

WEBVTT

NOTE duration:"00:52:41"

NOTE recognizability:0.877

NOTE language:en-us

NOTE Confidence: 0.70440453

00:00:10.510 --> 00:00:12.498 Alright, so good afternoon everyone.

NOTE Confidence: 0.70440453

00:00:12.498 --> 00:00:14.370 I'm going to start with a

NOTE Confidence: 0.907294767368421

00:00:14.434 --> 00:00:16.030 few quick announcements before

NOTE Confidence: 0.907294767368421

00:00:16.030 --> 00:00:18.025 I introduce our speaker today.

NOTE Confidence: 0.907294767368421

00:00:18.030 --> 00:00:20.304 First, the Sleep seminar lectures are

NOTE Confidence: 0.907294767368421

00:00:20.304 --> 00:00:22.530 available for CME credit when viewed

NOTE Confidence: 0.907294767368421

00:00:22.530 --> 00:00:24.770 in real time and to receive credit,

NOTE Confidence: 0.907294767368421

00:00:24.770 --> 00:00:27.146 just text the ID for the lecture to Yale

NOTE Confidence: 0.907294767368421

00:00:27.146 --> 00:00:29.596 Cloud CME by 3:15 PM today and there'll

NOTE Confidence: 0.907294767368421

00:00:29.596 --> 00:00:31.597 be more information on how to do that.

NOTE Confidence: 0.907294767368421

00:00:31.600 --> 00:00:33.763 Showing up in the chat and recordings

NOTE Confidence: 0.907294767368421

00:00:33.763 --> 00:00:35.443 of these lectures are available

NOTE Confidence: 0.907294767368421

00:00:35.443 --> 00:00:37.183 approximately 2 weeks after other

NOTE Confidence: 0.907294767368421

00:00:37.183 --> 00:00:39.577 lecture at the site noted in the chat.

NOTE Confidence: 0.907294767368421

00:00:39.580 --> 00:00:41.460 On these viewings are not

NOTE Confidence: 0.907294767368421

00:00:41.460 --> 00:00:42.588 available for credit.

NOTE Confidence: 0.907294767368421

00:00:42.590 --> 00:00:44.200 If you have questions during the talk,

NOTE Confidence: 0.907294767368421

00:00:44.200 --> 00:00:45.929 please just use the chat and we

NOTE Confidence: 0.907294767368421

00:00:45.929 --> 00:00:47.280 will address them at the end,

NOTE Confidence: 0.907294767368421

00:00:47.280 --> 00:00:49.020 and please keep your

NOTE Confidence: 0.907294767368421

00:00:49.020 --> 00:00:50.325 microphone muted otherwise,

NOTE Confidence: 0.907294767368421

00:00:50.330 --> 00:00:52.703 so now it is my pleasure to

NOTE Confidence: 0.907294767368421

00:00:52.703 --> 00:00:54.300 introduce today's seminar speaker,

NOTE Confidence: 0.907294767368421

00:00:54.300 --> 00:00:55.215 Dr Miranda Tam.

NOTE Confidence: 0.907294767368421

00:00:55.215 --> 00:00:57.045 Doctor Tan is the director of

NOTE Confidence: 0.907294767368421

00:00:57.045 --> 00:00:59.064 Sleep Medicine at Memorial Sloan

NOTE Confidence: 0.907294767368421

00:00:59.064 --> 00:01:00.716 Kettering Medical Center and

NOTE Confidence: 0.907294767368421

00:01:00.716 --> 00:01:02.320 an instructor of medicine.

NOTE Confidence: 0.907294767368421

00:01:02.320 --> 00:01:04.590 At Weill Cornell Medical College?

NOTE Confidence: 0.907294767368421

00:01:04.590 --> 00:01:06.084 She received her medical degree from

NOTE Confidence: 0.907294767368421

00:01:06.084 --> 00:01:07.401 New York College of Osteopathic

NOTE Confidence: 0.907294767368421

00:01:07.401 --> 00:01:09.051 Medicine and then moved to New

NOTE Confidence: 0.907294767368421

00:01:09.051 --> 00:01:10.330 Jersey for internal medicine,

NOTE Confidence: 0.907294767368421

00:01:10.330 --> 00:01:13.130 internship and residency at Rutgers.

NOTE Confidence: 0.907294767368421

00:01:13.130 --> 00:01:13.694 After that,

NOTE Confidence: 0.907294767368421

00:01:13.694 --> 00:01:15.386 she served as chief resident for

NOTE Confidence: 0.907294767368421

00:01:15.386 --> 00:01:17.087 quality and Patient safety and

NOTE Confidence: 0.907294767368421

00:01:17.087 --> 00:01:18.527 internal medicine at Dartmouth.

NOTE Confidence: 0.907294767368421

00:01:18.530 --> 00:01:20.828 And she completed her pulmonary and

NOTE Confidence: 0.907294767368421

00:01:20.828 --> 00:01:22.360 critical Care Medicine Fellowship

NOTE Confidence: 0.907294767368421

00:01:22.425 --> 00:01:23.913 at Thomas Jefferson University

NOTE Confidence: 0.907294767368421

00:01:23.913 --> 00:01:25.773 and her Sleep Medicine Fellowship

NOTE Confidence: 0.907294767368421

00:01:25.773 --> 00:01:27.708 at University of Pennsylvania.

NOTE Confidence: 0.907294767368421

00:01:27.710 --> 00:01:29.192 From there she moved to Memorial

NOTE Confidence: 0.907294767368421

00:01:29.192 --> 00:01:29.686 Sloan Kettering,  
NOTE Confidence: 0.907294767368421

00:01:29.690 --> 00:01:31.808 which she founded the Sleep Medicine  
NOTE Confidence: 0.907294767368421

00:01:31.808 --> 00:01:33.710 program within the pulmonary service,  
NOTE Confidence: 0.907294767368421

00:01:33.710 --> 00:01:35.586 and her work has led to the  
NOTE Confidence: 0.907294767368421

00:01:35.586 --> 00:01:37.523 revision of the Presurgical sleep  
NOTE Confidence: 0.907294767368421

00:01:37.523 --> 00:01:39.647 apnea screening guidelines there.  
NOTE Confidence: 0.907294767368421

00:01:39.650 --> 00:01:40.057 Plus,  
NOTE Confidence: 0.907294767368421

00:01:40.057 --> 00:01:42.092 she has established several clinical  
NOTE Confidence: 0.907294767368421

00:01:42.092 --> 00:01:44.310 patient pathways with other programs,  
NOTE Confidence: 0.907294767368421

00:01:44.310 --> 00:01:45.850 including with the male  
NOTE Confidence: 0.907294767368421

00:01:45.850 --> 00:01:47.005 sexual reproductive program,  
NOTE Confidence: 0.907294767368421

00:01:47.010 --> 00:01:48.742 the Integrative Medicine program,  
NOTE Confidence: 0.907294767368421

00:01:48.742 --> 00:01:50.907 and the bone marrow Transplant  
NOTE Confidence: 0.907294767368421

00:01:50.907 --> 00:01:51.790 Survivorship clinic,  
NOTE Confidence: 0.907294767368421

00:01:51.790 --> 00:01:53.746 among other awards that she's received,  
NOTE Confidence: 0.907294767368421

00:01:53.750 --> 00:01:55.916 she received a junior Faculty Development

NOTE Confidence: 0.907294767368421

00:01:55.916 --> 00:01:57.980 award at Memorial Sloan Kettering.

NOTE Confidence: 0.907294767368421

00:01:57.980 --> 00:02:00.044 She's an active member of the ATS and

NOTE Confidence: 0.907294767368421

00:02:00.044 --> 00:02:01.707 is currently serving on a working

NOTE Confidence: 0.907294767368421

00:02:01.707 --> 00:02:03.345 group to develop an official ATS

NOTE Confidence: 0.907294767368421

00:02:03.406 --> 00:02:04.966 research statement regarding cancer

NOTE Confidence: 0.907294767368421

00:02:04.966 --> 00:02:06.916 related fatigue and lung cancer.

NOTE Confidence: 0.907294767368421

00:02:06.920 --> 00:02:08.664 She is also a member of the American

NOTE Confidence: 0.907294767368421

00:02:08.664 --> 00:02:10.411 Academy of Sleep Medicine and a Fellow

NOTE Confidence: 0.907294767368421

00:02:10.411 --> 00:02:12.510 of the American College of Chest Physicians.

NOTE Confidence: 0.907294767368421

00:02:12.510 --> 00:02:14.150 Her research focuses on the

NOTE Confidence: 0.907294767368421

00:02:14.150 --> 00:02:15.462 predictors of obstructive sleep

NOTE Confidence: 0.907294767368421

00:02:15.462 --> 00:02:16.849 apnea and cancer patients,

NOTE Confidence: 0.907294767368421

00:02:16.850 --> 00:02:18.462 specifically using machine learning

NOTE Confidence: 0.907294767368421

00:02:18.462 --> 00:02:21.332 and on the prevalence and severity of

NOTE Confidence: 0.907294767368421

00:02:21.332 --> 00:02:23.648 obstructive sleep apnea in men with

NOTE Confidence: 0.907294767368421

00:02:23.648 --> 00:02:25.330 polycythemia on testosterone therapy.  
NOTE Confidence: 0.907294767368421

00:02:25.330 --> 00:02:26.850 She presented 4 abstracts at  
NOTE Confidence: 0.907294767368421

00:02:26.850 --> 00:02:28.066 the most recent ATS,  
NOTE Confidence: 0.907294767368421

00:02:28.070 --> 00:02:30.270 including one entitled Machine Learning  
NOTE Confidence: 0.907294767368421

00:02:30.270 --> 00:02:32.470 validated screening tool to predict  
NOTE Confidence: 0.907294767368421

00:02:32.534 --> 00:02:35.060 obstructive sleep apnea in cancer patients.  
NOTE Confidence: 0.907294767368421

00:02:35.060 --> 00:02:37.034 So we are so fortunate to have  
NOTE Confidence: 0.907294767368421

00:02:37.034 --> 00:02:39.038 Doctor Tan joins us today to  
NOTE Confidence: 0.907294767368421

00:02:39.038 --> 00:02:40.868 discuss machine learning and OSA  
NOTE Confidence: 0.907294767368421

00:02:40.868 --> 00:02:42.800 dreaming towards the future welcome.  
NOTE Confidence: 0.91242012

00:02:45.800 --> 00:02:47.701 Thank you for the introduction. Dr.  
NOTE Confidence: 0.91242012

00:02:47.701 --> 00:02:50.106 Hilbert and good afternoon everyone.  
NOTE Confidence: 0.91242012

00:02:50.110 --> 00:02:51.234 Thanks for tuning in.  
NOTE Confidence: 0.91242012

00:02:51.234 --> 00:02:52.920 I'm delighted to present my talk,  
NOTE Confidence: 0.91242012

00:02:52.920 --> 00:02:55.232 machine learning and OSA  
NOTE Confidence: 0.91242012

00:02:55.232 --> 00:02:57.544 dreaming towards the future.

NOTE Confidence: 0.91242012

00:02:57.550 --> 00:02:58.750 So as the title suggests,

NOTE Confidence: 0.91242012

00:02:58.750 --> 00:03:01.086 the purpose of this talk is to provide

NOTE Confidence: 0.91242012

00:03:01.086 --> 00:03:03.057 an overview of machine learning and

NOTE Confidence: 0.91242012

00:03:03.057 --> 00:03:05.456 discuss how we can integrate Emil to

NOTE Confidence: 0.91242012

00:03:05.456 --> 00:03:07.624 improve our understanding of OSA and

NOTE Confidence: 0.91242012

00:03:07.624 --> 00:03:10.408 hopefully move the needle closer towards

NOTE Confidence: 0.91242012

00:03:10.408 --> 00:03:12.730 personalized medicine for our patients,

NOTE Confidence: 0.91242012

00:03:12.730 --> 00:03:14.645 specifically the objectives of our

NOTE Confidence: 0.91242012

00:03:14.645 --> 00:03:17.070 discussion will be to review basic

NOTE Confidence: 0.91242012

00:03:17.070 --> 00:03:18.866 approaches of machine learning,

NOTE Confidence: 0.91242012

00:03:18.870 --> 00:03:20.534 described potential data sources

NOTE Confidence: 0.91242012

00:03:20.534 --> 00:03:23.030 for mill in obstructive sleep apnea,

NOTE Confidence: 0.91242012

00:03:23.030 --> 00:03:28.560 and identify opportunities for mill in OSA.

NOTE Confidence: 0.91242012

00:03:28.560 --> 00:03:30.548 As for obligatory disclosures,

NOTE Confidence: 0.91242012

00:03:30.548 --> 00:03:33.465 I have none, but I can offer you

NOTE Confidence: 0.91242012

00:03:33.465 --> 00:03:35.440 the code to obtain CME credit.  
NOTE Confidence: 0.91242012

00:03:35.440 --> 00:03:36.800 That's 28436.  
NOTE Confidence: 0.91242012

00:03:36.800 --> 00:03:41.170 That's again, that's 28436.  
NOTE Confidence: 0.91242012

00:03:41.170 --> 00:03:42.415 As for disclaimers,  
NOTE Confidence: 0.91242012

00:03:42.415 --> 00:03:44.905 I am not a data scientist.  
NOTE Confidence: 0.91242012

00:03:44.910 --> 00:03:47.430 I did some programming in college  
NOTE Confidence: 0.91242012

00:03:47.430 --> 00:03:50.078 where being referred to as novice  
NOTE Confidence: 0.91242012

00:03:50.078 --> 00:03:51.850 would be an overstatement.  
NOTE Confidence: 0.91242012

00:03:51.850 --> 00:03:53.395 The information I am presenting  
NOTE Confidence: 0.91242012

00:03:53.395 --> 00:03:56.173 to you today is to the lens of  
NOTE Confidence: 0.91242012

00:03:56.173 --> 00:03:58.118 a clinician with a background  
NOTE Confidence: 0.91242012

00:03:58.118 --> 00:03:59.873 through collaboration with data  
NOTE Confidence: 0.91242012

00:03:59.873 --> 00:04:01.685 scientists and computer engineers.  
NOTE Confidence: 0.91242012

00:04:01.690 --> 00:04:03.165 And my second disclaimer for  
NOTE Confidence: 0.91242012

00:04:03.165 --> 00:04:05.755 you is that this is going to be  
NOTE Confidence: 0.91242012

00:04:05.755 --> 00:04:07.159 a Prezi presentation format,



NOTE Confidence: 0.91242012

00:04:07.160 --> 00:04:09.770 so in contrast to traditional

NOTE Confidence: 0.91242012

00:04:09.770 --> 00:04:10.814 Microsoft PowerPoint,

NOTE Confidence: 0.91242012

00:04:10.820 --> 00:04:12.605 this has an interactive zoom

NOTE Confidence: 0.91242012

00:04:12.605 --> 00:04:14.033 which may induce nausea.

NOTE Confidence: 0.91242012

00:04:14.040 --> 00:04:15.756 So sorry in advance if you

NOTE Confidence: 0.91242012

00:04:15.756 --> 00:04:16.614 develop motion sickness.

NOTE Confidence: 0.722204439090909

00:04:19.610 --> 00:04:22.333 So the applications of AI and milk

NOTE Confidence: 0.722204439090909

00:04:22.333 --> 00:04:24.090 are ubiquitous throughout society.

