

NOTE Confidence: 0.9408569

00:48:25.440 --> 00:48:26.910 but I'm sure they're all clapping

NOTE Confidence: 0.9408569

00:48:26.910 --> 00:48:28.680 and oh, I'm sure, I'm sure

NOTE Confidence: 0.93092936

00:48:29.820 --> 00:48:30.814 awesome. So we do have a couple

NOTE Confidence: 0.93092936

00:48:30.820 --> 00:48:33.460 of questions that I'll just feel to you.

NOTE Confidence: 0.93092936

00:48:33.460 --> 00:48:35.700 One comment was about your

NOTE Confidence: 0.93092936

00:48:35.700 --> 00:48:38.460 talk about Google and how they,

NOTE Confidence: 0.93092936

00:48:38.460 --> 00:48:40.452 you know, each click and how

NOTE Confidence: 0.93092936

00:48:40.452 --> 00:48:41.780 they update the algorithms,

NOTE Confidence: 0.93092936

00:48:41.780 --> 00:48:44.700 you know, every single day.

NOTE Confidence: 0.93092936

00:48:44.700 --> 00:48:45.525 So this question,

NOTE Confidence: 0.93092936

00:48:45.525 --> 00:48:47.450 you know it's about on the comment

NOTE Confidence: 0.93092936

00:48:47.502 --> 00:48:48.874 about Google updating algorithms

NOTE Confidence: 0.93092936

00:48:48.874 --> 00:48:50.932 perhaps daily they don't need to

NOTE Confidence: 0.93092936

00:48:50.992 --> 00:48:52.417 go through an FDA approval.

NOTE Confidence: 0.93092936

00:48:52.420 --> 00:48:54.242 But is there a way, you know,

NOTE Confidence: 0.93092936

00:48:54.242 --> 00:48:56.839 once a healthcare algorithm is approved by

NOTE Confidence: 0.93092936

00:48:56.839 --> 00:48:58.904 the FDA and they and the base information,

NOTE Confidence: 0.93092936

00:48:58.904 --> 00:49:00.504 you know, that they can approve

NOTE Confidence: 0.93092936

00:49:00.504 --> 00:49:02.280 and update in an expedited fashion?

NOTE Confidence: 0.9354888

00:49:03.640 --> 00:49:05.117 Yeah, I think it's really good question.

NOTE Confidence: 0.9354888

00:49:05.120 --> 00:49:06.920 And you know I saw this with Apple,

NOTE Confidence: 0.9354888

00:49:06.920 --> 00:49:09.160 you know, I was talking to Apple

NOTE Confidence: 0.9354888

00:49:09.160 --> 00:49:11.240 about their AFIB algorithm and you

NOTE Confidence: 0.9354888

00:49:11.240 --> 00:49:12.440 know they actually made it better,

NOTE Confidence: 0.9354888

00:49:12.440 --> 00:49:13.637 they make it better all the time,

NOTE Confidence: 0.9354888

00:49:13.640 --> 00:49:15.152 but they actually can't implement it till

104

NOTE Confidence: 0.9354888

00:49:15.152 --> 00:49:16.960 they go back through an approval process.

NOTE Confidence: 0.9354888

00:49:16.960 --> 00:49:18.640 So this gets to the AI

NOTE Confidence: 0.9354888

00:49:18.640 --> 00:49:19.640 regulation piece, which is,

NOTE Confidence: 0.9354888

00:49:21.920 --> 00:49:24.321 you know, how how could this work

NOTE Confidence: 0.9354888

00:49:24.321 --> 00:49:26.318 where there was constant evaluation

NOTE Confidence: 0.9354888

00:49:26.318 --> 00:49:28.790 of the performance of an algorithm.