NOTE Confidence: 0.722204439090909

00:04:24.090 --> 00:04:27.290 Then say I, Netflix knows which shows to,

NOTE Confidence: 0.722204439090909

00:04:27.290 --> 00:04:29.740 recommend to us it can redirect my

NOTE Confidence: 0.722204439090909

00:04:29.740 --> 00:04:32.399 car when it's drifting out of lane,

NOTE Confidence: 0.722204439090909

00:04:32.400 --> 00:04:34.860 and Alexa can understand my mumblings

NOTE Confidence: 0.722204439090909

00:04:34.860 --> 00:04:37.638 after I've trained it to understand me

NOTE Confidence: 0.722204439090909

00:04:37.638 --> 00:04:40.635 over the past two years. But you know,

NOTE Confidence: 0.722204439090909

00:04:40.635 --> 00:04:43.032 before discussing the prospects for OSA,

NOTE Confidence: 0.722204439090909

00:04:43.032 --> 00:04:46.008 we should start with some basics to ensure  
NOTE Confidence: 0.722204439090909

00:04:46.008 --> 00:04:48.846 everyone in our audience is on the same page.  
NOTE Confidence: 0.722204439090909

00:04:48.850 --> 00:04:52.574 So AI and Emily are often used  
NOTE Confidence: 0.722204439090909

00:04:52.574 --> 00:04:54.773 interchangeably similar to COPD,  
NOTE Confidence: 0.722204439090909

00:04:54.773 --> 00:04:57.788 chronic bronchitis, asthma, COPD etc.  
NOTE Confidence: 0.722204439090909

00:04:57.790 --> 00:04:59.615 Yeah, we all know there  
NOTE Confidence: 0.722204439090909

00:04:59.615 --> 00:05:00.710 are subtle differences.  
NOTE Confidence: 0.722204439090909

00:05:00.710 --> 00:05:04.610 Artificial intelligence is defined as the  
NOTE Confidence: 0.722204439090909

00:05:04.610 --> 00:05:08.359 simulation of human intelligence by machines.  
NOTE Confidence: 0.722204439090909

00:05:08.360 --> 00:05:11.416 Picture of this AI is is like this  
NOTE Confidence: 0.722204439090909

00:05:11.416 --> 00:05:13.430 large umbrella term within AI.  
NOTE Confidence: 0.722204439090909

00:05:13.430 --> 00:05:15.890 There is a machine learning machine  
NOTE Confidence: 0.722204439090909

00:05:15.890 --> 00:05:18.393 learning or the algorithms that can  
NOTE Confidence: 0.722204439090909

00:05:18.393 --> 00:05:22.590 recognize trends and patterns from data.  
NOTE Confidence: 0.722204439090909

00:05:22.590 --> 00:05:24.710 And then there's deep learning.  
NOTE Confidence: 0.722204439090909

00:05:24.710 --> 00:05:27.710 So deep learning is a subspecialized

NOTE Confidence: 0.722204439090909  
00:05:27.710 --> 00:05:29.710 form of machine learning.  
NOTE Confidence: 0.722204439090909  
00:05:29.710 --> 00:05:33.175 And what it does is it is it's an  
NOTE Confidence: 0.722204439090909  
00:05:33.175 --> 00:05:35.063 artificial neural network with  
NOTE Confidence: 0.722204439090909  
00:05:35.063 --> 00:05:38.367 many layers to adapt and it learns  
NOTE Confidence: 0.722204439090909  
00:05:38.460 --> 00:05:41.066 through complex patterns of this  
NOTE Confidence: 0.722204439090909  
00:05:41.066 --> 00:05:42.584 from this high volume of data.  
NOTE Confidence: 0.722204439090909  
00:05:42.590 --> 00:05:44.078 And when I say high volume,  
NOTE Confidence: 0.722204439090909  
00:05:44.080 --> 00:05:49.678 I mean like 5:50, that's a lot of data.  
NOTE Confidence: 0.722204439090909  
00:05:49.680 --> 00:05:52.578 So here is a rudimentary example  
NOTE Confidence: 0.722204439090909  
00:05:52.578 --> 00:05:54.027 of machine learning,  
NOTE Confidence: 0.722204439090909  
00:05:54.030 --> 00:05:56.622 so we can tell we can tell the machine  
NOTE Confidence: 0.722204439090909  
00:05:56.622 --> 00:05:58.987 that we want to know what a dog is,  
NOTE Confidence: 0.722204439090909  
00:05:58.990 --> 00:06:00.758 and then we can train it by saying  
NOTE Confidence: 0.722204439090909  
00:06:00.758 --> 00:06:02.737 this is what a dog should look like.  
NOTE Confidence: 0.722204439090909  
00:06:02.740 --> 00:06:05.164 And then what we do is we can  
NOTE Confidence: 0.722204439090909

00:06:05.164 --> 00:06:06.630 present a new image.  
NOTE Confidence: 0.722204439090909  
00:06:06.630 --> 00:06:08.470 And then the machine can learn and say,  
NOTE Confidence: 0.722204439090909  
00:06:08.470 --> 00:06:12.558 well, I think this is also a dog.  
NOTE Confidence: 0.722204439090909  
00:06:12.560 --> 00:06:13.488 Then we can do.  
NOTE Confidence: 0.722204439090909  
00:06:13.488 --> 00:06:15.761 Next is give this a this picture of a  
NOTE Confidence: 0.722204439090909  
00:06:15.761 --> 00:06:18.079 cat and then the machine will tell us no.  
NOTE Confidence: 0.722204439090909  
00:06:18.080 --> 00:06:18.980 This is not a dog.  
NOTE Confidence: 0.722204439090909  
00:06:18.980 --> 00:06:20.338 It can't tell if it's a cat,  
NOTE Confidence: 0.722204439090909  
00:06:20.340 --> 00:06:22.437 but it knows that this is not a dog.  
NOTE Confidence: 0.882432125  
00:06:25.240 --> 00:06:28.616 So even though our talk is not to  
NOTE Confidence: 0.882432125  
00:06:28.616 --> 00:06:31.757 focus on deep learning, I really do  
NOTE Confidence: 0.882432125  
00:06:31.757 --> 00:06:33.570 think I should digress for a minute.  
NOTE Confidence: 0.882432125  
00:06:33.570 --> 00:06:35.424 To show you this image of  
NOTE Confidence: 0.882432125  
00:06:35.424 --> 00:06:36.660 deep learning and action.  
NOTE Confidence: 0.882432125  
00:06:36.660 --> 00:06:38.940 This is a really hot topic in the  
NOTE Confidence: 0.882432125  
00:06:38.940 --> 00:06:41.364 tech world and I I do think that

NOTE Confidence: 0.882432125

00:06:41.364 --> 00:06:43.021 this can penetrate Sleep Medicine

NOTE Confidence: 0.882432125

00:06:43.021 --> 00:06:45.016 sometime in the near future.

NOTE Confidence: 0.882432125

00:06:45.020 --> 00:06:47.666 So there are two distinct differences

NOTE Confidence: 0.882432125

00:06:47.666 --> 00:06:50.439 between machine learning and deep learning.

NOTE Confidence: 0.882432125

00:06:50.440 --> 00:06:51.940 Although traditional machine

NOTE Confidence: 0.882432125

00:06:51.940 --> 00:06:54.440 learning does not require hardcoding,

NOTE Confidence: 0.882432125

00:06:54.440 --> 00:06:57.037 it does require defined features of interest,

NOTE Confidence: 0.882432125

00:06:57.040 --> 00:07:00.570 such as age, race, etc.

NOTE Confidence: 0.882432125

00:07:00.570 --> 00:07:01.953 Deep learning, however,

NOTE Confidence: 0.882432125

00:07:01.953 --> 00:07:04.258 leverages these neural networks to

NOTE Confidence: 0.882432125

00:07:04.258 --> 00:07:07.290 learn the relevant features or patterns.

NOTE Confidence: 0.882432125

00:07:07.290 --> 00:07:08.810 So in deep learning,

NOTE Confidence: 0.882432125

00:07:08.810 --> 00:07:11.504 the first layer not shown here may

NOTE Confidence: 0.882432125

00:07:11.504 --> 00:07:14.152 just be a series of circle and dots.

NOTE Confidence: 0.882432125

00:07:14.160 --> 00:07:15.888 OK, then what deep learning will

NOTE Confidence: 0.882432125

00:07:15.888 --> 00:07:18.180 do is then look at the next layer.  
NOTE Confidence: 0.882432125

00:07:18.180 --> 00:07:20.567 So for example here on this first  
NOTE Confidence: 0.882432125

00:07:20.567 --> 00:07:23.340 column we have that top row that what  
NOTE Confidence: 0.882432125

00:07:23.340 --> 00:07:25.986 deep learning will do is look at that  
NOTE Confidence: 0.882432125

00:07:25.986 --> 00:07:28.309 top row and say that's a face and  
NOTE Confidence: 0.882432125

00:07:28.309 --> 00:07:29.912 then in the second column it'll say  
NOTE Confidence: 0.882432125

00:07:29.912 --> 00:07:31.928 well this could be a car and then the  
NOTE Confidence: 0.882432125

00:07:31.928 --> 00:07:33.750 third column could say this is an elephant.  
NOTE Confidence: 0.882432125

00:07:33.750 --> 00:07:34.790 And then we'll do it.  
NOTE Confidence: 0.882432125

00:07:34.790 --> 00:07:37.090 Apply another layer after that,  
NOTE Confidence: 0.882432125

00:07:37.090 --> 00:07:38.775 and then it'll start understanding  
NOTE Confidence: 0.882432125

00:07:38.775 --> 00:07:40.830 that while this is a face,  
NOTE Confidence: 0.882432125

00:07:40.830 --> 00:07:42.998 this is a car.  
NOTE Confidence: 0.882432125

00:07:42.998 --> 00:07:45.166 This is a chair.  
NOTE Confidence: 0.882432125

00:07:45.170 --> 00:07:46.520 This is my deep learning,  
NOTE Confidence: 0.882432125

00:07:46.520 --> 00:07:48.184 requires 5:50 amount of

NOTE Confidence: 0.882432125

00:07:48.184 --> 00:07:49.848 data to make inferences,

NOTE Confidence: 0.882432125

00:07:49.850 --> 00:07:51.910 whereas in machine learning this

NOTE Confidence: 0.882432125

00:07:51.910 --> 00:07:54.740 can be done and performed on a

NOTE Confidence: 0.882432125

00:07:54.740 --> 00:07:56.465 smaller pool of patients i.e.

NOTE Confidence: 0.882432125

00:07:56.470 --> 00:07:59.214 You know 200 to 300 patients for data.

NOTE Confidence: 0.931478005

00:08:02.680 --> 00:08:05.446 OK, so we Speaking of data,

NOTE Confidence: 0.931478005

00:08:05.450 --> 00:08:07.648 you know what is big data right?

NOTE Confidence: 0.931478005

00:08:07.650 --> 00:08:10.638 We frequently hear the term in

NOTE Confidence: 0.931478005

00:08:10.638 --> 00:08:13.788 the context of AI ML DL big data,

NOTE Confidence: 0.931478005

00:08:13.788 --> 00:08:16.416 it described by the 5DS.

NOTE Confidence: 0.931478005

00:08:16.416 --> 00:08:19.344 That's volume velocity,

NOTE Confidence: 0.931478005

00:08:19.344 --> 00:08:23.158 veracity, variety and value.

NOTE Confidence: 0.931478005

00:08:23.160 --> 00:08:24.790 So volume speaks for itself.

NOTE Confidence: 0.931478005

00:08:24.790 --> 00:08:26.764 You need large volumes in order

NOTE Confidence: 0.931478005

00:08:26.764 --> 00:08:28.960 for it to qualify as big data.

NOTE Confidence: 0.931478005

00:08:28.960 --> 00:08:31.430 Velocity speaks to the speed.  
NOTE Confidence: 0.931478005

00:08:31.430 --> 00:08:33.210 I wish the data is.  
NOTE Confidence: 0.931478005

00:08:33.210 --> 00:08:35.766 Acquired so if it takes you two years to  
NOTE Confidence: 0.931478005

00:08:35.766 --> 00:08:38.004 extract the data then it's not big data.  
NOTE Confidence: 0.931478005

00:08:38.010 --> 00:08:40.900 It should be instantaneous turnover.  
NOTE Confidence: 0.931478005

00:08:40.900 --> 00:08:44.280 Veracity describes the quality right?  
NOTE Confidence: 0.931478005

00:08:44.280 --> 00:08:46.450 So we really need good quality data,  
NOTE Confidence: 0.931478005

00:08:46.450 --> 00:08:48.642 so if any if I learn only one  
NOTE Confidence: 0.931478005

00:08:48.642 --> 00:08:50.374 thing from the data scientists  
NOTE Confidence: 0.931478005

00:08:50.374 --> 00:08:52.594 and engineers that we work with  
NOTE Confidence: 0.931478005

00:08:52.594 --> 00:08:54.958 is that garbage in garbage out.  
NOTE Confidence: 0.931478005

00:08:54.960 --> 00:08:59.456 If we feed the machine with bad data,  
NOTE Confidence: 0.931478005

00:08:59.460 --> 00:09:01.230 we are most likely going to  
NOTE Confidence: 0.931478005

00:09:01.230 --> 00:09:02.410 receive a poor algorithm,  
NOTE Confidence: 0.931478005

00:09:02.410 --> 00:09:06.386 so we really must enforce a quality data.  
NOTE Confidence: 0.931478005

00:09:06.390 --> 00:09:09.295 Next just as important we have variety



NOTE Confidence: 0.931478005  
00:09:09.295 --> 00:09:11.920 in data in order for the machine  
NOTE Confidence: 0.931478005  
00:09:11.920 --> 00:09:13.710 to determine the best algorithm.  
NOTE Confidence: 0.931478005  
00:09:13.710 --> 00:09:16.926 It requires an ecosystem of multiple  
NOTE Confidence: 0.931478005  
00:09:16.926 --> 00:09:18.534 different interactions simultaneously.  
NOTE Confidence: 0.931478005  
00:09:18.540 --> 00:09:20.772 This kind of what this kind of like  
NOTE Confidence: 0.931478005  
00:09:20.772 --> 00:09:23.103 diverges from what we are familiar with  
NOTE Confidence: 0.931478005  
00:09:23.103 --> 00:09:25.330 in traditional medicine where it's like OK.  
NOTE Confidence: 0.931478005  
00:09:25.330 --> 00:09:27.376 Let's focus and hyper focus on  
NOTE Confidence: 0.931478005  
00:09:27.376 --> 00:09:29.719 this one facet whereas this one  
NOTE Confidence: 0.931478005  
00:09:29.719 --> 00:09:32.004 heavily relies on variety and  
NOTE Confidence: 0.931478005  
00:09:32.004 --> 00:09:33.375 understanding multiple different  
NOTE Confidence: 0.931478005  
00:09:33.439 --> 00:09:35.659 interactions to understand what is  
NOTE Confidence: 0.931478005  
00:09:35.659 --> 00:09:37.879 prominent and what is significant?  
NOTE Confidence: 0.931478005  
00:09:37.880 --> 00:09:40.554 So now I feel like I've been  
NOTE Confidence: 0.931478005  
00:09:40.554 --> 00:09:43.125 belaboring the point of quality and  
NOTE Confidence: 0.931478005

00:09:43.125 --> 00:09:45.365 unfortunately loss in the term.  
NOTE Confidence: 0.931478005

00:09:45.370 --> 00:09:48.877 Big data is the importance of quality  
NOTE Confidence: 0.931478005

00:09:48.877 --> 00:09:51.528 data and the volume of data often  
NOTE Confidence: 0.931478005

00:09:51.528 --> 00:09:53.619 overshadows the quality of the data,  
NOTE Confidence: 0.931478005

00:09:53.620 --> 00:09:55.828 which is the perfect for the  
NOTE Confidence: 0.931478005

00:09:55.828 --> 00:09:57.300 for the poor algorithm.  
NOTE Confidence: 0.931478005

00:09:57.300 --> 00:09:58.740 So I really wanted to drive  
NOTE Confidence: 0.931478005

00:09:58.740 --> 00:10:00.430 home this point of quality data.  
NOTE Confidence: 0.653115926666667

00:10:02.490 --> 00:10:04.416 And so you'll see my akawa.  
NOTE Confidence: 0.653115926666667

00:10:04.420 --> 00:10:06.280 He is the editor in chief  
NOTE Confidence: 0.653115926666667

00:10:06.280 --> 00:10:07.520 of the Molecular Brain.  
NOTE Confidence: 0.653115926666667

00:10:07.520 --> 00:10:10.048 When my account did is that he reviewed  
NOTE Confidence: 0.653115926666667

00:10:10.050 --> 00:10:14.906 181 AI manuscripts this past year in 2020.  
NOTE Confidence: 0.653115926666667

00:10:14.910 --> 00:10:17.670 40 of them were deemed too good to be true,  
NOTE Confidence: 0.653115926666667

00:10:17.670 --> 00:10:20.138 and he questioned their authenticity and  
NOTE Confidence: 0.653115926666667

00:10:20.138 --> 00:10:23.515 what he did is he requested the raw data of

NOTE Confidence: 0.653115926666667  
00:10:23.515 --> 00:10:26.665 a of the 40 studies to assess its integrity.  
NOTE Confidence: 0.653115926666667  
00:10:26.670 --> 00:10:28.510 Half were withdrawn because  
NOTE Confidence: 0.653115926666667  
00:10:28.510 --> 00:10:30.810 the data couldn't be provided.  
NOTE Confidence: 0.653115926666667  
00:10:30.810 --> 00:10:33.666 Of the other twenty remaining 19  
NOTE Confidence: 0.653115926666667  
00:10:33.666 --> 00:10:36.123 were rejected either because of  
NOTE Confidence: 0.653115926666667  
00:10:36.123 --> 00:10:38.838 insufficient raw data or the data  
NOTE Confidence: 0.653115926666667  
00:10:38.838 --> 00:10:41.018 mismatched with the prediction results,  
NOTE Confidence: 0.653115926666667  
00:10:41.020 --> 00:10:43.624 or the output could not be reproduced.  
NOTE Confidence: 0.653115926666667  
00:10:43.630 --> 00:10:46.294 When we tested with the validation test sets,  
NOTE Confidence: 0.653115926666667  
00:10:46.300 --> 00:10:48.948 so ultimately only one of the 40 were  
NOTE Confidence: 0.653115926666667  
00:10:48.948 --> 00:10:50.850 accepted. So don't waste your time.  
NOTE Confidence: 0.653115926666667  
00:10:50.850 --> 00:10:52.866 Just really make sure that the quality of  
NOTE Confidence: 0.653115926666667  
00:10:52.866 --> 00:10:55.239 the data is is the best that you can provide.  
NOTE Confidence: 0.905044663333333  
00:10:58.120 --> 00:11:01.620 OK, so now we're armed with the  
NOTE Confidence: 0.905044663333333  
00:11:01.620 --> 00:11:03.932 definitions of AI, ML and DL.  
NOTE Confidence: 0.905044663333333

00:11:03.932 --> 00:11:06.832 We know what big data is and we  
NOTE Confidence: 0.9050446633333333

00:11:06.832 --> 00:11:09.358 stress the need for quality data.  
NOTE Confidence: 0.9050446633333333

00:11:09.360 --> 00:11:11.306 Now, how does this all work together?  
NOTE Confidence: 0.9050446633333333

00:11:11.310 --> 00:11:13.812 So here's a bird's eye view  
NOTE Confidence: 0.9050446633333333

00:11:13.812 --> 00:11:15.480 of the process itself.  
NOTE Confidence: 0.9050446633333333

00:11:15.480 --> 00:11:17.864 So first we start with the big data,  
NOTE Confidence: 0.9050446633333333

00:11:17.870 --> 00:11:19.542 either obtained via HR.  
NOTE Confidence: 0.9050446633333333

00:11:19.542 --> 00:11:21.632 This could be imaging could  
NOTE Confidence: 0.9050446633333333

00:11:21.632 --> 00:11:23.599 be genomic sequencing,  
NOTE Confidence: 0.9050446633333333

00:11:23.600 --> 00:11:28.055 whatever have you and we input it into AI  
NOTE Confidence: 0.9050446633333333