NOTE Confidence: 0.9354888

00:49:28.790 --> 00:49:30.956 I mean, should this be punctuated

NOTE Confidence: 0.9354888

00:49:30.956 --> 00:49:34.068 where like every year you put in a new

NOTE Confidence: 0.9354888

00:49:34.068 --> 00:49:35.819 algorithm for approval or could should

NOTE Confidence: 0.9354888

00:49:35.819 --> 00:49:37.660 it be continuous where the FDA can

NOTE Confidence: 0.9354888

00:49:37.719 --> 00:49:38.899 continually evaluate the performance

NOTE Confidence: 0.9354888

00:49:38.899 --> 00:49:41.417 of a of a model and see what's

NOTE Confidence: 0.9354888

00:49:41.417 --> 00:49:43.147 being leveraged within the company.

NOTE Confidence: 0.9354888

00:49:43.150 --> 00:49:44.655 But I think this is an area, right,

NOTE Confidence: 0.9354888

00:49:44.655 --> 00:49:46.980 for, for innovation in creative

NOTE Confidence: 0.9354888

00:49:46.980 --> 00:49:48.615 thinking because just as you

NOTE Confidence: 0.9354888

00:49:48.615 --> 00:49:49.790 say that it's higher stakes.

NOTE Confidence: 0.9354888

00:49:49.790 --> 00:49:51.270 I mean, if Google screws up a search,

NOTE Confidence: 0.9354888

00:49:51.270 --> 00:49:53.430 it's not, you know, not the big of deal.

NOTE Confidence: 0.9354888

00:49:53.430 --> 00:49:55.264 But, you know, if we're in medicine,

NOTE Confidence: 0.9354888

00:49:55.270 --> 00:49:57.358 we have to have higher standards and we

NOTE Confidence: 0.9354888

00:49:57.358 --> 00:49:59.342 have to derisk these algorithms to make

NOTE Confidence: 0.9354888

00:49:59.342 --> 00:50:00.950 sure they're doing what they're doing,

NOTE Confidence: 0.9354888

00:50:00.950 --> 00:50:04.150 You know, at the very least,

NOTE Confidence: 0.9354888

00:50:04.150 --> 00:50:06.390 even if we have to go through

NOTE Confidence: 0.9354888

00:50:06.390 --> 00:50:07.152 periodic upgrades,

NOTE Confidence: 0.9354888

00:50:07.152 --> 00:50:09.438 the the algorithm itself in the

NOTE Confidence: 0.9354888

00:50:09.438 --> 00:50:11.013 background should be capable of

NOTE Confidence: 0.9354888

00:50:11.013 --> 00:50:12.777 learning all the time and it it

NOTE Confidence: 0.9354888

00:50:12.835 --> 00:50:14.749 should also be capable of determining

NOTE Confidence: 0.9354888

00:50:14.749 --> 00:50:16.518 whether or not it's gotten worse.

NOTE Confidence: 0.9354888

00:50:16.518 --> 00:50:18.470 I mean in some ways that you may,

NOTE Confidence: 0.9354888

00:50:18.470 --> 00:50:20.350 many of you may know chats if you teach math.

NOTE Confidence: 0.9354888

00:50:20.350 --> 00:50:23.320 Some people have suggested and published,

NOTE Confidence: 0.9354888

00:50:23.320 --> 00:50:25.512 you know was worse than ChatGPT 3.5.

NOTE Confidence: 0.9354888

00:50:25.512 --> 00:50:26.640 How'd that happen?

NOTE Confidence: 0.9354888

00:50:26.640 --> 00:50:28.264 You know and you know so there needs

NOTE Confidence: 0.9354888

00:50:28.264 --> 00:50:30.364 to be ways to determine over time

NOTE Confidence: 0.9354888

00:50:30.364 --> 00:50:31.676 whether performance is degrading.

NOTE Confidence: 0.9354888

00:50:31.680 --> 00:50:32.835 It could be the patients are changing.

NOTE Confidence: 0.9354888

00:50:32.840 --> 00:50:33.880 It could be the information

NOTE Confidence: 0.9354888

00:50:33.880 --> 00:50:34.920 is changing that's coming in.