00:11:28.055 --> 00:11:30.118 UMSL and then finally we get our outcome.  
NOTE Confidence: 0.9050446633333333

00:11:30.120 --> 00:11:33.460 We get the diagnostic accuracy.  
NOTE Confidence: 0.9050446633333333

00:11:33.460 --> 00:11:35.304 We get prediction models.  
NOTE Confidence: 0.9050446633333333

00:11:35.304 --> 00:11:37.609 We get workflow efficiency and  
NOTE Confidence: 0.9050446633333333

00:11:37.609 --> 00:11:39.748 precision medicine simple enough.  
NOTE Confidence: 0.9050446633333333

00:11:39.750 --> 00:11:41.580 OK, maybe not that simple,

NOTE Confidence: 0.9050446633333333  
00:11:41.580 --> 00:11:43.348 so let's get a little bit more granular.  
NOTE Confidence: 0.912025521666667  
00:11:45.500 --> 00:11:48.878 So how does machine learning work?  
NOTE Confidence: 0.912025521666667  
00:11:48.880 --> 00:11:52.860 So Machine learns through training.  
NOTE Confidence: 0.912025521666667  
00:11:52.860 --> 00:11:55.610 Training is an iterative learning  
NOTE Confidence: 0.912025521666667  
00:11:55.610 --> 00:11:59.040 until the best model is found.  
NOTE Confidence: 0.912025521666667  
00:11:59.040 --> 00:12:02.360 So let's say we want to predict OSA.  
NOTE Confidence: 0.912025521666667  
00:12:02.360 --> 00:12:05.944 OK first, what we need to do is  
NOTE Confidence: 0.912025521666667  
00:12:05.944 --> 00:12:08.718 to classify OSA via features.  
NOTE Confidence: 0.912025521666667  
00:12:08.720 --> 00:12:10.070 In order to do this,  
NOTE Confidence: 0.912025521666667  
00:12:10.070 --> 00:12:12.170 we will tell the machine.  
NOTE Confidence: 0.912025521666667  
00:12:12.170 --> 00:12:15.656 That OSA isn't hi greater than five  
NOTE Confidence: 0.912025521666667  
00:12:15.656 --> 00:12:19.909 and non OSA isn't ahi less than five?  
NOTE Confidence: 0.912025521666667  
00:12:19.910 --> 00:12:22.070 And that's our label of interests  
NOTE Confidence: 0.912025521666667  
00:12:22.070 --> 00:12:24.160 with the definition of interest.  
NOTE Confidence: 0.912025521666667  
00:12:24.160 --> 00:12:27.140 The next thing we will do is we will feed it.  
NOTE Confidence: 0.912025521666667

00:12:27.140 --> 00:12:30.180 We will feed our machine with a variety  
NOTE Confidence: 0.912025521666667

00:12:30.180 --> 00:12:33.148 of patient characteristics such as age,  
NOTE Confidence: 0.912025521666667

00:12:33.150 --> 00:12:37.140 BMI, gender, next size, anything.  
NOTE Confidence: 0.912025521666667

00:12:37.140 --> 00:12:38.763 From there on,  
NOTE Confidence: 0.912025521666667

00:12:38.763 --> 00:12:43.320 these features will be analyzed.  
NOTE Confidence: 0.912025521666667

00:12:43.320 --> 00:12:45.708 I use that term features interchangeably  
NOTE Confidence: 0.912025521666667

00:12:45.708 --> 00:12:47.300 with patient characteristics because  
NOTE Confidence: 0.912025521666667

00:12:47.354 --> 00:12:49.622 features is a term that's used in the world.  
NOTE Confidence: 0.912025521666667

00:12:49.630 --> 00:12:50.400 So anyways,  
NOTE Confidence: 0.912025521666667

00:12:50.400 --> 00:12:51.940 these patient characteristics or  
NOTE Confidence: 0.912025521666667

00:12:51.940 --> 00:12:54.582 features will then be extracted.  
NOTE Confidence: 0.912025521666667

00:12:54.582 --> 00:12:57.397 One example of feature extraction  
NOTE Confidence: 0.912025521666667

00:12:57.397 --> 00:13:00.778 is principal component analysis,  
NOTE Confidence: 0.912025521666667

00:13:00.780 --> 00:13:02.598 principal component analysis.  
NOTE Confidence: 0.912025521666667

00:13:02.598 --> 00:13:06.234 What this does is it determines  
NOTE Confidence: 0.912025521666667

00:13:06.240 --> 00:13:09.000 what is the best fit of this feature

NOTE Confidence: 0.912025521666667  
00:13:09.000 --> 00:13:11.459 to match our label of interest.  
NOTE Confidence: 0.912025521666667  
00:13:11.460 --> 00:13:12.408 So for example.  
NOTE Confidence: 0.912025521666667  
00:13:12.408 --> 00:13:15.273 If we were to use PCA to extract  
NOTE Confidence: 0.912025521666667  
00:13:15.273 --> 00:13:18.108 the features and create components.  
NOTE Confidence: 0.912025521666667  
00:13:18.110 --> 00:13:20.950 What we will find is that maybe age  
NOTE Confidence: 0.912025521666667  
00:13:20.950 --> 00:13:24.070 greater than 50 will match closely with OSA.  
NOTE Confidence: 0.912025521666667  
00:13:24.070 --> 00:13:26.842 Maybe BMI greater than 35 will  
NOTE Confidence: 0.912025521666667  
00:13:26.842 --> 00:13:28.690 match closely with OSA.  
NOTE Confidence: 0.912025521666667  
00:13:28.690 --> 00:13:30.690 After employing this feature,  
NOTE Confidence: 0.912025521666667  
00:13:30.690 --> 00:13:33.690 extraction of the most salient components,  
NOTE Confidence: 0.912025521666667  
00:13:33.690 --> 00:13:36.830 then vectors are formed.  
NOTE Confidence: 0.912025521666667  
00:13:36.830 --> 00:13:38.590 These vectors, what they are,  
NOTE Confidence: 0.912025521666667  
00:13:38.590 --> 00:13:40.870 is really an interaction of  
NOTE Confidence: 0.912025521666667  
00:13:40.870 --> 00:13:42.694 all the key components.  
NOTE Confidence: 0.912025521666667  
00:13:42.700 --> 00:13:45.586 So another example is in my  
NOTE Confidence: 0.912025521666667

00:13:45.586 --> 00:13:48.326 identify an old obese man.  
NOTE Confidence: 0.912025521666667

00:13:48.326 --> 00:13:52.958 Or am I identify a post menopausal  
NOTE Confidence: 0.912025521666667

00:13:52.958 --> 00:13:55.696 woman with history of radiation  
NOTE Confidence: 0.912025521666667

00:13:55.696 --> 00:13:58.150 to the head in the neck.  
NOTE Confidence: 0.912025521666667

00:13:58.150 --> 00:14:00.538 So basically the more vectors we  
NOTE Confidence: 0.912025521666667

00:14:00.538 --> 00:14:03.279 can create based on the more data,  
NOTE Confidence: 0.912025521666667

00:14:03.280 --> 00:14:05.170 the better our algorithm will be,  
NOTE Confidence: 0.912025521666667

00:14:05.170 --> 00:14:07.494 because these vectors will then be fed  
NOTE Confidence: 0.912025521666667

00:14:07.494 --> 00:14:09.710 into the machine learning algorithm.  
NOTE Confidence: 0.912025521666667

00:14:09.710 --> 00:14:11.738 I'm at the machine learning algorithm  
NOTE Confidence: 0.912025521666667

00:14:11.738 --> 00:14:14.783 will do is it will process these vectors  
NOTE Confidence: 0.912025521666667

00:14:14.783 --> 00:14:17.213 together form clusters and then it  
NOTE Confidence: 0.912025521666667

00:14:17.280 --> 00:14:19.866 will develop the best classifier model.  
NOTE Confidence: 0.912025521666667

00:14:19.870 --> 00:14:22.790 So with this best classifier model will do?  
NOTE Confidence: 0.912025521666667

00:14:22.790 --> 00:14:25.010 Is that it'll say, well,  
NOTE Confidence: 0.912025521666667

00:14:25.010 --> 00:14:28.690 we can most likely predict OSA to this



NOTE Confidence: 0.912025521666667  
00:14:28.690 --> 00:14:32.330 maximum degree 98% using this model.  
NOTE Confidence: 0.912025521666667  
00:14:32.330 --> 00:14:33.919 But we need to know that this  
NOTE Confidence: 0.912025521666667  
00:14:33.919 --> 00:14:35.110 model is indeed accurate,  
NOTE Confidence: 0.912025521666667  
00:14:35.110 --> 00:14:35.447 right?  
NOTE Confidence: 0.912025521666667  
00:14:35.447 --> 00:14:38.143 So then what we will need to do  
NOTE Confidence: 0.912025521666667  
00:14:38.143 --> 00:14:40.928 is to see if we can apply this  
NOTE Confidence: 0.912025521666667  
00:14:40.928 --> 00:14:43.135 best model to actually predict  
NOTE Confidence: 0.912025521666667  
00:14:43.135 --> 00:14:45.900 our desired outcome being OSA.  
NOTE Confidence: 0.912025521666667  
00:14:45.900 --> 00:14:47.890 So then what we do is we give it like  
NOTE Confidence: 0.912025521666667  
00:14:47.952 --> 00:14:49.680 what we call the validation set,  
NOTE Confidence: 0.912025521666667  
00:14:49.680 --> 00:14:51.864 otherwise known as a test data set.  
NOTE Confidence: 0.912025521666667  
00:14:51.870 --> 00:14:54.630 What this is is something unseen,  
NOTE Confidence: 0.912025521666667  
00:14:54.630 --> 00:14:55.478 completely naive.  
NOTE Confidence: 0.912025521666667  
00:14:55.478 --> 00:14:58.446 We feed it again to the machine  
NOTE Confidence: 0.912025521666667  
00:14:58.446 --> 00:14:59.840 via data input.  
NOTE Confidence: 0.912025521666667

00:14:59.840 --> 00:15:00.328 Again,  
NOTE Confidence: 0.912025521666667

00:15:00.328 --> 00:15:02.773 the features are extracted and  
NOTE Confidence: 0.912025521666667

00:15:02.773 --> 00:15:05.238 then feature vectors are formed.  
NOTE Confidence: 0.912025521666667

00:15:05.240 --> 00:15:07.459 Then finally we want to note if  
NOTE Confidence: 0.912025521666667

00:15:07.459 --> 00:15:09.220 the predicted label is achieved.  
NOTE Confidence: 0.912025521666667

00:15:09.220 --> 00:15:11.824 If the predicted label in this  
NOTE Confidence: 0.912025521666667

00:15:11.824 --> 00:15:13.560 case OSA is achieved,  
NOTE Confidence: 0.912025521666667

00:15:13.560 --> 00:15:15.846 then we know that this is a very good.  
NOTE Confidence: 0.912025521666667

00:15:15.850 --> 00:15:16.380 Algorithm.  
NOTE Confidence: 0.915240158571429

00:15:20.840 --> 00:15:24.638 So to summarize, we start with data we  
NOTE Confidence: 0.915240158571429

00:15:24.638 --> 00:15:27.564 start first with a data training set.  
NOTE Confidence: 0.915240158571429

00:15:27.570 --> 00:15:29.448 It gets fed into the algorithm.  
NOTE Confidence: 0.915240158571429

00:15:29.450 --> 00:15:30.641 There's an evaluation,  
NOTE Confidence: 0.915240158571429

00:15:30.641 --> 00:15:32.626 and a model is formed.  
NOTE Confidence: 0.915240158571429

00:15:32.630 --> 00:15:34.950 Then we repeat with a test data set,  
NOTE Confidence: 0.915240158571429

00:15:34.950 --> 00:15:37.155 otherwise known as a validation data set,

NOTE Confidence: 0.915240158571429  
00:15:37.160 --> 00:15:39.035 and essentially it's just naive  
NOTE Confidence: 0.915240158571429  
00:15:39.035 --> 00:15:41.234 information fed into the machine to  
NOTE Confidence: 0.915240158571429  
00:15:41.234 --> 00:15:43.338 see if the model that we built was  
NOTE Confidence: 0.915240158571429  
00:15:43.338 --> 00:15:46.538 correct in achieving our prediction.  
NOTE Confidence: 0.915240158571429  
00:15:46.540 --> 00:15:50.130 So how do we know that this is not by chance?  
NOTE Confidence: 0.915240158571429  
00:15:50.130 --> 00:15:53.235 How do we know that this algorithm is indeed  
NOTE Confidence: 0.915240158571429  
00:15:53.235 --> 00:15:55.858 reliable outside of this one data test set?  
NOTE Confidence: 0.915240158571429  
00:15:55.860 --> 00:15:59.298 Well, let me just repeat just we want  
NOTE Confidence: 0.915240158571429  
00:15:59.298 --> 00:16:01.134 to make sure we have reproducibility  
NOTE Confidence: 0.915240158571429  
00:16:01.134 --> 00:16:03.365 and we want to make sure that we  
NOTE Confidence: 0.915240158571429  
00:16:03.365 --> 00:16:05.319 don't have what's called overfitting.  
NOTE Confidence: 0.915240158571429  
00:16:05.320 --> 00:16:08.839 Overfitting is essentially.  
NOTE Confidence: 0.915240158571429  
00:16:08.840 --> 00:16:10.108 Us saying that yeah,  
NOTE Confidence: 0.915240158571429  
00:16:10.108 --> 00:16:11.693 this is a perfect study,  
NOTE Confidence: 0.915240158571429  
00:16:11.700 --> 00:16:13.639 but only for our small cold water.  
NOTE Confidence: 0.915240158571429

00:16:13.640 --> 00:16:15.397 So the more data that we feed  
NOTE Confidence: 0.915240158571429

00:16:15.397 --> 00:16:17.148 them or test datasets to show  
NOTE Confidence: 0.915240158571429

00:16:17.148 --> 00:16:19.014 that if the prediction can again  
NOTE Confidence: 0.915240158571429

00:16:19.014 --> 00:16:21.243 be achieved and achieved then we  
NOTE Confidence: 0.915240158571429

00:16:21.243 --> 00:16:23.098 know that we're not overfitting.  
NOTE Confidence: 0.924105116666667

00:16:26.630 --> 00:16:28.190 So based on the shared  
NOTE Confidence: 0.924105116666667

00:16:28.190 --> 00:16:29.438 process of machine learning,  
NOTE Confidence: 0.924105116666667

00:16:29.440 --> 00:16:31.606 all of us can appreciate that  
NOTE Confidence: 0.924105116666667

00:16:31.606 --> 00:16:33.624 machine learning is vastly different  
NOTE Confidence: 0.924105116666667

00:16:33.624 --> 00:16:35.636 from evidence based medicine.  
NOTE Confidence: 0.924105116666667

00:16:35.640 --> 00:16:37.896 One is really not better than the other.  
NOTE Confidence: 0.924105116666667

00:16:37.900 --> 00:16:39.548 It's almost like comparing  
NOTE Confidence: 0.924105116666667

00:16:39.548 --> 00:16:41.181 apples and oranges, right?  
NOTE Confidence: 0.924105116666667

00:16:41.181 --> 00:16:43.527 But acknowledgement of the differences will  
NOTE Confidence: 0.924105116666667

00:16:43.527 --> 00:16:46.209 allow us to embrace machine learning as  
NOTE Confidence: 0.924105116666667

00:16:46.209 --> 00:16:49.379 one of our future options and Sleep Medicine.