NOTE Confidence: 0.9354888

00:50:34.920 --> 00:50:36.852 It could be whole range of things

NOTE Confidence: 0.9354888

00:50:36.852 --> 00:50:38.325 that could perturb a certain model.

NOTE Confidence: 0.9354888

00:50:38.325 --> 00:50:39.830 I mean that's not unlikely it happened

NOTE Confidence: 0.9354888

00:50:39.869 --> 00:50:41.159 on the A-fib algorithm because it's

NOTE Confidence: 0.9354888

00:50:41.159 --> 00:50:42.838 just using a sensor from an Apple Watch,

NOTE Confidence: 0.9354888

00:50:42.840 --> 00:50:44.046 but but it could be happening

NOTE Confidence: 0.9354888

00:50:44.046 --> 00:50:45.440 in a lot of other ways.

NOTE Confidence: 0.9354888

00:50:45.440 --> 00:50:47.057 So I think we need to develop

NOTE Confidence: 0.9354888

00:50:47.057 --> 00:50:47.519 dynamic approaches,

NOTE Confidence: 0.9268419

00:50:49.820 --> 00:50:51.668 Yeah. And and you kind of

NOTE Confidence: 0.9268419

00:50:51.668 --> 00:50:52.900 already touched on this,

NOTE Confidence: 0.9268419

00:50:52.900 --> 00:50:53.974 this relates to kind of what

NOTE Confidence: 0.9268419

00:50:53.974 --> 00:50:55.179 you talked about in your answer.

NOTE Confidence: 0.9268419

00:50:55.180 --> 00:50:56.152 But next question,

NOTE Confidence: 0.9268419

00:50:56.152 --> 00:50:58.096 also wanted to kind of ask,

NOTE Confidence: 0.9268419

00:50:58.100 --> 00:50:58.856 you know, do you feel that a,

NOTE Confidence: 0.9268419

00:50:58.860 --> 00:51:00.659 I should be held to a higher

NOTE Confidence: 0.9268419

00:51:00.659 --> 00:51:02.152 standard than just being better

NOTE Confidence: 0.9268419

00:51:02.152 --> 00:51:04.096 than our current standard of care?

NOTE Confidence: 0.9268419

00:51:05.300 --> 00:51:06.455 I don't know. Would you take better,

108

NOTE Confidence: 0.9268419

00:51:06.460 --> 00:51:08.940 I mean, you know, it's like I'm I'm

NOTE Confidence: 0.9268419

00:51:08.940 --> 00:51:11.559 not sure any new innovation needs to

NOTE Confidence: 0.9268419

00:51:11.559 --> 00:51:14.240 be evaluated based on what benefit it

NOTE Confidence: 0.9268419

00:51:14.240 --> 00:51:17.840 provides and at what risk and at what cost.

NOTE Confidence: 0.9268419

00:51:17.840 --> 00:51:20.965 And so, you know, if it if it's better

NOTE Confidence: 0.9318973

00:51:23.010 --> 00:51:25.770 then you know, I I don't know what it means

NOTE Confidence: 0.9318973

00:51:25.770 --> 00:51:28.647 and maybe the questioner could clarify that.

NOTE Confidence: 0.9318973

00:51:28.650 --> 00:51:30.528 What would a higher standard mean?

NOTE Confidence: 0.9318973

00:51:30.530 --> 00:51:32.450 I mean to me it's there's so many

NOTE Confidence: 0.9318973

00:51:32.450 --> 00:51:33.650 things that we integrate into medicine.

NOTE Confidence: 0.9318973

00:51:33.650 --> 00:51:34.666 I mean robotic surgery,

NOTE Confidence: 0.9318973

00:51:34.666 --> 00:51:36.190 I mean it's never really been

NOTE Confidence: 0.9318973

00:51:36.242 --> 00:51:37.490 shown to improve outcomes.

NOTE Confidence: 0.9318973

00:51:37.490 --> 00:51:38.610 It costs millions of dollars.

NOTE Confidence: 0.9318973

00:51:38.610 --> 00:51:40.610 It's mostly used for advertising.