NOTE Confidence: 0.924105116666667  
00:16:49.380 --> 00:16:50.553 So, specifically, PBM,  
NOTE Confidence: 0.924105116666667  
00:16:50.553 --> 00:16:53.035 as we know, is hypothesis driven,  
NOTE Confidence: 0.924105116666667  
00:16:53.035 --> 00:16:54.340 versus machine learning,  
NOTE Confidence: 0.924105116666667  
00:16:54.340 --> 00:16:56.016 is data driven right?  
NOTE Confidence: 0.924105116666667  
00:16:56.016 --> 00:16:59.670 EBM we have to account for confounders,  
NOTE Confidence: 0.924105116666667  
00:16:59.670 --> 00:17:00.860 we have to eliminate confounders.  
NOTE Confidence: 0.924105116666667  
00:17:00.860 --> 00:17:03.072 So then there's tends to be less  
NOTE Confidence: 0.924105116666667  
00:17:03.072 --> 00:17:05.150 variables and a lower diversity,  
NOTE Confidence: 0.924105116666667  
00:17:05.150 --> 00:17:07.146 whereas machine learning heavily  
NOTE Confidence: 0.924105116666667  
00:17:07.146 --> 00:17:10.140 predicated itself on a high diversity,  
NOTE Confidence: 0.924105116666667  
00:17:10.140 --> 00:17:12.455 so we need more variables  
NOTE Confidence: 0.924105116666667  
00:17:12.455 --> 00:17:14.770 to sort out the noise.  
NOTE Confidence: 0.924105116666667  
00:17:14.770 --> 00:17:19.208 EBM what it does is it compares groups to  
NOTE Confidence: 0.924105116666667  
00:17:19.208 --> 00:17:22.603 infer causation whereas machine learning  
NOTE Confidence: 0.924105116666667  
00:17:22.603 --> 00:17:26.559 relies on clustering to infer causation.  
NOTE Confidence: 0.924105116666667

00:17:26.560 --> 00:17:28.108 Next, a medium,  
NOTE Confidence: 0.924105116666667

00:17:28.108 --> 00:17:30.688 its success susceptible to bias  
NOTE Confidence: 0.924105116666667

00:17:30.688 --> 00:17:33.499 because of evidence hierarchy.  
NOTE Confidence: 0.924105116666667

00:17:33.500 --> 00:17:35.048 Whereas in machine learning  
NOTE Confidence: 0.924105116666667

00:17:35.048 --> 00:17:36.596 there is no hierarchy,  
NOTE Confidence: 0.924105116666667

00:17:36.600 --> 00:17:37.098 right?  
NOTE Confidence: 0.924105116666667

00:17:37.098 --> 00:17:40.086 So no hierarchy and we're possibly  
NOTE Confidence: 0.924105116666667

00:17:40.086 --> 00:17:43.108 eliminating the risk of bias outside  
NOTE Confidence: 0.924105116666667

00:17:43.108 --> 00:17:46.000 of the data collection process itself.  
NOTE Confidence: 0.924105116666667

00:17:46.000 --> 00:17:47.770 And then finally in EBM.  
NOTE Confidence: 0.924105116666667

00:17:47.770 --> 00:17:50.266 We have confidence in the evidence  
NOTE Confidence: 0.924105116666667

00:17:50.270 --> 00:17:53.725 with more studies and also  
NOTE Confidence: 0.924105116666667

00:17:53.725 --> 00:17:56.914 replication of the study outcome.  
NOTE Confidence: 0.924105116666667

00:17:56.914 --> 00:18:00.256 Similarly to some degree in machine  
NOTE Confidence: 0.924105116666667

00:18:00.256 --> 00:18:02.548 learning we have confidence in  
NOTE Confidence: 0.924105116666667

00:18:02.548 --> 00:18:04.276 repetition by increasing the

NOTE Confidence: 0.924105116666667  
00:18:04.276 --> 00:18:06.162 training datasets and I just  
NOTE Confidence: 0.924105116666667  
00:18:06.162 --> 00:18:07.752 mentioned and then also feeding  
NOTE Confidence: 0.924105116666667  
00:18:07.752 --> 00:18:09.678 it with multiple validation sets  
NOTE Confidence: 0.924105116666667  
00:18:09.678 --> 00:18:12.132 to ensure that we didn't overfit.  
NOTE Confidence: 0.924105116666667  
00:18:12.140 --> 00:18:13.988 So Apple and orange they're different,  
NOTE Confidence: 0.924105116666667  
00:18:13.990 --> 00:18:15.340 but they're both good for you.  
NOTE Confidence: 0.972724328  
00:18:17.720 --> 00:18:20.000 OK, so that was fun.  
NOTE Confidence: 0.972724328  
00:18:20.000 --> 00:18:21.968 Now let's transition into  
NOTE Confidence: 0.972724328  
00:18:21.968 --> 00:18:23.936 machine learning in OSA.  
NOTE Confidence: 0.972724328  
00:18:23.940 --> 00:18:25.740 Here we have an English bulldog.  
NOTE Confidence: 0.972724328  
00:18:25.740 --> 00:18:27.408 Can anyone unmute and tell me  
NOTE Confidence: 0.972724328  
00:18:27.408 --> 00:18:29.252 why we have the English bulldog  
NOTE Confidence: 0.972724328  
00:18:29.252 --> 00:18:31.244 as my mascot for Melon OSA?  
NOTE Confidence: 0.95395195  
00:18:33.850 --> 00:18:34.360 Anyone?  
NOTE Confidence: 0.947652332  
00:18:38.670 --> 00:18:43.174 OK, well I'll tell you so the bulldog  
NOTE Confidence: 0.947652332

00:18:43.174 --> 00:18:46.420 snores probably has sleep apnea, maybe.  
NOTE Confidence: 0.947652332

00:18:46.420 --> 00:18:48.420 Well, my internal machine thinks  
NOTE Confidence: 0.947652332

00:18:48.420 --> 00:18:51.027 I've always say every time I see  
NOTE Confidence: 0.947652332

00:18:51.027 --> 00:18:52.905 a bulldog because of this story.  
NOTE Confidence: 0.947652332

00:18:52.910 --> 00:18:55.178 And also I think of this.  
NOTE Confidence: 0.947652332

00:18:55.180 --> 00:18:57.707 So the the field of OSA is.  
NOTE Confidence: 0.947652332

00:18:57.710 --> 00:19:00.160 It's truly right for machine  
NOTE Confidence: 0.947652332

00:19:00.160 --> 00:19:02.120 learning algorithms and recognition.  
NOTE Confidence: 0.947652332

00:19:02.120 --> 00:19:04.256 It is prime for mill and possibly a  
NOTE Confidence: 0.947652332

00:19:04.256 --> 00:19:05.805 shoulder ahead of other subspecialties  
NOTE Confidence: 0.947652332

00:19:05.805 --> 00:19:08.045 due to its abundance of data sources  
NOTE Confidence: 0.947652332

00:19:08.105 --> 00:19:09.897 both in the medical level for the  
NOTE Confidence: 0.947652332

00:19:09.897 --> 00:19:12.430 patient in the form of EHR data on  
NOTE Confidence: 0.947652332

00:19:12.430 --> 00:19:14.647 diagnostic sleep study path data and  
NOTE Confidence: 0.947652332

00:19:14.647 --> 00:19:17.307 at the digital health product level for  
NOTE Confidence: 0.947652332

00:19:17.307 --> 00:19:19.966 the patients as a consumer in the form



NOTE Confidence: 0.947652332

00:19:19.966 --> 00:19:22.694 of Fitbit and sleep apps and bed sensors.

NOTE Confidence: 0.947652332

00:19:22.694 --> 00:19:25.820 So the options for data or boundless,

NOTE Confidence: 0.947652332

00:19:25.820 --> 00:19:28.436 the hint of its success relies on quality

NOTE Confidence: 0.947652332

00:19:28.436 --> 00:19:30.640 data collection that I've been mentioning.

NOTE Confidence: 0.947652332

00:19:30.640 --> 00:19:32.412 Integration, transformation,

NOTE Confidence: 0.947652332

00:19:32.412 --> 00:19:34.184 and interpretation.

NOTE Confidence: 0.947652332

00:19:34.184 --> 00:19:36.782 Biostar clinicians only clean,

NOTE Confidence: 0.947652332

00:19:36.782 --> 00:19:38.426 usable and meaningful data.

NOTE Confidence: 0.947652332

00:19:38.430 --> 00:19:40.315 Can create value for our

NOTE Confidence: 0.947652332

00:19:40.315 --> 00:19:41.823 patients in the future.

NOTE Confidence: 0.947652332

00:19:41.830 --> 00:19:43.225 So what types of sleep

NOTE Confidence: 0.947652332

00:19:43.225 --> 00:19:44.870 data do we have access to?

NOTE Confidence: 0.914475584285714

00:19:47.480 --> 00:19:49.048 So here's the first class of data.

NOTE Confidence: 0.914475584285714

00:19:49.050 --> 00:19:51.802 We have state technology, so to the non

NOTE Confidence: 0.914475584285714

00:19:51.802 --> 00:19:54.131 sleep physicians in the audience we have

NOTE Confidence: 0.914475584285714

00:19:54.131 --> 00:19:56.537 a polysomnogram on the left and we have  
NOTE Confidence: 0.914475584285714

00:19:56.537 --> 00:19:59.810 a home sleep apnea test on the right.  
NOTE Confidence: 0.914475584285714

00:19:59.810 --> 00:20:02.175 So the polysomnograms are very  
NOTE Confidence: 0.914475584285714

00:20:02.175 --> 00:20:04.644 rich in raw data, so here.  
NOTE Confidence: 0.914475584285714

00:20:04.644 --> 00:20:06.940 We are able to note their their neural  
NOTE Confidence: 0.914475584285714

00:20:07.011 --> 00:20:09.398 status were able to see limb movements,  
NOTE Confidence: 0.914475584285714

00:20:09.400 --> 00:20:12.048 were able to see heart rate and oxygenation,  
NOTE Confidence: 0.914475584285714

00:20:12.050 --> 00:20:13.322 but you know what?  
NOTE Confidence: 0.914475584285714

00:20:13.322 --> 00:20:15.669 We use less than half of this  
NOTE Confidence: 0.914475584285714

00:20:15.669 --> 00:20:17.459 to determine what is OS.  
NOTE Confidence: 0.914475584285714

00:20:17.460 --> 00:20:20.477 What is OSA we use the hi.  
NOTE Confidence: 0.914475584285714

00:20:20.480 --> 00:20:23.406 How much of the inside is gathered  
NOTE Confidence: 0.914475584285714

00:20:23.406 --> 00:20:25.750 from this sleep study right?  
NOTE Confidence: 0.914475584285714

00:20:25.750 --> 00:20:28.578 So the PSG itself lends itself to,  
NOTE Confidence: 0.914475584285714

00:20:28.580 --> 00:20:31.232 you know, dynamic phenotyping like why  
NOTE Confidence: 0.914475584285714

00:20:31.232 --> 00:20:34.527 can't we use symptoms in addition to the

NOTE Confidence: 0.914475584285714

00:20:34.527 --> 00:20:37.659 raw data to help us understand more of OSA?

NOTE Confidence: 0.914475584285714

00:20:37.660 --> 00:20:39.935 How do we subtype patients

NOTE Confidence: 0.914475584285714

00:20:39.935 --> 00:20:41.755 based on this data?

NOTE Confidence: 0.914475584285714

00:20:41.760 --> 00:20:43.696 I mean, if we truly think about it,

NOTE Confidence: 0.914475584285714

00:20:43.700 --> 00:20:45.056 the the ISR,

NOTE Confidence: 0.914475584285714

00:20:45.056 --> 00:20:46.864 like the interscore reliability,

NOTE Confidence: 0.914475584285714

00:20:46.870 --> 00:20:49.350 it just shows us that we cannot best

NOTE Confidence: 0.914475584285714

00:20:49.350 --> 00:20:51.370 determine what N one and two is like.

NOTE Confidence: 0.914475584285714

00:20:51.370 --> 00:20:52.546 We need more people,

NOTE Confidence: 0.914475584285714

00:20:52.546 --> 00:20:55.069 so why can't we just push this a

NOTE Confidence: 0.914475584285714

00:20:55.069 --> 00:20:56.794 step forward into machine learning

NOTE Confidence: 0.914475584285714

00:20:56.794 --> 00:20:58.763 and have the machine tell us

NOTE Confidence: 0.914475584285714

00:20:58.763 --> 00:21:00.779 this is truly an one based on

NOTE Confidence: 0.914475584285714

00:21:00.780 --> 00:21:03.670 all of these previous findings?

NOTE Confidence: 0.914475584285714

00:21:03.670 --> 00:21:05.672 And even on the right we had

NOTE Confidence: 0.914475584285714

00:21:05.672 --> 00:21:07.340 the home sleep apnea test,  
NOTE Confidence: 0.914475584285714

00:21:07.340 --> 00:21:10.716 so age sites have been accelerated into use.  
NOTE Confidence: 0.914475584285714

00:21:10.720 --> 00:21:12.538 I'd say definitely during the pandemic,  
NOTE Confidence: 0.914475584285714

00:21:12.540 --> 00:21:14.532 and even with the age that we have  
NOTE Confidence: 0.914475584285714

00:21:14.532 --> 00:21:15.944 a reasonable amount of continuous  
NOTE Confidence: 0.914475584285714

00:21:15.944 --> 00:21:17.946 data for just one night of sleep.  
NOTE Confidence: 0.9340829

00:21:20.730 --> 00:21:22.826 I'm in terms of.  
NOTE Confidence: 0.9340829

00:21:22.826 --> 00:21:25.970 You know objective long term monitoring.  
NOTE Confidence: 0.9340829

00:21:25.970 --> 00:21:28.259 I think we're really in a good  
NOTE Confidence: 0.9340829

00:21:28.259 --> 00:21:30.071 position compared to other types  
NOTE Confidence: 0.9340829

00:21:30.071 --> 00:21:32.345 of chronic diseases because we have  
NOTE Confidence: 0.9340829

00:21:32.345 --> 00:21:34.839 the ability to watch patients every  
NOTE Confidence: 0.9340829

00:21:34.839 --> 00:21:36.924 night and gather objective data  
NOTE Confidence: 0.9340829

00:21:36.924 --> 00:21:40.200 regarding their PAP compliance.  
NOTE Confidence: 0.9340829

00:21:40.200 --> 00:21:41.828 Also, throughout the course  
NOTE Confidence: 0.9340829

00:21:41.828 --> 00:21:43.456 of their chronic disease.

NOTE Confidence: 0.9340829

00:21:43.460 --> 00:21:45.740 So for those that are unfamiliar,

NOTE Confidence: 0.9340829

00:21:45.740 --> 00:21:47.510 here is an example of a

NOTE Confidence: 0.9340829

00:21:47.510 --> 00:21:48.395 PAP compliance report.

NOTE Confidence: 0.9340829

00:21:48.400 --> 00:21:51.120 Were able to determine their dates of usage,

NOTE Confidence: 0.9340829

00:21:51.120 --> 00:21:52.780 their hours of usage,

NOTE Confidence: 0.9340829

00:21:52.780 --> 00:21:54.855 their average pressure per night,

NOTE Confidence: 0.9340829

00:21:54.860 --> 00:21:57.359 even if they had a leak there.

NOTE Confidence: 0.9340829

00:21:57.360 --> 00:22:01.180 Hi, this is we have access to all of this,

NOTE Confidence: 0.9340829

00:22:01.180 --> 00:22:03.567 we just need to analyze it together

NOTE Confidence: 0.9340829

00:22:03.567 --> 00:22:06.239 and figure out what's most meaningful.

NOTE Confidence: 0.848088152857143

00:22:10.210 --> 00:22:13.450 Another huge data source for

NOTE Confidence: 0.848088152857143

00:22:13.450 --> 00:22:15.918 Sleep Medicine, particularly OSA

NOTE Confidence: 0.848088152857143

00:22:15.918 --> 00:22:18.838 as a consumer sleep technology.

NOTE Confidence: 0.848088152857143

00:22:18.840 --> 00:22:20.835 We are swimming in data

NOTE Confidence: 0.848088152857143

00:22:20.835 --> 00:22:22.830 and the patients love this.

NOTE Confidence: 0.848088152857143

00:22:22.830 --> 00:22:24.790 I can't say that all clinicians office,  
NOTE Confidence: 0.848088152857143

00:22:24.790 --> 00:22:27.538 but definitely the patients love this.  
NOTE Confidence: 0.848088152857143

00:22:27.540 --> 00:22:30.025 The most common consumer sleep tech that  
NOTE Confidence: 0.848088152857143

00:22:30.025 --> 00:22:32.936 we are probably familiar with is the Fitbit.  
NOTE Confidence: 0.848088152857143

00:22:32.940 --> 00:22:36.126 So the Fitbit on utilizes these  
NOTE Confidence: 0.848088152857143

00:22:36.126 --> 00:22:38.250 Tri axial accelerometer sensors  
NOTE Confidence: 0.848088152857143

00:22:38.342 --> 00:22:40.787 to determine like heart rate.  
NOTE Confidence: 0.848088152857143

00:22:40.790 --> 00:22:42.418 It's basically like actigraphy  
NOTE Confidence: 0.848088152857143

00:22:42.418 --> 00:22:44.453 where we uses motion sensor,  
NOTE Confidence: 0.848088152857143

00:22:44.460 --> 00:22:45.884 so it's determining like,  
NOTE Confidence: 0.848088152857143

00:22:45.884 --> 00:22:48.585 well this is activity so the patients  
NOTE Confidence: 0.848088152857143

00:22:48.585 --> 00:22:50.770 likely not sleeping at this time  
NOTE Confidence: 0.848088152857143

00:22:50.770 --> 00:22:52.839 and there are other flavors of  
NOTE Confidence: 0.848088152857143

00:22:52.839 --> 00:22:54.699 this two in terms of wearables.  
NOTE Confidence: 0.848088152857143

00:22:54.700 --> 00:22:55.960 There's also the oral ring,  
NOTE Confidence: 0.848088152857143

00:22:55.960 --> 00:22:57.270 which is the upper right.

NOTE Confidence: 0.848088152857143  
00:22:57.270 --> 00:22:59.020 Diagram.  
NOTE Confidence: 0.848088152857143  
00:22:59.020 --> 00:23:00.856 And then now recently there is  
NOTE Confidence: 0.848088152857143  
00:23:00.856 --> 00:23:02.080 a bin new rebels.  
NOTE Confidence: 0.848088152857143  
00:23:02.080 --> 00:23:04.877 So what new rebels do is they have  
NOTE Confidence: 0.848088152857143  
00:23:04.877 --> 00:23:07.979 this lower energy radar that detects  
NOTE Confidence: 0.848088152857143  
00:23:07.979 --> 00:23:10.131 movement and breathing the diagram  
NOTE Confidence: 0.848088152857143  
00:23:10.131 --> 00:23:11.757 to the bottom left hand corner.  
NOTE Confidence: 0.848088152857143  
00:23:11.760 --> 00:23:14.150 That's the Google Nest hub.  
NOTE Confidence: 0.848088152857143  
00:23:14.150 --> 00:23:15.686 So the Google Nest Hub recently  
NOTE Confidence: 0.848088152857143  
00:23:15.686 --> 00:23:17.569 launched as a sleep sensing feature,  
NOTE Confidence: 0.848088152857143  
00:23:17.570 --> 00:23:20.167 which estimates when you went to bed  
NOTE Confidence: 0.848088152857143  
00:23:20.167 --> 00:23:23.285 when you woke up and how long you slept.  
NOTE Confidence: 0.848088152857143  
00:23:23.290 --> 00:23:25.498 It can also detect sounds like  
NOTE Confidence: 0.848088152857143  
00:23:25.498 --> 00:23:27.474 snoring and coughing as well  
NOTE Confidence: 0.848088152857143  
00:23:27.474 --> 00:23:29.218 as environmental features such  
NOTE Confidence: 0.848088152857143

00:23:29.218 --> 00:23:31.398 as wide in room temperature.  
NOTE Confidence: 0.848088152857143

00:23:31.400 --> 00:23:33.098 What these sensors are designed to  
NOTE Confidence: 0.848088152857143

00:23:33.098 --> 00:23:35.422 do is to help assess sleep quality  
NOTE Confidence: 0.848088152857143

00:23:35.422 --> 00:23:37.307 and help identify potential causes  
NOTE Confidence: 0.848088152857143

00:23:37.307 --> 00:23:39.658 of sleep disruption in the morning.  
NOTE Confidence: 0.848088152857143

00:23:39.660 --> 00:23:42.194 The Nest Hub will show your sleep  
NOTE Confidence: 0.848088152857143

00:23:42.194 --> 00:23:44.470 summary and then the sleep data  
NOTE Confidence: 0.848088152857143

00:23:44.470 --> 00:23:46.325 syncs with Google Fit app.  
NOTE Confidence: 0.848088152857143

00:23:46.330 --> 00:23:48.385 So after learning your sleep  
NOTE Confidence: 0.848088152857143

00:23:48.385 --> 00:23:50.440 habits and patterns through AI,  
NOTE Confidence: 0.848088152857143

00:23:50.440 --> 00:23:52.420 the sleep sensing will then give  
NOTE Confidence: 0.848088152857143

00:23:52.420 --> 00:23:53.080 personalized recommendations  
NOTE Confidence: 0.848088152857143

00:23:53.080 --> 00:23:54.548 as a matter of fact,  
NOTE Confidence: 0.848088152857143

00:23:54.550 --> 00:23:58.337 Google partnered with the ASM to deliver  
NOTE Confidence: 0.848088152857143

00:23:58.337 --> 00:24:01.200 these recommendations tailored based on this,  
NOTE Confidence: 0.848088152857143

00:24:01.200 --> 00:24:02.980 the prior night's sleep.