NOTE Confidence: 0.9318973

00:51:40.610 --> 00:51:42.170 You know, it's like, yeah,

NOTE Confidence: 0.9318973

00:51:42.170 --> 00:51:43.526 I don't think that was good,

NOTE Confidence: 0.9318973

00:51:43.530 --> 00:51:44.970 you know, to do that.

NOTE Confidence: 0.9318973

00:51:44.970 --> 00:51:47.394 You know, it it it maybe it's more

NOTE Confidence: 0.9318973

00:51:47.394 --> 00:51:48.696 fun for the surgeons, I don't know.

NOTE Confidence: 0.9318973

00:51:48.696 --> 00:51:49.788 But it's like I don't know,

NOTE Confidence: 0.9318973

00:51:49.790 --> 00:51:51.106 I'm not sure the benefit it's driving.

NOTE Confidence: 0.9318973

00:51:51.110 --> 00:51:51.776 We should be,

NOTE Confidence: 0.9318973

00:51:51.776 --> 00:51:52.886 we should be applying high

NOTE Confidence: 0.9318973

00:51:52.886 --> 00:51:54.059 standards to everything that

NOTE Confidence: 0.9318973

00:51:54.059 --> 00:51:55.427 gets implemented within medicine.

NOTE Confidence: 0.9318973

00:51:55.430 --> 00:51:57.550 We should be valuing it in those dimensions,

NOTE Confidence: 0.9318973

00:51:57.550 --> 00:51:57.888 safety,

NOTE Confidence: 0.9318973

00:51:57.888 --> 00:51:59.240 effectiveness and cost and

NOTE Confidence: 0.9318973

00:51:59.240 --> 00:52:01.383 figuring out how do we better

NOTE Confidence: 0.9318973

00:52:01.383 --> 00:52:02.947 serve the patient's needs.

NOTE Confidence: 0.9263494

00:52:06.510 --> 00:52:09.950 All right. So the next question you know

NOTE Confidence: 0.9263494

00:52:09.950 --> 00:52:12.259 ask you know considering you know certain

NOTE Confidence: 0.9263494

00:52:12.259 --> 00:52:14.317 specialties that rely very heavily on

NOTE Confidence: 0.9263494

00:52:14.317 --> 00:52:16.609 image analysis and pattern recognition.

NOTE Confidence: 0.9263494

00:52:16.610 --> 00:52:18.418 Do you think that a I would eventually

NOTE Confidence: 0.9263494

00:52:18.418 --> 00:52:20.781 replace you know specialties such as you

NOTE Confidence: 0.9263494

00:52:20.781 --> 00:52:23.010 know pathology or radiology in the future.

NOTE Confidence: 0.9128876

00:52:23.690 --> 00:52:25.280 You know look if you're heavily

NOTE Confidence: 0.9128876

00:52:25.280 --> 00:52:26.668 reliant on on pattern recognition

NOTE Confidence: 0.9128876

00:52:26.668 --> 00:52:29.060 then it's up to you as a specialty

NOTE Confidence: 0.9128876

00:52:29.060 --> 00:52:31.321 to show you what your value added

NOTE Confidence: 0.9128876

00:52:31.321 --> 00:52:33.250 is beyond pattern recognition.

NOTE Confidence: 0.9128876

00:52:33.250 --> 00:52:35.522 I I do believe there will be a

NOTE Confidence: 0.9128876

00:52:35.522 --> 00:52:37.770 day where the pattern recognition

NOTE Confidence: 0.9128876

00:52:37.770 --> 00:52:40.010 software will be able to provide

NOTE Confidence: 0.9269565

00:52:42.490 --> 00:52:44.668 comprehensive information about

NOTE Confidence: 0.9269565

00:52:44.668 --> 00:52:47.891 images and and and signals, right.