NOTE Confidence: 0.848088152857143  
00:24:02.980 --> 00:24:03.301 So,  
NOTE Confidence: 0.848088152857143  
00:24:03.301 --> 00:24:03.943 for example,  
NOTE Confidence: 0.848088152857143  
00:24:03.943 --> 00:24:06.190 it might say you are not sleeping  
NOTE Confidence: 0.848088152857143  
00:24:06.264 --> 00:24:07.904 this much considered going to  
NOTE Confidence: 0.848088152857143  
00:24:07.904 --> 00:24:10.320 bed at a regular time each night.  
NOTE Confidence: 0.848088152857143  
00:24:10.320 --> 00:24:12.780 Pretty crazy.  
NOTE Confidence: 0.848088152857143  
00:24:12.780 --> 00:24:15.095 Then finally the third class  
NOTE Confidence: 0.848088152857143  
00:24:15.095 --> 00:24:18.196 of data for sleep that is near  
NOTE Confidence: 0.848088152857143  
00:24:18.196 --> 00:24:20.956 and dear to us all is the EHR.  
NOTE Confidence: 0.848088152857143  
00:24:20.960 --> 00:24:24.248 From HR we can gather a  
NOTE Confidence: 0.848088152857143  
00:24:24.248 --> 00:24:25.892 demographics socioeconomic status,  
NOTE Confidence: 0.848088152857143  
00:24:25.900 --> 00:24:29.324 even comorbidities, lab data,  
NOTE Confidence: 0.848088152857143  
00:24:29.324 --> 00:24:30.698 imaging, hospitalizations,  
NOTE Confidence: 0.848088152857143  
00:24:30.698 --> 00:24:32.252 health care utilization,  
NOTE Confidence: 0.848088152857143  
00:24:32.252 --> 00:24:33.806 self reported questionnaires,  
NOTE Confidence: 0.848088152857143

00:24:33.810 --> 00:24:36.114 and then we can multiply the data by  
NOTE Confidence: 0.848088152857143

00:24:36.114 --> 00:24:38.378 combining it with the sleep technology  
NOTE Confidence: 0.848088152857143

00:24:38.378 --> 00:24:39.998 that we previously mentioned,  
NOTE Confidence: 0.848088152857143

00:24:40.000 --> 00:24:41.950 as well as consumer sleep technology.  
NOTE Confidence: 0.896466715

00:24:44.400 --> 00:24:45.978 So we have all this data,  
NOTE Confidence: 0.896466715

00:24:45.980 --> 00:24:47.600 so here's a comprehensive summary  
NOTE Confidence: 0.896466715

00:24:47.600 --> 00:24:50.060 slide of all our big data sources,  
NOTE Confidence: 0.896466715

00:24:50.060 --> 00:24:52.100 challenges and opportunities.  
NOTE Confidence: 0.896466715

00:24:52.100 --> 00:24:55.500 I borrowed this from Peppin.  
NOTE Confidence: 0.896466715

00:24:55.500 --> 00:24:58.332 So to recap, we talked about the Patella  
NOTE Confidence: 0.896466715

00:24:58.332 --> 00:25:00.559 monitoring as well as a sleep study,  
NOTE Confidence: 0.896466715

00:25:00.560 --> 00:25:02.044 but also social media.  
NOTE Confidence: 0.896466715

00:25:02.044 --> 00:25:04.758 I know social media can also affect  
NOTE Confidence: 0.896466715

00:25:04.758 --> 00:25:08.022 sleep if you are tweeting as our former  
NOTE Confidence: 0.896466715

00:25:08.022 --> 00:25:10.325 president at 2:00 o'clock in the  
NOTE Confidence: 0.896466715

00:25:10.325 --> 00:25:12.418 morning 3:00 o'clock in the morning,

NOTE Confidence: 0.896466715

00:25:12.418 --> 00:25:13.758 4:00 o'clock in the morning.

NOTE Confidence: 0.896466715

00:25:13.760 --> 00:25:15.116 Then most likely you are going

NOTE Confidence: 0.896466715

00:25:15.116 --> 00:25:16.660 to have a sleep disturbance.

NOTE Confidence: 0.896466715

00:25:16.660 --> 00:25:17.902 Now, how will this affect your

NOTE Confidence: 0.896466715

00:25:17.902 --> 00:25:18.959 PAP usage if you're supposed

NOTE Confidence: 0.896466715

00:25:18.959 --> 00:25:20.415 to be on C PAP for tweeting at

NOTE Confidence: 0.896466715

00:25:20.415 --> 00:25:21.597 3:00 o'clock in the morning?

NOTE Confidence: 0.896466715

00:25:21.600 --> 00:25:23.604 This is all valuable data for

NOTE Confidence: 0.896466715

00:25:23.604 --> 00:25:25.630 us to help identify patients.

NOTE Confidence: 0.896466715

00:25:25.630 --> 00:25:28.520 Even before they start therapy.

NOTE Confidence: 0.896466715

00:25:28.520 --> 00:25:29.544 Other things to consider.

NOTE Confidence: 0.896466715

00:25:29.544 --> 00:25:31.725 The omics and I think we may have

NOTE Confidence: 0.896466715

00:25:31.725 --> 00:25:33.185 mentioned and lifestyle activities so

NOTE Confidence: 0.896466715

00:25:33.185 --> 00:25:35.581 we know in the sleep world that patients

NOTE Confidence: 0.896466715

00:25:35.581 --> 00:25:37.480 that are more active during the day,

NOTE Confidence: 0.896466715

00:25:37.480 --> 00:25:38.555 they're they're more likely to  
NOTE Confidence: 0.896466715

00:25:38.555 --> 00:25:39.829 get a better night's sleep.  
NOTE Confidence: 0.763384447142857

00:25:42.820 --> 00:25:44.452 And Geo localization.  
NOTE Confidence: 0.763384447142857

00:25:44.452 --> 00:25:46.628 We mentioned socioeconomic status,  
NOTE Confidence: 0.763384447142857

00:25:46.630 --> 00:25:49.140 how that can affect OSA, but then  
NOTE Confidence: 0.763384447142857

00:25:49.140 --> 00:25:52.118 also access to care or pollen counts.  
NOTE Confidence: 0.763384447142857

00:25:52.118 --> 00:25:52.816 Imagine that.  
NOTE Confidence: 0.763384447142857

00:25:52.816 --> 00:25:55.704 So now on your phone you can detect  
NOTE Confidence: 0.763384447142857

00:25:55.704 --> 00:25:57.876 what is the pollen count outside.  
NOTE Confidence: 0.763384447142857

00:25:57.880 --> 00:26:00.296 Should I bring my Flonase in the morning?  
NOTE Confidence: 0.763384447142857

00:26:00.300 --> 00:26:02.556 How will this affect OSA patients?  
NOTE Confidence: 0.763384447142857

00:26:02.560 --> 00:26:06.263 Well patients with OSA and allergic rhinitis  
NOTE Confidence: 0.763384447142857

00:26:06.263 --> 00:26:10.116 may have decreased pain here and right there,  
NOTE Confidence: 0.763384447142857

00:26:10.120 --> 00:26:10.846 congested at night.  
NOTE Confidence: 0.763384447142857

00:26:10.846 --> 00:26:12.540 They don't want to use their nasal.  
NOTE Confidence: 0.763384447142857

00:26:12.540 --> 00:26:13.960 Ask they're congested at night.

NOTE Confidence: 0.763384447142857  
00:26:13.960 --> 00:26:15.298 They can't breathe through their mask.  
NOTE Confidence: 0.763384447142857  
00:26:15.300 --> 00:26:16.628 We can identify this,  
NOTE Confidence: 0.763384447142857  
00:26:16.628 --> 00:26:19.263 and we can refine our therapy based on  
NOTE Confidence: 0.763384447142857  
00:26:19.263 --> 00:26:21.551 what we know from all of this data,  
NOTE Confidence: 0.763384447142857  
00:26:21.560 --> 00:26:24.250 and consolidating every piece together.  
NOTE Confidence: 0.927295688  
00:26:27.740 --> 00:26:30.260 But life isn't easy, right?  
NOTE Confidence: 0.927295688  
00:26:30.260 --> 00:26:32.156 This data is heterogeneous.  
NOTE Confidence: 0.927295688  
00:26:32.156 --> 00:26:34.526 How do we ensure interoperability  
NOTE Confidence: 0.927295688  
00:26:34.526 --> 00:26:36.120 of all this data?  
NOTE Confidence: 0.927295688  
00:26:36.120 --> 00:26:37.660 So we have one Amar?  
NOTE Confidence: 0.927295688  
00:26:37.660 --> 00:26:40.066 Why can't Sloan talk to Yale?  
NOTE Confidence: 0.927295688  
00:26:40.070 --> 00:26:41.645 Combine our data and then  
NOTE Confidence: 0.927295688  
00:26:41.645 --> 00:26:43.220 figure out the best solution.  
NOTE Confidence: 0.927295688  
00:26:43.220 --> 00:26:44.955 Once the interoperability like unfortunately  
NOTE Confidence: 0.927295688  
00:26:44.955 --> 00:26:47.529 we have Allscripts I'm not sure about Yale.  
NOTE Confidence: 0.927295688

00:26:47.530 --> 00:26:48.860 If you guys have Epicor,  
NOTE Confidence: 0.927295688

00:26:48.860 --> 00:26:52.142 Allscripts but that's always comes into  
NOTE Confidence: 0.927295688

00:26:52.142 --> 00:26:55.013 question interoperability also data privacy.  
NOTE Confidence: 0.927295688

00:26:55.013 --> 00:26:57.377 So recently Google health.  
NOTE Confidence: 0.927295688

00:26:57.380 --> 00:26:59.256 I think they tried to work with  
NOTE Confidence: 0.927295688

00:26:59.256 --> 00:27:01.245 EMR and there was a lot of  
NOTE Confidence: 0.927295688

00:27:01.245 --> 00:27:02.925 pushback in terms of data privacy.  
NOTE Confidence: 0.927295688

00:27:02.930 --> 00:27:06.560 So their project has stalled.  
NOTE Confidence: 0.927295688

00:27:06.560 --> 00:27:08.036 Next, we want to think about,  
NOTE Confidence: 0.927295688

00:27:08.040 --> 00:27:11.477 you know the the natural inherent flaws  
NOTE Confidence: 0.927295688

00:27:11.477 --> 00:27:14.180 of the observational studies right?  
NOTE Confidence: 0.927295688

00:27:14.180 --> 00:27:15.173 And then finally,  
NOTE Confidence: 0.927295688

00:27:15.173 --> 00:27:16.828 if we have the proper  
NOTE Confidence: 0.927295688

00:27:16.830 --> 00:27:18.790 infrastructures for data sharing.  
NOTE Confidence: 0.871588334117647

00:27:21.700 --> 00:27:23.836 But you know, we should definitely  
NOTE Confidence: 0.871588334117647

00:27:23.836 --> 00:27:26.053 commit to moving big data and

NOTE Confidence: 0.871588334117647  
00:27:26.053 --> 00:27:27.858 machine learning and OSA four.  
NOTE Confidence: 0.871588334117647  
00:27:27.860 --> 00:27:30.948 This can really help us reshape our OSA  
NOTE Confidence: 0.871588334117647  
00:27:30.948 --> 00:27:33.303 through integrated care and could help  
NOTE Confidence: 0.871588334117647  
00:27:33.303 --> 00:27:35.577 us a partner with other institutions.  
NOTE Confidence: 0.871588334117647  
00:27:35.580 --> 00:27:37.715 And then also maybe even use this  
NOTE Confidence: 0.871588334117647  
00:27:37.715 --> 00:27:40.069 information that we learn through big data  
NOTE Confidence: 0.871588334117647  
00:27:40.069 --> 00:27:42.139 and machine learning to create proper  
NOTE Confidence: 0.871588334117647  
00:27:42.202 --> 00:27:44.387 risks for a therapeutic interventions.  
NOTE Confidence: 0.896628105294118  
00:27:46.760 --> 00:27:48.412 And that all of this is that  
NOTE Confidence: 0.896628105294118  
00:27:48.412 --> 00:27:49.714 patients so patients at the  
NOTE Confidence: 0.896628105294118  
00:27:49.714 --> 00:27:51.059 center so patient centered care.  
NOTE Confidence: 0.93892009625  
00:27:53.580 --> 00:27:55.836 OK, so now that we have the data,  
NOTE Confidence: 0.93892009625  
00:27:55.840 --> 00:27:58.544 how can we make meaningful use of this  
NOTE Confidence: 0.93892009625  
00:27:58.544 --> 00:28:01.950 data so one common tool is automation.  
NOTE Confidence: 0.93892009625  
00:28:01.950 --> 00:28:03.822 Automation is basically the  
NOTE Confidence: 0.93892009625

00:28:03.822 --> 00:28:06.162 extrication of humans and piles  
NOTE Confidence: 0.93892009625

00:28:06.162 --> 00:28:08.667 of paper as much as possible.  
NOTE Confidence: 0.93892009625

00:28:08.670 --> 00:28:12.066 So we can achieve this through continuous  
NOTE Confidence: 0.93892009625

00:28:12.066 --> 00:28:14.896 remote telemonitoring and feedback messaging,  
NOTE Confidence: 0.93892009625

00:28:14.900 --> 00:28:18.410 so that's one form of automation.  
NOTE Confidence: 0.93892009625

00:28:18.410 --> 00:28:20.468 And this is an example of  
NOTE Confidence: 0.93892009625

00:28:20.468 --> 00:28:22.830 it via the telly OSA trials.  
NOTE Confidence: 0.93892009625

00:28:22.830 --> 00:28:24.390 This is crying and Co.  
NOTE Confidence: 0.93892009625

00:28:24.390 --> 00:28:26.140 He sought to examine the  
NOTE Confidence: 0.93892009625

00:28:26.140 --> 00:28:27.190 effects of telemedicine,  
NOTE Confidence: 0.93892009625

00:28:27.190 --> 00:28:30.050 delivered OSA education and CPAP  
NOTE Confidence: 0.93892009625

00:28:30.050 --> 00:28:31.766 telemonitoring with automated  
NOTE Confidence: 0.93892009625

00:28:31.766 --> 00:28:34.459 patient feedback messaging on CPAP  
NOTE Confidence: 0.93892009625

00:28:34.459 --> 00:28:37.284 adherence is a four armed a randomized  
NOTE Confidence: 0.93892009625

00:28:37.284 --> 00:28:39.248 factorial design clinical trial and  
NOTE Confidence: 0.93892009625

00:28:39.248 --> 00:28:42.720 he enrolled about 14150 patients.



NOTE Confidence: 0.93892009625

00:28:42.720 --> 00:28:44.540 So for all intensive purposes,

NOTE Confidence: 0.93892009625

00:28:44.540 --> 00:28:46.466 this figure it collapses the four

NOTE Confidence: 0.93892009625

00:28:46.466 --> 00:28:48.511 treatment arms into three to directly

NOTE Confidence: 0.93892009625

00:28:48.511 --> 00:28:50.256 compare the automated feedback messaging

NOTE Confidence: 0.93892009625

00:28:50.256 --> 00:28:52.447 and what he found was that here,

NOTE Confidence: 0.93892009625

00:28:52.450 --> 00:28:54.214 like you can't see that arrow here.

NOTE Confidence: 0.93892009625

00:28:54.220 --> 00:28:56.800 OK, so here what he saw is that the the

NOTE Confidence: 0.93892009625

00:28:56.875 --> 00:28:58.800 patients who received messaging from

NOTE Confidence: 0.93892009625

00:28:58.800 --> 00:29:01.599 the onset of CPAP and throughout were

NOTE Confidence: 0.93892009625

00:29:01.599 --> 00:29:04.427 more likely to be compliant compared to

NOTE Confidence: 0.93892009625

00:29:04.427 --> 00:29:07.790 those without messaging after one year.

NOTE Confidence: 0.93892009625

00:29:07.790 --> 00:29:09.865 This was proven to be

NOTE Confidence: 0.93892009625

00:29:09.865 --> 00:29:10.695 statistically significant,

NOTE Confidence: 0.93892009625

00:29:10.700 --> 00:29:12.940 so we learned that there's a positive impact

NOTE Confidence: 0.93892009625

00:29:12.940 --> 00:29:15.309 on those who receive continuous messaging.