NOTE Confidence: 0.9269565

00:52:47.891 --> 00:52:49.973 And so I think that the

NOTE Confidence: 0.9269565

00:52:49.973 --> 00:52:51.687 essence of medicine will be

NOTE Confidence: 0.9269565

00:52:54.010 --> 00:52:55.635 for individual patients and and

NOTE Confidence: 0.9269565

00:52:55.635 --> 00:52:58.230 the human touch. How do you bring

NOTE Confidence: 0.9269565

00:52:58.230 --> 00:53:00.054 that information into a system?

NOTE Confidence: 0.9269565

00:53:00.054 --> 00:53:02.058 I mean what role does it play?

NOTE Confidence: 0.9269565

00:53:02.058 --> 00:53:04.250 I mean in the same way you could say

NOTE Confidence: 0.9269565

00:53:04.250 --> 00:53:05.576 will we have selfdriving cars with

NOTE Confidence: 0.9269565

00:53:05.576 --> 00:53:07.090 you always need to have a driver.

NOTE Confidence: 0.9269565

00:53:07.090 --> 00:53:08.896 Will you have do you need

NOTE Confidence: 0.9269565

00:53:08.896 --> 00:53:10.100 pilots in the cockpit.

NOTE Confidence: 0.9269565

00:53:10.100 --> 00:53:10.812 You know, I, I,

NOTE Confidence: 0.9269565

00:53:10.812 --> 00:53:12.082 you know the safe thing to say

NOTE Confidence: 0.9269565

00:53:12.082 --> 00:53:13.495 about this is in the way the AM a

NOTE Confidence: 0.9269565

00:53:13.538 --> 00:53:15.234 loves to talk about it so it doesn't

NOTE Confidence: 0.9269565

00:53:15.234 --> 00:53:17.170 offend anyone is to say you know

NOTE Confidence: 0.9269565

00:53:17.170 --> 00:53:18.378 this is augmented intelligence.

NOTE Confidence: 0.9269565

00:53:18.380 --> 00:53:20.980 We help humans perform better.

NOTE Confidence: 0.9269565

00:53:20.980 --> 00:53:23.140 But I think there may be a day where

NOTE Confidence: 0.9269565

00:53:23.140 --> 00:53:26.155 there at least is a requirement

NOTE Confidence: 0.9269565

00:53:26.155 --> 00:53:28.476 for fewer people to be able to

NOTE Confidence: 0.9269565

00:53:28.476 --> 00:53:29.296 provide the kind of oversight.

NOTE Confidence: 0.9269565

00:53:29.300 --> 00:53:31.050 I mean I'm not sure as humans

NOTE Confidence: 0.9269565

00:53:31.050 --> 00:53:32.954 that we will ever be completely

NOTE Confidence: 0.9269565

00:53:32.954 --> 00:53:35.138 comfortable with not having a human,

NOTE Confidence: 0.9269565

00:53:35.140 --> 00:53:37.247 you know, in in in the loop.

NOTE Confidence: 0.9269565

00:53:37.250 --> 00:53:39.294 You know it it it at least

NOTE Confidence: 0.9269565

00:53:39.294 --> 00:53:40.969 provides a degree of comfort,

NOTE Confidence: 0.9269565

00:53:40.970 --> 00:53:42.812 someone you can talk to interact

NOTE Confidence: 0.9269565

00:53:42.812 --> 00:53:45.066 with on a human basis and someone

NOTE Confidence: 0.9269565

00:53:45.066 --> 00:53:47.078 who has expertise that can

NOTE Confidence: 0.9269565

00:53:47.078 --> 00:53:48.810 help manage complex systems.

NOTE Confidence: 0.9269565

00:53:48.810 --> 00:53:50.754 But the question is will it

NOTE Confidence: 0.9269565

00:53:50.754 --> 00:53:52.370 ultimately enable us to say,

NOTE Confidence: 0.9269565

00:53:52.370 --> 00:53:54.710 you know one radiologist can actually

NOTE Confidence: 0.9269565

00:53:54.710 --> 00:53:57.298 oversee a larger number of a larger

NOTE Confidence: 0.9269565

00:53:57.298 --> 00:53:59.218 workload because the way in which

NOTE Confidence: 0.9269565

00:53:59.218 --> 00:54:01.288 this is going and and again this

NOTE Confidence: 0.9269565

00:54:01.288 --> 00:54:03.124 is you'd have to validate this.