NOTE Confidence: 0.93892009625

00:29:15.310 --> 00:29:16.121 Interestingly,  
NOTE Confidence: 0.93892009625

00:29:16.121 --> 00:29:20.176 those who initially received messaging.  
NOTE Confidence: 0.93892009625

00:29:20.180 --> 00:29:20.671 Right,  
NOTE Confidence: 0.93892009625

00:29:20.671 --> 00:29:23.617 but they stopped after 90 days.  
NOTE Confidence: 0.93892009625

00:29:23.620 --> 00:29:26.100 Had similar outcomes compared to  
NOTE Confidence: 0.93892009625

00:29:26.100 --> 00:29:29.229 those who never even received a text.  
NOTE Confidence: 0.93892009625

00:29:29.230 --> 00:29:30.664 If I were to extrapolate this  
NOTE Confidence: 0.93892009625

00:29:30.664 --> 00:29:31.620 to my real life,  
NOTE Confidence: 0.93892009625

00:29:31.620 --> 00:29:34.084 then I should nag my husband to  
NOTE Confidence: 0.93892009625

00:29:34.084 --> 00:29:36.484 the dishes every day if I want  
NOTE Confidence: 0.93892009625

00:29:36.484 --> 00:29:38.380 him to wash the dishes right?  
NOTE Confidence: 0.93892009625

00:29:38.380 --> 00:29:40.320 So.  
NOTE Confidence: 0.93892009625

00:29:40.320 --> 00:29:43.638 Next up, instead of you know,  
NOTE Confidence: 0.93892009625

00:29:43.640 --> 00:29:45.256 maybe continuous remote telemonitoring.  
NOTE Confidence: 0.93892009625

00:29:45.256 --> 00:29:47.680 What if we use self reported  
NOTE Confidence: 0.93892009625

00:29:47.744 --> 00:29:49.734 questionnaires and link them to

NOTE Confidence: 0.93892009625  
00:29:49.734 --> 00:29:51.724 sleep studies or appointment types?  
NOTE Confidence: 0.93892009625  
00:29:51.730 --> 00:29:53.938 How can we repair this automatically  
NOTE Confidence: 0.93892009625  
00:29:53.938 --> 00:29:57.114 to remove the paper waste and to better  
NOTE Confidence: 0.93892009625  
00:29:57.114 --> 00:29:59.159 understand our parents our patients?  
NOTE Confidence: 0.93892009625  
00:29:59.160 --> 00:30:02.618 And then finally we can consider alerts  
NOTE Confidence: 0.93892009625  
00:30:02.618 --> 00:30:05.048 based on consumer technology data.  
NOTE Confidence: 0.93892009625  
00:30:05.048 --> 00:30:06.470 So for example,  
NOTE Confidence: 0.93892009625  
00:30:06.470 --> 00:30:08.096 during the pandemic what we did  
NOTE Confidence: 0.93892009625  
00:30:08.096 --> 00:30:09.991 is we gave these little pulse  
NOTE Confidence: 0.93892009625  
00:30:09.991 --> 00:30:11.495 oximeters for our patients,  
NOTE Confidence: 0.93892009625  
00:30:11.500 --> 00:30:13.276 sent them home and we would call them.  
NOTE Confidence: 0.93892009625  
00:30:13.280 --> 00:30:15.494 We had like an army of nurses called patients  
NOTE Confidence: 0.93892009625  
00:30:15.494 --> 00:30:18.200 every day, checking in on their symptoms.  
NOTE Confidence: 0.93892009625  
00:30:18.200 --> 00:30:19.781 You know now.  
NOTE Confidence: 0.93892009625  
00:30:19.781 --> 00:30:21.889 Shouldn't we think about?  
NOTE Confidence: 0.93892009625

00:30:21.890 --> 00:30:23.658 Advancing shouldn't we think  
NOTE Confidence: 0.93892009625

00:30:23.658 --> 00:30:25.426 about Bluetooth technology right?  
NOTE Confidence: 0.93892009625

00:30:25.430 --> 00:30:27.174 What about home oximeters?  
NOTE Confidence: 0.93892009625

00:30:27.174 --> 00:30:29.790 An alarm system can be prepared,  
NOTE Confidence: 0.93892009625

00:30:29.790 --> 00:30:32.550 and what we can do is we can be alarmed  
NOTE Confidence: 0.93892009625

00:30:32.622 --> 00:30:35.573 every time their auction dips below 85%.  
NOTE Confidence: 0.93892009625

00:30:35.573 --> 00:30:36.519 For example,  
NOTE Confidence: 0.93892009625

00:30:36.519 --> 00:30:39.357 this already exists for blood pressure.  
NOTE Confidence: 0.93892009625

00:30:39.360 --> 00:30:42.426 This already exists for glucose monitoring,  
NOTE Confidence: 0.93892009625

00:30:42.430 --> 00:30:44.686 would it benefit the sleep apnea  
NOTE Confidence: 0.93892009625

00:30:44.686 --> 00:30:47.520 patient to watch all of these metrics  
NOTE Confidence: 0.93892009625

00:30:47.520 --> 00:30:50.028 while they're being treated at home?  
NOTE Confidence: 0.93892009625

00:30:50.030 --> 00:30:52.190 Hopefully you know if we start  
NOTE Confidence: 0.93892009625

00:30:52.190 --> 00:30:53.630 using Bluetooth technology more  
NOTE Confidence: 0.93892009625

00:30:53.694 --> 00:30:56.016 transporting the information to a cloud,  
NOTE Confidence: 0.93892009625

00:30:56.020 --> 00:30:57.855 automating alerts we can interact

NOTE Confidence: 0.93892009625

00:30:57.855 --> 00:30:59.323 with our patients better,

NOTE Confidence: 0.93892009625

00:30:59.330 --> 00:31:00.746 provide better feedback,

NOTE Confidence: 0.93892009625

00:31:00.746 --> 00:31:01.690 better engagement,

NOTE Confidence: 0.93892009625

00:31:01.690 --> 00:31:02.938 and hopefully better outcomes.

NOTE Confidence: 0.83052855

00:31:07.360 --> 00:31:08.728 OK, let's see.

NOTE Confidence: 0.871639605

00:31:11.520 --> 00:31:14.130 OK, so here is another example

NOTE Confidence: 0.871639605

00:31:14.130 --> 00:31:16.700 of an integration tool HL seven.

NOTE Confidence: 0.871639605

00:31:16.700 --> 00:31:21.160 OK so HL 7 otherwise known as health level 7,

NOTE Confidence: 0.871639605

00:31:21.160 --> 00:31:24.136 but this is a conduit between

NOTE Confidence: 0.871639605

00:31:24.136 --> 00:31:26.410 platform A and platform B.

NOTE Confidence: 0.871639605

00:31:26.410 --> 00:31:27.880 In terms of Sleep Medicine,

NOTE Confidence: 0.871639605

00:31:27.880 --> 00:31:30.390 it can create a bidirectional

NOTE Confidence: 0.871639605

00:31:30.390 --> 00:31:32.900 passage of information of sleep

NOTE Confidence: 0.871639605

00:31:32.992 --> 00:31:35.624 data and HR data and vice versa.

NOTE Confidence: 0.871639605

00:31:35.630 --> 00:31:37.710 So when I was a fellow at Penn,

NOTE Confidence: 0.871639605

00:31:37.710 --> 00:31:41.077 we utilized the HL 7 framework to  
NOTE Confidence: 0.871639605

00:31:41.077 --> 00:31:43.163 identify patients with insufficient  
NOTE Confidence: 0.871639605

00:31:43.163 --> 00:31:46.475 PAP usage in high risk patients,  
NOTE Confidence: 0.871639605

00:31:46.480 --> 00:31:47.707 commercial transport operators,  
NOTE Confidence: 0.871639605

00:31:47.707 --> 00:31:51.015 and also we use this data to identify  
NOTE Confidence: 0.871639605

00:31:51.015 --> 00:31:53.640 who had high HI despite path usage.  
NOTE Confidence: 0.871639605

00:31:53.640 --> 00:31:55.854 What we did is this is the prequel era.  
NOTE Confidence: 0.871639605

00:31:55.860 --> 00:31:57.465 By the way,  
NOTE Confidence: 0.871639605

00:31:57.465 --> 00:32:00.140 we generated letters not trusting  
NOTE Confidence: 0.871639605

00:32:00.140 --> 00:32:03.360 regenerated letters to send them to patients.  
NOTE Confidence: 0.871639605

00:32:03.360 --> 00:32:04.592 Then what we did is we wanted to  
NOTE Confidence: 0.871639605

00:32:04.592 --> 00:32:06.087 see if the patients actually called,  
NOTE Confidence: 0.871639605

00:32:06.090 --> 00:32:08.460 we measure call volumes to see  
NOTE Confidence: 0.871639605

00:32:08.460 --> 00:32:10.501 if patients actually came back  
NOTE Confidence: 0.871639605

00:32:10.501 --> 00:32:12.829 to clinic and to understand if  
NOTE Confidence: 0.871639605

00:32:12.829 --> 00:32:14.931 this affected their a clinical

NOTE Confidence: 0.871639605

00:32:14.931 --> 00:32:17.096 outcomes such as blood pressure.

NOTE Confidence: 0.871639605

00:32:17.100 --> 00:32:18.584 And lo and behold,

NOTE Confidence: 0.871639605

00:32:18.584 --> 00:32:21.279 we found that patients with higher PAP

NOTE Confidence: 0.871639605

00:32:21.279 --> 00:32:24.037 usage was linked to lower blood pressure,

NOTE Confidence: 0.871639605

00:32:24.040 --> 00:32:26.590 diastolic blood pressure.

NOTE Confidence: 0.871639605

00:32:26.590 --> 00:32:28.291 So this is just one example of

NOTE Confidence: 0.871639605

00:32:28.291 --> 00:32:30.446 what we did a couple of years ago

NOTE Confidence: 0.871639605

00:32:30.446 --> 00:32:32.220 and other things to think about.

NOTE Confidence: 0.871639605

00:32:32.220 --> 00:32:34.795 Easy integration tool is a

NOTE Confidence: 0.871639605

00:32:34.795 --> 00:32:36.710 population management database query.

NOTE Confidence: 0.871639605

00:32:36.710 --> 00:32:39.790 You can query info and combine it

NOTE Confidence: 0.871639605

00:32:39.790 --> 00:32:42.429 with general sleep diagnostics,

NOTE Confidence: 0.871639605

00:32:42.430 --> 00:32:43.660 consumer health technology

NOTE Confidence: 0.871639605

00:32:43.660 --> 00:32:45.300 and development algorithms to

NOTE Confidence: 0.871639605

00:32:45.300 --> 00:32:47.230 predict outcomes and performance.

NOTE Confidence: 0.762594573076923

00:32:52.350 --> 00:32:54.774 So currently at MSK we are  
NOTE Confidence: 0.762594573076923

00:32:54.774 --> 00:32:57.409 completing a study of ML and OSA.  
NOTE Confidence: 0.762594573076923

00:32:57.410 --> 00:33:00.272 So we had about 300 or 400 patients in  
NOTE Confidence: 0.762594573076923

00:33:00.272 --> 00:33:03.058 sleep clinic that referred for home sleep  
NOTE Confidence: 0.762594573076923

00:33:03.058 --> 00:33:06.030 study and we wanted to determine the  
NOTE Confidence: 0.762594573076923

00:33:06.030 --> 00:33:08.634 predictors of OSA in cancer patients.  
NOTE Confidence: 0.762594573076923

00:33:08.640 --> 00:33:11.872 The first step was do we really need  
NOTE Confidence: 0.762594573076923

00:33:11.872 --> 00:33:14.094 machine learning data scientists are  
NOTE Confidence: 0.762594573076923

00:33:14.094 --> 00:33:17.212 not cheap and can we simply use our  
NOTE Confidence: 0.762594573076923

00:33:17.212 --> 00:33:19.300 beloved logistic regression to determine  
NOTE Confidence: 0.762594573076923

00:33:19.300 --> 00:33:21.955 predictors of obstructive sleep apnea?  
NOTE Confidence: 0.762594573076923

00:33:21.960 --> 00:33:24.417 So we answered our first question by  
NOTE Confidence: 0.762594573076923

00:33:24.417 --> 00:33:28.058 testing to see if there is a linear  
NOTE Confidence: 0.762594573076923

00:33:28.058 --> 00:33:29.567 relationship between characteristics  
NOTE Confidence: 0.762594573076923

00:33:29.567 --> 00:33:32.018 otherwise known as features and OSA.  
NOTE Confidence: 0.762594573076923

00:33:32.020 --> 00:33:35.172 So the first three subplots we have here



NOTE Confidence: 0.762594573076923  
00:33:35.172 --> 00:33:38.150 depict the features scattered in 3D space.  
NOTE Confidence: 0.762594573076923  
00:33:38.150 --> 00:33:41.542 What this shows us is that there's a  
NOTE Confidence: 0.762594573076923  
00:33:41.542 --> 00:33:43.833 nonlinear relationship between each of  
NOTE Confidence: 0.762594573076923  
00:33:43.833 --> 00:33:46.563 the features and obstructive sleep apnea.  
NOTE Confidence: 0.762594573076923  
00:33:46.570 --> 00:33:48.754 So we've tried using chronic kidney  
NOTE Confidence: 0.762594573076923  
00:33:48.754 --> 00:33:50.650 disease with stop bang score,  
NOTE Confidence: 0.762594573076923  
00:33:50.650 --> 00:33:53.075 diabetes, all the comorbidities you  
NOTE Confidence: 0.762594573076923  
00:33:53.075 --> 00:33:56.810 could think of COPD metastasis and  
NOTE Confidence: 0.762594573076923  
00:33:56.810 --> 00:34:00.610 we found no linear relationship.  
NOTE Confidence: 0.762594573076923  
00:34:00.610 --> 00:34:02.440 We this was an iterative process.  
NOTE Confidence: 0.762594573076923  
00:34:02.440 --> 00:34:04.906 We kept feeding it more data and more data.  
NOTE Confidence: 0.762594573076923  
00:34:04.910 --> 00:34:07.310 Still no relationship.  
NOTE Confidence: 0.762594573076923  
00:34:07.310 --> 00:34:09.725 So I suppose we can still continue  
NOTE Confidence: 0.762594573076923  
00:34:09.725 --> 00:34:10.760 with logistic regression,  
NOTE Confidence: 0.762594573076923  
00:34:10.760 --> 00:34:13.448 but that would be obviously flawed  
NOTE Confidence: 0.762594573076923

00:34:13.450 --> 00:34:16.024 since we confirmed the nonlinearity of  
NOTE Confidence: 0.762594573076923

00:34:16.024 --> 00:34:18.939 features we sought to use unsupervised  
NOTE Confidence: 0.762594573076923

00:34:18.939 --> 00:34:21.749 machine learning and employed advanced  
NOTE Confidence: 0.762594573076923

00:34:21.750 --> 00:34:25.096 techniques such as PCA combined with RF,  
NOTE Confidence: 0.762594573076923

00:34:25.100 --> 00:34:27.024 so its principal component  
NOTE Confidence: 0.762594573076923

00:34:27.024 --> 00:34:28.948 analysis and random forests.  
NOTE Confidence: 0.762594573076923

00:34:28.950 --> 00:34:29.970 So the PCA,  
NOTE Confidence: 0.762594573076923

00:34:29.970 --> 00:34:32.350 what it did is it performed feature  
NOTE Confidence: 0.762594573076923

00:34:32.425 --> 00:34:35.320 extractions to determine the relevant  
NOTE Confidence: 0.762594573076923

00:34:35.320 --> 00:34:37.388 components and then these components.  
NOTE Confidence: 0.762594573076923

00:34:37.388 --> 00:34:40.053 Were processed to yield clusters or feature  
NOTE Confidence: 0.762594573076923

00:34:40.053 --> 00:34:42.664 vectors that are most relevant to our  
NOTE Confidence: 0.762594573076923

00:34:42.664 --> 00:34:45.224 population and there we have the 4th subplot,  
NOTE Confidence: 0.762594573076923

00:34:45.230 --> 00:34:45.834 the 4th.  
NOTE Confidence: 0.762594573076923

00:34:45.834 --> 00:34:47.948 So plot is a projection of the  
NOTE Confidence: 0.762594573076923

00:34:47.948 --> 00:34:49.562 features as principal components

NOTE Confidence: 0.762594573076923

00:34:49.562 --> 00:34:51.637 in three dimensions that contribute

NOTE Confidence: 0.762594573076923

00:34:51.637 --> 00:34:54.050 to the maximum variance of OSA.

NOTE Confidence: 0.762594573076923

00:34:54.050 --> 00:34:55.440 We mentioned that the algorithm

NOTE Confidence: 0.762594573076923

00:34:55.440 --> 00:34:57.870 will do is it will try to help us

NOTE Confidence: 0.762594573076923

00:34:57.870 --> 00:34:59.650 predict OSH the best of their ability

NOTE Confidence: 0.762594573076923

00:34:59.650 --> 00:35:01.674 based on the data that we fed it.

NOTE Confidence: 0.762594573076923

00:35:01.680 --> 00:35:04.336 So within 93% we were able to determine

NOTE Confidence: 0.762594573076923

00:35:04.336 --> 00:35:06.240 this within this Max variance,

NOTE Confidence: 0.762594573076923

00:35:06.240 --> 00:35:08.660 we will have OSA.

NOTE Confidence: 0.762594573076923

00:35:08.660 --> 00:35:11.306 And then finally the best classifier

NOTE Confidence: 0.762594573076923

00:35:11.306 --> 00:35:13.740 was determined for subsequent datasets.

NOTE Confidence: 0.89583829

00:35:16.950 --> 00:35:19.169 So I will share our preliminary findings

NOTE Confidence: 0.89583829

00:35:19.169 --> 00:35:21.218 with you because you sacrificed your

NOTE Confidence: 0.89583829

00:35:21.218 --> 00:35:23.633 Wednesday afternoon to join me here today.

NOTE Confidence: 0.89583829

00:35:23.640 --> 00:35:26.230 So through mill we learned that the

NOTE Confidence: 0.89583829

00:35:26.230 --> 00:35:27.866 strongest predictors of obstructive  
NOTE Confidence: 0.89583829

00:35:27.866 --> 00:35:30.614 sleep apnea and cancer patients were  
NOTE Confidence: 0.89583829

00:35:30.614 --> 00:35:32.682 stopping score radiation therapy to  
NOTE Confidence: 0.89583829

00:35:32.682 --> 00:35:34.880 the head and neck and cancer type.  
NOTE Confidence: 0.89583829

00:35:34.880 --> 00:35:35.906 Meaning. Specifically,  
NOTE Confidence: 0.89583829

00:35:35.906 --> 00:35:40.010 it was long head and neck and prostate.  
NOTE Confidence: 0.89583829

00:35:40.010 --> 00:35:42.248 So here is a diagram that  
NOTE Confidence: 0.89583829

00:35:42.248 --> 00:35:43.740 illustrates the airflow limitations  
NOTE Confidence: 0.89583829

00:35:43.807 --> 00:35:45.459 in obstructive sleep apnea.  
NOTE Confidence: 0.89583829

00:35:45.460 --> 00:35:47.204 So in figure a,  
NOTE Confidence: 0.89583829

00:35:47.204 --> 00:35:50.082 this is the normal sleep we have  
NOTE Confidence: 0.89583829

00:35:50.082 --> 00:35:52.158 air that enters through the nose  
NOTE Confidence: 0.89583829

00:35:52.158 --> 00:35:54.474 and then down the posterior or  
NOTE Confidence: 0.89583829

00:35:54.474 --> 00:35:56.802 fairings and trade into the lungs  
NOTE Confidence: 0.89583829

00:35:56.877 --> 00:35:59.413 and figure B is that of sleep apnea.  
NOTE Confidence: 0.89583829

00:35:59.420 --> 00:36:01.355 So in figure B we can see the error

NOTE Confidence: 0.89583829

00:36:01.355 --> 00:36:03.056 is trying to enter through the

NOTE Confidence: 0.89583829

00:36:03.056 --> 00:36:04.946 nose and then there is relaxation

NOTE Confidence: 0.89583829

00:36:04.946 --> 00:36:07.424 instruction and the posterior or Franks,

NOTE Confidence: 0.89583829

00:36:07.430 --> 00:36:09.634 thus causing the chronic

NOTE Confidence: 0.89583829

00:36:09.634 --> 00:36:10.736 intermittent hypoxia.

NOTE Confidence: 0.89583829

00:36:10.740 --> 00:36:12.604 In obstructive sleep apnea.

NOTE Confidence: 0.89583829

00:36:12.604 --> 00:36:13.536 And finally,

NOTE Confidence: 0.89583829

00:36:13.540 --> 00:36:17.740 in see this is a diagram of a patient who

NOTE Confidence: 0.89583829

00:36:17.842 --> 00:36:21.937 received radiation to the head and neck.

NOTE Confidence: 0.89583829

00:36:21.940 --> 00:36:22.328 Alright,

NOTE Confidence: 0.89583829

00:36:22.328 --> 00:36:24.268 so similarly air will enter

NOTE Confidence: 0.89583829

00:36:24.268 --> 00:36:26.550 through the nose and then it

NOTE Confidence: 0.89583829

00:36:26.550 --> 00:36:28.030 it will counter obstruction.

NOTE Confidence: 0.89583829

00:36:28.030 --> 00:36:29.620 This obstruction can be from

NOTE Confidence: 0.89583829

00:36:29.620 --> 00:36:30.892 the posterior or pharynx,

NOTE Confidence: 0.89583829

00:36:30.900 --> 00:36:33.052 or it can be in the form of  
NOTE Confidence: 0.89583829

00:36:33.052 --> 00:36:35.119 fibrosis or scarring or stenosis.  
NOTE Confidence: 0.89583829

00:36:35.120 --> 00:36:37.160 Even after radiation therapy.  
NOTE Confidence: 0.89583829

00:36:37.160 --> 00:36:39.200 So this radiation therapy  
NOTE Confidence: 0.89583829

00:36:39.200 --> 00:36:42.192 can increase risk for OSA or  
NOTE Confidence: 0.89583829

00:36:42.192 --> 00:36:43.608 exacerbate pre-existing OSA.  
NOTE Confidence: 0.894589283

00:36:47.740 --> 00:36:49.340 Alright, so this just goes  
NOTE Confidence: 0.894589283

00:36:49.340 --> 00:36:50.940 to show you our results.  
NOTE Confidence: 0.894589283

00:36:50.940 --> 00:36:54.030 We have 100% sensitivity and 90%  
NOTE Confidence: 0.894589283

00:36:54.030 --> 00:36:56.760 specificity on the PCA plus RF was  
NOTE Confidence: 0.894589283

00:36:56.760 --> 00:36:59.243 able to determine the Max variants  
NOTE Confidence: 0.894589283

00:36:59.243 --> 00:37:01.303 of OSA through clustering and  
NOTE Confidence: 0.894589283

00:37:01.303 --> 00:37:03.948 this was indeed superior to the  
NOTE Confidence: 0.894589283

00:37:03.948 --> 00:37:06.558 traditional techniques of LR or RF.  
NOTE Confidence: 0.894589283

00:37:06.560 --> 00:37:08.845 Individually we've said it multiple  
NOTE Confidence: 0.894589283

00:37:08.845 --> 00:37:11.130 tests thereafter and were able

NOTE Confidence: 0.894589283

00:37:11.207 --> 00:37:13.182 to reproduce the same result

NOTE Confidence: 0.894589283

00:37:13.182 --> 00:37:15.157 of OSA accurately and again.

NOTE Confidence: 0.894589283

00:37:15.160 --> 00:37:16.588 This was unsupervised learning.

NOTE Confidence: 0.8132068025

00:37:20.250 --> 00:37:23.407 So an ML is applicable from diagnosis

NOTE Confidence: 0.8132068025

00:37:23.407 --> 00:37:26.150 to intervention ING to you know

NOTE Confidence: 0.8132068025

00:37:26.150 --> 00:37:27.933 long term monitoring, right?

NOTE Confidence: 0.8132068025

00:37:27.933 --> 00:37:31.244 So we tend to fixate on diagnosis,

NOTE Confidence: 0.8132068025

00:37:31.250 --> 00:37:32.925 but let's shift towards this

NOTE Confidence: 0.8132068025

00:37:32.925 --> 00:37:33.938 chronic management, right?

NOTE Confidence: 0.8132068025

00:37:33.938 --> 00:37:35.966 Like how do we improve compliance

NOTE Confidence: 0.8132068025

00:37:35.966 --> 00:37:37.700 for our patients using milk?

NOTE Confidence: 0.8132068025

00:37:37.700 --> 00:37:39.566 How much compliance is even necessary?

NOTE Confidence: 0.8132068025

00:37:39.570 --> 00:37:42.054 So we have this large advantage of the path.

NOTE Confidence: 0.8132068025

00:37:42.060 --> 00:37:44.404 And I think we should try to leverage

NOTE Confidence: 0.8132068025

00:37:44.404 --> 00:37:47.041 this in the future for studies to

NOTE Confidence: 0.8132068025

00:37:47.041 --> 00:37:49.026 improve management of our patients.  
NOTE Confidence: 0.8132068025

00:37:49.030 --> 00:37:50.645 Next thing to appreciate that  
NOTE Confidence: 0.8132068025

00:37:50.645 --> 00:37:52.630 you know the purpose of mill.  
NOTE Confidence: 0.8132068025

00:37:52.630 --> 00:37:54.770 It's a compliment that physician  
NOTE Confidence: 0.8132068025

00:37:54.770 --> 00:37:56.482 not replace a physician.  
NOTE Confidence: 0.8132068025

00:37:56.490 --> 00:37:57.705 IBM Watson failed.  
NOTE Confidence: 0.8132068025

00:37:57.705 --> 00:38:00.540 This is daily and everyones memory right.  
NOTE Confidence: 0.8132068025

00:38:00.540 --> 00:38:02.070 But you know we just have to work with it,  
NOTE Confidence: 0.8132068025

00:38:02.070 --> 00:38:02.358 right?  
NOTE Confidence: 0.8132068025

00:38:02.358 --> 00:38:04.374 We have to be able to translate  
NOTE Confidence: 0.8132068025

00:38:04.374 --> 00:38:06.142 the structured data instead of  
NOTE Confidence: 0.8132068025

00:38:06.142 --> 00:38:07.646 something valuable and actionable  
NOTE Confidence: 0.8132068025

00:38:07.646 --> 00:38:09.320 information for our patients.  
NOTE Confidence: 0.8132068025

00:38:09.320 --> 00:38:10.580 And then finally, you know,  
NOTE Confidence: 0.8132068025

00:38:10.580 --> 00:38:13.100 we should always strive for  
NOTE Confidence: 0.8132068025

00:38:13.100 --> 00:38:15.436 aiming for clinical value,



NOTE Confidence: 0.8132068025  
00:38:15.436 --> 00:38:17.188 establishing these maybe  
NOTE Confidence: 0.8132068025  
00:38:17.188 --> 00:38:18.940 decision support systems.  
NOTE Confidence: 0.8132068025  
00:38:18.940 --> 00:38:20.110 For future discovery.  
NOTE Confidence: 0.8047944125  
00:38:22.830 --> 00:38:24.934 So some general opportunities  
NOTE Confidence: 0.8047944125  
00:38:24.934 --> 00:38:27.038 we can redefine OSA.  
NOTE Confidence: 0.8047944125  
00:38:27.040 --> 00:38:29.116 This is clearly low hanging fruit.  
NOTE Confidence: 0.8047944125  
00:38:29.120 --> 00:38:32.812 The HI consists of Hypopneas and apneas.  
NOTE Confidence: 0.8047944125  
00:38:32.812 --> 00:38:34.840 Well, what about?  
NOTE Confidence: 0.8047944125  
00:38:34.840 --> 00:38:36.244 What about restless legs?  
NOTE Confidence: 0.8047944125  
00:38:36.244 --> 00:38:37.297 What about arousals?  
NOTE Confidence: 0.8047944125  
00:38:37.300 --> 00:38:39.890 What is it about the brain waves  
NOTE Confidence: 0.8047944125  
00:38:39.890 --> 00:38:42.136 that can affect hi and you know,  
NOTE Confidence: 0.8047944125  
00:38:42.136 --> 00:38:43.328 machine learning will help  
NOTE Confidence: 0.8047944125  
00:38:43.328 --> 00:38:44.520 us understand this better.  
NOTE Confidence: 0.8047944125  
00:38:44.520 --> 00:38:47.404 What about the ODI O2 nadir time  
NOTE Confidence: 0.8047944125

00:38:47.404 --> 00:38:49.379 auction saturation less than 88%?  
NOTE Confidence: 0.8047944125

00:38:49.380 --> 00:38:52.176 How does this factor into OSA?  
NOTE Confidence: 0.8047944125

00:38:52.180 --> 00:38:55.276 And then can we combine this with clinical  
NOTE Confidence: 0.8047944125

00:38:55.276 --> 00:38:57.202 symptoms and atrophy to understand  
NOTE Confidence: 0.8047944125

00:38:57.202 --> 00:39:00.000 what OSA is better so that we can  
NOTE Confidence: 0.8047944125

00:39:00.000 --> 00:39:02.180 personalize therapy for these patients?  
NOTE Confidence: 0.8047944125

00:39:02.180 --> 00:39:04.105 There's a very large knowledge  
NOTE Confidence: 0.8047944125

00:39:04.105 --> 00:39:05.645 gap in Sleep Medicine.  
NOTE Confidence: 0.8047944125

00:39:05.650 --> 00:39:08.415 But we have to figure out how  
NOTE Confidence: 0.8047944125

00:39:08.415 --> 00:39:10.480 to move forward using ML.  
NOTE Confidence: 0.8047944125

00:39:10.480 --> 00:39:12.400 And other opportunities with the  
NOTE Confidence: 0.8047944125

00:39:12.400 --> 00:39:14.320 proper definition of OSA treatment.  
NOTE Confidence: 0.8047944125

00:39:14.320 --> 00:39:15.660 As I mentioned earlier,  
NOTE Confidence: 0.8047944125

00:39:15.660 --> 00:39:17.496 Pop success is the 70%  
NOTE Confidence: 0.8047944125

00:39:17.496 --> 00:39:19.480 compliance is very archaic.  
NOTE Confidence: 0.8047944125

00:39:19.480 --> 00:39:22.560 We have to kind of reevaluate that

NOTE Confidence: 0.8047944125  
00:39:22.560 --> 00:39:23.552 morbidity and mortality outcomes.  
NOTE Confidence: 0.8047944125  
00:39:23.552 --> 00:39:25.040 I think there was a jerk  
NOTE Confidence: 0.8047944125  
00:39:25.088 --> 00:39:26.028 you earlier this year.  
NOTE Confidence: 0.8047944125  
00:39:26.030 --> 00:39:27.440 That said, maybe you know,  
NOTE Confidence: 0.8047944125  
00:39:27.440 --> 00:39:28.945 treatment for OSA won't help  
NOTE Confidence: 0.8047944125  
00:39:28.945 --> 00:39:29.848 our cardiovascular patients  
NOTE Confidence: 0.8047944125  
00:39:29.848 --> 00:39:31.400 when we know in our hearts.  
NOTE Confidence: 0.8047944125  
00:39:31.400 --> 00:39:33.518 It's definitely can help some patients.  
NOTE Confidence: 0.8047944125  
00:39:33.520 --> 00:39:35.529 And how do we combine this with  
NOTE Confidence: 0.8047944125  
00:39:35.529 --> 00:39:36.710 subjective measures as well?  
NOTE Confidence: 0.8047944125  
00:39:36.710 --> 00:39:38.098 And then the personalized  
NOTE Confidence: 0.8047944125  
00:39:38.098 --> 00:39:39.833 medicine that we talked about,  
NOTE Confidence: 0.8047944125  
00:39:39.840 --> 00:39:40.824 the different.  
NOTE Confidence: 0.8047944125  
00:39:40.824 --> 00:39:43.284 Algorithms based on phenotype cluster  
NOTE Confidence: 0.8047944125  
00:39:43.284 --> 00:39:46.009 analysis and targeting clinical outcomes.  
NOTE Confidence: 0.913766945454546

00:39:49.460 --> 00:39:52.540 And then also you know health care  
NOTE Confidence: 0.913766945454546

00:39:52.540 --> 00:39:54.730 disparities is always important.  
NOTE Confidence: 0.913766945454546

00:39:54.730 --> 00:39:56.515 How do we address all the races?  
NOTE Confidence: 0.913766945454546

00:39:56.520 --> 00:39:58.401 So, for example,  
NOTE Confidence: 0.913766945454546

00:39:58.401 --> 00:40:01.536 Asian Americans and African Americans,  
NOTE Confidence: 0.913766945454546

00:40:01.540 --> 00:40:05.040 they are known to develop OSA at  
NOTE Confidence: 0.913766945454546

00:40:05.040 --> 00:40:07.913 earlier ages and at lower BMI's,  
NOTE Confidence: 0.913766945454546

00:40:07.913 --> 00:40:09.272 but they're frequently  
NOTE Confidence: 0.913766945454546

00:40:09.272 --> 00:40:11.537 being missed by their GP.  
NOTE Confidence: 0.913766945454546

00:40:11.540 --> 00:40:13.268 So how do we better address these groups?  
NOTE Confidence: 0.913766945454546

00:40:13.270 --> 00:40:14.986 And of course, women post menopausal  
NOTE Confidence: 0.913766945454546

00:40:14.986 --> 00:40:16.630 women who can develop sleep apnea  
NOTE Confidence: 0.913766945454546

00:40:16.630 --> 00:40:18.406 at the same rate at a higher age.  
NOTE Confidence: 0.913766945454546

00:40:18.410 --> 00:40:19.769 These again are.  
NOTE Confidence: 0.913766945454546

00:40:19.769 --> 00:40:22.030 Frequently going missed, and of course,  
NOTE Confidence: 0.913766945454546

00:40:22.030 --> 00:40:24.130 how do we improve access to care?