NOTE Confidence: 0.9269565

00:54:03.130 --> 00:54:04.930 But but by the way our current system

NOTE Confidence: 0.9269565

00:54:04.930 --> 00:54:06.740 depending on humans is rife with errors too.

NOTE Confidence: 0.9269565

00:54:06.740 --> 00:54:08.572 So you know we we have to sort

NOTE Confidence: 0.9269565

00:54:08.572 --> 00:54:09.380 of manage this.

NOTE Confidence: 0.9269565

00:54:09.380 --> 00:54:12.158 I I don't have a position on it

NOTE Confidence: 0.9269565

00:54:12.158 --> 00:54:14.630 as much as think I want to be open

NOTE Confidence: 0.9269565

00:54:14.630 --> 00:54:16.700 minded about what's best for patients.

NOTE Confidence: 0.9269565

00:54:16.700 --> 00:54:18.636 And so then I don't want to there

NOTE Confidence: 0.9269565

00:54:18.636 --> 00:54:20.346 never should be a goal to say my

NOTE Confidence: 0.9269565

00:54:20.346 --> 00:54:21.811 goal is to ensure the persistence

NOTE Confidence: 0.9269565

00:54:21.811 --> 00:54:24.023 of my specialty or to ensure the

NOTE Confidence: 0.9269565

00:54:24.023 --> 00:54:25.444 persistence of my institutional

NOTE Confidence: 0.9269565

00:54:25.444 --> 00:54:27.652 organization or the way it exists.

NOTE Confidence: 0.9269565

00:54:27.660 --> 00:54:29.804 Because of the way it is we should

NOTE Confidence: 0.9269565

00:54:29.804 --> 00:54:32.498 always be thinking what is the ideal

NOTE Confidence: 0.9269565

00:54:32.498 --> 00:54:33.836 optimal configuration that provides

NOTE Confidence: 0.9269565

00:54:33.836 --> 00:54:35.572 the very best outcomes for our patients.

NOTE Confidence: 0.9269565

00:54:35.580 --> 00:54:38.464 And and by the way outcomes also

NOTE Confidence: 0.9269565

00:54:38.464 --> 00:54:40.090 includes their experience how

NOTE Confidence: 0.9269565

00:54:40.090 --> 00:54:42.175 they feel about it not just did

NOTE Confidence: 0.9269565

00:54:42.175 --> 00:54:43.540 they live or die or get get,

NOTE Confidence: 0.9269565

00:54:43.540 --> 00:54:45.260 you know are they healthier.

NOTE Confidence: 0.9269565

00:54:45.260 --> 00:54:47.738 But it will also be about their

NOTE Confidence: 0.9269565

00:54:47.738 --> 00:54:49.924 experience of the care because there,

NOTE Confidence: 0.9269565

00:54:49.924 --> 00:54:51.396 you know This is why I don't think

NOTE Confidence: 0.9269565

00:54:51.396 --> 00:54:53.110 that you know people aren't going

NOTE Confidence: 0.9269565

00:54:53.110 --> 00:54:55.264 to go away because kind of comfort

NOTE Confidence: 0.9269565

00:54:55.264 --> 00:54:56.804 you provide the the guidance

NOTE Confidence: 0.9269565

00:54:56.804 --> 00:54:58.772 the the help through difficult

NOTE Confidence: 0.9269565

00:54:58.772 --> 00:55:00.496 situations the holding vans.

NOTE Confidence: 0.9269565

00:55:00.500 --> 00:55:02.145 You know that there's an

NOTE Confidence: 0.9269565

00:55:02.145 --> 00:55:03.461 essential feature of medicine

NOTE Confidence: 0.9269565

00:55:03.461 --> 00:55:05.148 that's about the human aspects.

NOTE Confidence: 0.9269565

00:55:05.150 --> 00:55:07.264 But but the question is can this

NOTE Confidence: 0.9269565

00:55:07.264 --> 00:55:09.089 technology help us perform so much

NOTE Confidence: 0.9269565

00:55:09.089 --> 00:55:11.297 better and be maybe leverage you

NOTE Confidence: 0.9269565

00:55:11.297 --> 00:55:13.991 know force multiply our efforts in

NOTE Confidence: 0.9269565

00:55:13.991 --> 00:55:16.120 ways that that allows us to cover

NOTE Confidence: 0.9269565

00:55:16.120 --> 00:55:17.703 more people more efficiently in ways

NOTE Confidence: 0.9269565

00:55:17.703 --> 00:55:19.383 without losing the human part of it.

NOTE Confidence: 0.9360469

00:55:22.790 --> 00:55:25.670 Awesome. We have one more question.

NOTE Confidence: 0.9360469

00:55:25.670 --> 00:55:26.990 Do you feel that there

NOTE Confidence: 0.9360469

00:55:26.990 --> 00:55:28.310 are issues in applying AI,

NOTE Confidence: 0.9360469

00:55:28.310 --> 00:55:30.242 you know that it's derive from a

NOTE Confidence: 0.9360469

00:55:30.242 --> 00:55:31.694 large population based model to

NOTE Confidence: 0.9360469

00:55:31.694 --> 00:55:33.124 a more local healthcare system.

NOTE Confidence: 0.9360469

00:55:33.130 --> 00:55:33.970 So now it was like you know,

NOTE Confidence: 0.9360469

00:55:33.970 --> 00:55:36.338 other ways to kind of adjust you know,

NOTE Confidence: 0.9360469

00:55:36.338 --> 00:55:38.326 a large population data into a more,

NOTE Confidence: 0.9360469

00:55:38.330 --> 00:55:39.850 you know, local area.

NOTE Confidence: 0.9247298

00:55:40.050 --> 00:55:40.968 Yeah, I think that's a really,

NOTE Confidence: 0.9247298

00:55:40.970 --> 00:55:41.813 really good question.

NOTE Confidence: 0.9247298

117

00:55:41.813 --> 00:55:43.780 And by the way we don't do

NOTE Confidence: 0.9247298

00:55:43.843 --> 00:55:45.247 a good job of that mess.

NOTE Confidence: 0.9247298

00:55:45.250 --> 00:55:46.890 I mean that Chads Vasco is an example,

NOTE Confidence: 0.9247298

00:55:46.890 --> 00:55:48.650 we have one Chads Vasco for the entire

NOTE Confidence: 0.9247298

00:55:48.650 --> 00:55:50.375 world and yet you know you have a

NOTE Confidence: 0.9247298

00:55:50.375 --> 00:55:51.869 stroke belt where the risk of stroke

NOTE Confidence: 0.9247298

00:55:51.869 --> 00:55:53.810 has been 50% higher than is in New Haven.

NOTE Confidence: 0.9247298

00:55:53.810 --> 00:55:55.730 But we don't do any calibration

NOTE Confidence: 0.9247298

00:55:55.730 --> 00:55:57.404 of that model. I you know,

NOTE Confidence: 0.9247298

00:55:57.404 --> 00:55:59.064 I believe that in the future probably

NOTE Confidence: 0.9247298

00:55:59.064 --> 00:56:00.786 there's going to be fine tuning of

NOTE Confidence: 0.9247298

00:56:00.786 --> 00:56:02.358 models that you know where appropriate,

NOTE Confidence: 0.9247298

00:56:02.360 --> 00:56:05.160 when there are specifics to to populations

NOTE Confidence: 0.9247298

00:56:05.160 --> 00:56:08.038 that need to be taken into account.

NOTE Confidence: 0.9247298

00:56:08.040 --> 00:56:09.475 And if there's any question about that,

NOTE Confidence: 0.9247298

00:56:09.480 --> 00:56:10.999 if we get to precision medicine world,

NOTE Confidence: 0.9247298

00:56:11.000 --> 00:56:13.088 we want to be able to have our

NOTE Confidence: 0.9247298

00:56:13.088 --> 00:56:14.948 information be as specific to that

NOTE Confidence: 0.9247298

00:56:14.948 --> 00:56:16.543 individual if we're using models

NOTE Confidence: 0.9247298

00:56:16.543 --> 00:56:18.520 or maybe maybe corrections or fine

NOTE Confidence: 0.9247298

00:56:18.520 --> 00:56:20.872 tuning that needs to be done in

NOTE Confidence: 0.9247298

00:56:20.872 --> 00:56:23.504 order to to make sure that it's

NOTE Confidence: 0.9247298

00:56:23.504 --> 00:56:24.840 performance is best for that group.

NOTE Confidence: 0.9247298

00:56:24.840 --> 00:56:25.520 And and by the way,

NOTE Confidence: 0.9247298

00:56:25.520 --> 00:56:27.168 this is an issue that comes up where

NOTE Confidence: 0.9247298

00:56:27.168 --> 00:56:29.124 maybe if you've got for example white

NOTE Confidence: 0.9247298

00:56:29.124 --> 00:56:30.614 populations but you haven't included

NOTE Confidence: 0.9247298

00:56:30.667 --> 00:56:32.209 black populations or you know you

NOTE Confidence: 0.9247298

00:56:32.209 --> 00:56:34.074 don't have an included diversity of

NOTE Confidence: 0.9247298

00:56:34.074 --> 00:56:36.159 people within the training models,

NOTE Confidence: 0.9247298

00:56:36.160 --> 00:56:38.904 you can potentially be getting output

NOTE Confidence: 0.9247298

00:56:38.904 --> 00:56:40.600 that's not as relevant to the entire group.

NOTE Confidence: 0.9247298

00:56:40.600 --> 00:56:42.160 So it really is incumbent upon us to

NOTE Confidence: 0.9247298

00:56:42.160 --> 00:56:43.877 make sure that it is equally applicable.

NOTE Confidence: 0.933982

00:56:46.000 --> 00:56:50.520 Awesome. So we are just about at 1:00.

NOTE Confidence: 0.933982

00:56:50.520 --> 00:56:53.433 I don't see any more. Awesome.

NOTE Confidence: 0.933982

00:56:53.433 --> 00:56:55.777 Yeah, I don't see any more questions anymore.

NOTE Confidence: 0.933982

00:56:55.780 --> 00:56:57.016 Once again, thank you so much,

NOTE Confidence: 0.933982

00:56:57.020 --> 00:56:57.936 Doctor Krumholtz,

NOTE Confidence: 0.933982

00:56:57.936 --> 00:57:00.684 for joining us on our perspectives

NOTE Confidence: 0.933982

00:57:00.684 --> 00:57:03.206 lecture and for giving a very great

NOTE Confidence: 0.933982

00:57:03.206 --> 00:57:05.654 talk on AI and health and information age.

NOTE Confidence: 0.933982

00:57:05.660 --> 00:57:08.333 And thank you everyone for coming in today.

NOTE Confidence: 0.933982

00:57:08.333 --> 00:57:09.952 I just want to, you know,

NOTE Confidence: 0.933982

00:57:09.952 --> 00:57:13.808 put on one more vouch for Doctor Krumholtz.

NOTE Confidence: 0.933982

00:57:13.808 --> 00:57:16.676 And Doctor Foreman's podcast can

NOTE Confidence: 0.933982

00:57:16.676 --> 00:57:19.550 attest that it's, it's very good.

NOTE Confidence: 0.933982

00:57:19.550 --> 00:57:21.110 I'll just say that.

NOTE Confidence: 0.933982

00:57:21.110 --> 00:57:21.770 Thank you so much.

NOTE Confidence: 0.933982

00:57:21.770 --> 00:57:23.310 Thank you so much for that and.