NOTE Confidence: 0.913766945454546  
00:40:24.130 --> 00:40:26.824 So one of our long term goals, right?  
NOTE Confidence: 0.913766945454546  
00:40:26.824 --> 00:40:29.110 ML and OSA study is to develop a website.  
NOTE Confidence: 0.913766945454546  
00:40:29.110 --> 00:40:31.790 This way we can post this algorithm so  
NOTE Confidence: 0.913766945454546  
00:40:31.790 --> 00:40:34.061 you know clinicians and oncologists  
NOTE Confidence: 0.913766945454546  
00:40:34.061 --> 00:40:36.596 in rural communities can adequately  
NOTE Confidence: 0.913766945454546  
00:40:36.596 --> 00:40:39.330 define R OSA like sleep studies.  
NOTE Confidence: 0.913766945454546  
00:40:39.330 --> 00:40:40.670 Excuse me, sleep physicians,  
NOTE Confidence: 0.913766945454546  
00:40:40.670 --> 00:40:42.680 there's a dearth of us like  
NOTE Confidence: 0.913766945454546  
00:40:42.743 --> 00:40:44.179 we need more clinicians,  
NOTE Confidence: 0.913766945454546  
00:40:44.180 --> 00:40:45.340 but that's pretty much impossible  
NOTE Confidence: 0.913766945454546  
00:40:45.340 --> 00:40:46.268 in the near future.  
NOTE Confidence: 0.913766945454546  
00:40:46.270 --> 00:40:49.168 So how do we improve access to care and  
NOTE Confidence: 0.913766945454546  
00:40:49.168 --> 00:40:52.210 help our colleagues that are defined OSA?  
NOTE Confidence: 0.913766945454546  
00:40:52.210 --> 00:40:54.680 And then finally, you know,  
NOTE Confidence: 0.913766945454546  
00:40:54.680 --> 00:40:56.660 we have to validate consumer technology,  
NOTE Confidence: 0.913766945454546

00:40:56.660 --> 00:40:56.854 right?  
NOTE Confidence: 0.913766945454546

00:40:56.854 --> 00:40:58.876 So we had to find a way to meet in  
NOTE Confidence: 0.913766945454546

00:40:58.876 --> 00:41:00.680 the middle to engage our patients.  
NOTE Confidence: 0.913766945454546

00:41:00.680 --> 00:41:03.130 And also we have to recognize that  
NOTE Confidence: 0.913766945454546

00:41:03.130 --> 00:41:05.164 OSA does not occur in isolation.  
NOTE Confidence: 0.913766945454546

00:41:05.170 --> 00:41:07.468 So we have to consider insomnia.  
NOTE Confidence: 0.913766945454546

00:41:07.470 --> 00:41:09.837 Their CBT apps like how do we work with  
NOTE Confidence: 0.913766945454546

00:41:09.837 --> 00:41:12.139 that to improve sleep apnea treatment?  
NOTE Confidence: 0.73121339

00:41:15.780 --> 00:41:20.014 So AI is a comment. It can be applied  
NOTE Confidence: 0.73121339

00:41:20.014 --> 00:41:21.158 throughout the essay journey.  
NOTE Confidence: 0.73121339

00:41:21.160 --> 00:41:23.204 It can start with cleaning by screening.  
NOTE Confidence: 0.73121339

00:41:23.210 --> 00:41:25.352 How do we improve screening based  
NOTE Confidence: 0.73121339

00:41:25.352 --> 00:41:26.780 on patient related features?  
NOTE Confidence: 0.73121339

00:41:26.780 --> 00:41:28.747 How do we improve our diagnostic testing?  
NOTE Confidence: 0.73121339

00:41:28.750 --> 00:41:30.136 Should we create an algorithm and  
NOTE Confidence: 0.73121339

00:41:30.136 --> 00:41:31.749 have it available to our colleagues?

NOTE Confidence: 0.73121339  
00:41:31.750 --> 00:41:35.158 How do we redefine the definition of OSA?  
NOTE Confidence: 0.73121339  
00:41:35.160 --> 00:41:37.115 How do we improve therapy  
NOTE Confidence: 0.73121339  
00:41:37.115 --> 00:41:38.288 like tailoring therapy?  
NOTE Confidence: 0.73121339  
00:41:38.290 --> 00:41:40.114 Who would best be suited for  
NOTE Confidence: 0.73121339  
00:41:40.114 --> 00:41:41.330 the oral mandibular device?  
NOTE Confidence: 0.73121339  
00:41:41.330 --> 00:41:43.610 You know now there's an L  
NOTE Confidence: 0.73121339  
00:41:43.610 --> 00:41:44.750 for mandibular movement.  
NOTE Confidence: 0.73121339  
00:41:44.750 --> 00:41:45.308 At night,  
NOTE Confidence: 0.73121339  
00:41:45.308 --> 00:41:47.261 so this way these patients may be  
NOTE Confidence: 0.73121339  
00:41:47.261 --> 00:41:49.432 best fitted for an oral appliance  
NOTE Confidence: 0.73121339  
00:41:49.432 --> 00:41:51.262 rather than going through straight  
NOTE Confidence: 0.73121339  
00:41:51.328 --> 00:41:53.100 to see PAP and also for follow up,  
NOTE Confidence: 0.73121339  
00:41:53.100 --> 00:41:55.816 can we predict those who will not  
NOTE Confidence: 0.73121339  
00:41:55.816 --> 00:41:58.679 adhere to CPAP initially if we have  
NOTE Confidence: 0.73121339  
00:41:58.679 --> 00:42:00.518 a patient in the middle sleeping  
NOTE Confidence: 0.73121339

00:42:00.518 --> 00:42:02.060 in the middle of Central Park,  
NOTE Confidence: 0.73121339

00:42:02.060 --> 00:42:03.901 are they less likely to be accurate  
NOTE Confidence: 0.73121339

00:42:03.901 --> 00:42:05.776 with PAT because they have chronic  
NOTE Confidence: 0.73121339

00:42:05.776 --> 00:42:07.896 allergies and then finally with  
NOTE Confidence: 0.73121339

00:42:07.896 --> 00:42:10.116 the longitudinal of follow up?  
NOTE Confidence: 0.73121339

00:42:10.120 --> 00:42:13.192 Are there ways that we can predict risk  
NOTE Confidence: 0.73121339

00:42:13.192 --> 00:42:15.328 of hospitalizations in our OSA patients?  
NOTE Confidence: 0.73121339

00:42:15.330 --> 00:42:16.956 Can we create an electric system?  
NOTE Confidence: 0.916864511052632

00:42:19.080 --> 00:42:20.488 And as mentioned earlier,  
NOTE Confidence: 0.916864511052632

00:42:20.488 --> 00:42:22.958 you know it's important to note that  
NOTE Confidence: 0.916864511052632

00:42:22.958 --> 00:42:25.023 there there should be a way where  
NOTE Confidence: 0.916864511052632

00:42:25.023 --> 00:42:28.180 this ML should not replace RTGS.  
NOTE Confidence: 0.916864511052632

00:42:28.180 --> 00:42:31.008 And could this mill help us better  
NOTE Confidence: 0.916864511052632

00:42:31.008 --> 00:42:34.046 target what RCTs are needed in the  
NOTE Confidence: 0.916864511052632

00:42:34.046 --> 00:42:37.660 future for Sleep Medicine? It's.  
NOTE Confidence: 0.916864511052632

00:42:37.660 --> 00:42:40.306 But you know, we shouldn't overshoot



NOTE Confidence: 0.916864511052632  
00:42:40.306 --> 00:42:42.608 our expectations and remember the  
NOTE Confidence: 0.916864511052632  
00:42:42.608 --> 00:42:45.011 challenges of machine learning, right?  
NOTE Confidence: 0.916864511052632  
00:42:45.011 --> 00:42:46.073 Realistically speaking,  
NOTE Confidence: 0.916864511052632  
00:42:46.073 --> 00:42:49.259 can we have a data scientist  
NOTE Confidence: 0.916864511052632  
00:42:49.259 --> 00:42:51.420 in every institution?  
NOTE Confidence: 0.916864511052632  
00:42:51.420 --> 00:42:52.940 Or maybe even better yet,  
NOTE Confidence: 0.916864511052632  
00:42:52.940 --> 00:42:57.268 on every medical team, maybe in the ICU?  
NOTE Confidence: 0.916864511052632  
00:42:57.270 --> 00:42:59.615 Second thing is you know the academic  
NOTE Confidence: 0.916864511052632  
00:42:59.615 --> 00:43:00.947 partnership with industry, right?  
NOTE Confidence: 0.916864511052632  
00:43:00.947 --> 00:43:03.563 How do we you know industry is way  
NOTE Confidence: 0.916864511052632  
00:43:03.563 --> 00:43:05.816 ahead of us in terms of data analytics?  
NOTE Confidence: 0.916864511052632  
00:43:05.816 --> 00:43:08.480 Is there a simple way to do identify  
NOTE Confidence: 0.916864511052632  
00:43:08.547 --> 00:43:11.544 and hash the data so that we can start  
NOTE Confidence: 0.916864511052632  
00:43:11.544 --> 00:43:14.268 collaborating with external companies?  
NOTE Confidence: 0.916864511052632  
00:43:14.270 --> 00:43:16.398 Third, democratization of data  
NOTE Confidence: 0.916864511052632

00:43:16.398 --> 00:43:18.526 from all healthcare ecosystems,  
NOTE Confidence: 0.916864511052632

00:43:18.530 --> 00:43:20.726 like we have the consumer technology.  
NOTE Confidence: 0.916864511052632

00:43:20.730 --> 00:43:22.186 How do we get access to that?  
NOTE Confidence: 0.916864511052632

00:43:22.190 --> 00:43:23.350 We have the HR data.  
NOTE Confidence: 0.916864511052632

00:43:23.350 --> 00:43:24.382 How do we get access that  
NOTE Confidence: 0.916864511052632

00:43:24.382 --> 00:43:25.499 we have all the app data?  
NOTE Confidence: 0.916864511052632

00:43:25.500 --> 00:43:27.187 How do we get access to that?  
NOTE Confidence: 0.916864511052632

00:43:27.190 --> 00:43:28.770 And then finally, you know,  
NOTE Confidence: 0.916864511052632

00:43:28.770 --> 00:43:29.880 designing prospective studies.  
NOTE Confidence: 0.916864511052632

00:43:29.880 --> 00:43:31.730 How do we improve sensitivity,  
NOTE Confidence: 0.916864511052632

00:43:31.730 --> 00:43:34.580 specificity and accuracy  
NOTE Confidence: 0.916864511052632

00:43:34.580 --> 00:43:36.479 with leveraging mill?  
NOTE Confidence: 0.851549034

00:43:39.500 --> 00:43:42.110 So sorry you know here.  
NOTE Confidence: 0.851549034

00:43:42.110 --> 00:43:44.387 I just want to close this out with the  
NOTE Confidence: 0.851549034

00:43:44.387 --> 00:43:46.139 artificial intelligence Sleep Medicine.  
NOTE Confidence: 0.851549034

00:43:46.140 --> 00:43:48.678 So GSM has noticed that you

NOTE Confidence: 0.851549034  
00:43:48.678 --> 00:43:51.560 know we have to address AI,  
NOTE Confidence: 0.851549034  
00:43:51.560 --> 00:43:53.569 but it makes a point to highlight  
NOTE Confidence: 0.851549034  
00:43:53.569 --> 00:43:55.535 that the goal of AI integration  
NOTE Confidence: 0.851549034  
00:43:55.535 --> 00:43:57.623 should be to augment not replace  
NOTE Confidence: 0.851549034  
00:43:57.623 --> 00:43:59.557 expert evaluation of sleep data.  
NOTE Confidence: 0.934971465  
00:44:03.300 --> 00:44:06.120 So it's OK to be different.  
NOTE Confidence: 0.934971465  
00:44:06.120 --> 00:44:08.436 Machine learning will not replace EBM.  
NOTE Confidence: 0.934971465  
00:44:08.440 --> 00:44:11.160 We should use it in conjunction with it.  
NOTE Confidence: 0.934971465  
00:44:11.160 --> 00:44:12.540 There are multiple data  
NOTE Confidence: 0.934971465  
00:44:12.540 --> 00:44:14.265 sources for Mill and OSA.  
NOTE Confidence: 0.934971465  
00:44:14.270 --> 00:44:17.720 Quality data will require integration,  
NOTE Confidence: 0.934971465  
00:44:17.720 --> 00:44:20.380 transformation and clinical interpretation to  
NOTE Confidence: 0.934971465  
00:44:20.380 --> 00:44:24.090 create a compelling value prop for AI and ML.  
NOTE Confidence: 0.934971465  
00:44:24.090 --> 00:44:25.107 And then finally,  
NOTE Confidence: 0.934971465  
00:44:25.107 --> 00:44:28.050 you know an animal can't solve every problem.  
NOTE Confidence: 0.934971465

00:44:28.050 --> 00:44:30.804 But we can start in a field such as  
NOTE Confidence: 0.934971465

00:44:30.804 --> 00:44:33.468 OSA that has sufficient problems.  
NOTE Confidence: 0.934971465

00:44:33.470 --> 00:44:35.948 To begin with and for us  
NOTE Confidence: 0.934971465

00:44:35.948 --> 00:44:38.110 to tackle one by one.  
NOTE Confidence: 0.934971465

00:44:38.110 --> 00:44:39.102 And finally, you know,  
NOTE Confidence: 0.934971465

00:44:39.102 --> 00:44:41.054 I hope we can empower our patients  
NOTE Confidence: 0.934971465

00:44:41.054 --> 00:44:42.666 with this more personalized  
NOTE Confidence: 0.934971465

00:44:42.666 --> 00:44:44.278 approach through continuous care.  
NOTE Confidence: 0.87725463875

00:44:46.410 --> 00:44:48.586 And I like to close off with this.  
NOTE Confidence: 0.87725463875

00:44:48.590 --> 00:44:50.305 I know we're all excited for ML  
NOTE Confidence: 0.87725463875

00:44:50.305 --> 00:44:52.049 and ready to take it by storm,  
NOTE Confidence: 0.87725463875

00:44:52.050 --> 00:44:54.409 so please do read this primer article.  
NOTE Confidence: 0.87725463875

00:44:54.410 --> 00:44:55.187 It's by JAMA.  
NOTE Confidence: 0.87725463875

00:44:55.187 --> 00:44:57.000 It's how to read articles that use  
NOTE Confidence: 0.87725463875

00:44:57.057 --> 00:44:58.803 machine learning so we can identify  
NOTE Confidence: 0.87725463875

00:44:58.803 --> 00:45:00.938 that this would be good and this

NOTE Confidence: 0.87725463875

00:45:00.938 --> 00:45:02.453 is considered bad garbage data.

NOTE Confidence: 0.860433001

00:45:04.570 --> 00:45:06.770 And I I definitely want

NOTE Confidence: 0.860433001

00:45:06.770 --> 00:45:08.970 to thank my dream team.

NOTE Confidence: 0.860433001

00:45:08.970 --> 00:45:11.210 It's these are wonderful software

NOTE Confidence: 0.860433001

00:45:11.210 --> 00:45:13.450 engineers and physicians that are

NOTE Confidence: 0.860433001

00:45:13.450 --> 00:45:16.257 well versed in data analytics and they

NOTE Confidence: 0.860433001

00:45:16.257 --> 00:45:18.190 really guided me through this process.

NOTE Confidence: 0.930623201428571

00:45:20.290 --> 00:45:22.257 So thank you all for your time.

NOTE Confidence: 0.930623201428571

00:45:22.260 --> 00:45:24.430 I know we have a hard stop at 3:00 PM.

NOTE Confidence: 0.930623201428571

00:45:24.430 --> 00:45:25.730 I have my contact information

NOTE Confidence: 0.930623201428571

00:45:25.730 --> 00:45:27.314 there on the screen tube you'd

NOTE Confidence: 0.930623201428571

00:45:27.314 --> 00:45:28.917 like to email me and in private.

NOTE Confidence: 0.8857627

00:45:40.020 --> 00:45:41.840 Thank you so much Doctor Tan,

NOTE Confidence: 0.827946781666667

00:45:41.840 --> 00:45:43.132 that was wonderful really.

NOTE Confidence: 0.827946781666667

00:45:43.132 --> 00:45:45.064 A great, great overview of machine

NOTE Confidence: 0.827946781666667

00:45:45.064 --> 00:45:47.400 learning and how it applies to sleep.  
NOTE Confidence: 0.827946781666667

00:45:47.400 --> 00:45:48.560 And I agree with you.  
NOTE Confidence: 0.827946781666667

00:45:48.560 --> 00:45:51.096 I think that sleep is really an excellent.  
NOTE Confidence: 0.827946781666667

00:45:51.100 --> 00:45:52.384 You know it's the perfect field  
NOTE Confidence: 0.827946781666667

00:45:52.384 --> 00:45:54.041 'cause we have so much data and there  
NOTE Confidence: 0.827946781666667

00:45:54.041 --> 00:45:55.610 is so much that we have to learn.  
NOTE Confidence: 0.827946781666667

00:45:55.610 --> 00:45:58.157 I'm going to moderate the chat so I want  
NOTE Confidence: 0.827946781666667

00:45:58.157 --> 00:46:01.002 to see first if there's any questions in  
NOTE Confidence: 0.827946781666667

00:46:01.002 --> 00:46:03.846 the chat already that I will ask you about.  
NOTE Confidence: 0.827946781666667

00:46:03.850 --> 00:46:05.728 I have a thank you already.  
NOTE Confidence: 0.827946781666667

00:46:05.730 --> 00:46:07.618 If people want to unmute, that's  
NOTE Confidence: 0.827946781666667

00:46:07.618 --> 00:46:11.034 certainly fine to ask your own question.  
NOTE Confidence: 0.827946781666667

00:46:11.040 --> 00:46:12.660 I mean, I think you brought up a lot  
NOTE Confidence: 0.827946781666667

00:46:12.660 --> 00:46:14.207 of the great questions actually in  
NOTE Confidence: 0.827946781666667

00:46:14.207 --> 00:46:16.039 one of your final summary slides is,  
NOTE Confidence: 0.827946781666667

00:46:16.040 --> 00:46:17.720 you know there's so much opportunity.

NOTE Confidence: 0.827946781666667  
00:46:17.720 --> 00:46:19.176 But how do we get around some  
NOTE Confidence: 0.827946781666667  
00:46:19.176 --> 00:46:19.800 of these issues?  
NOTE Confidence: 0.827946781666667  
00:46:19.800 --> 00:46:21.520 You know the privacy issues?  
NOTE Confidence: 0.827946781666667  
00:46:21.520 --> 00:46:22.688 How did different institutions  
NOTE Confidence: 0.827946781666667  
00:46:22.688 --> 00:46:24.756 like ours don't talk to each other  
NOTE Confidence: 0.827946781666667  
00:46:24.756 --> 00:46:26.358 and the platforms that the PAP  
NOTE Confidence: 0.827946781666667  
00:46:26.358 --> 00:46:28.019 devices use don't talk to each other  
NOTE Confidence: 0.827946781666667  
00:46:28.019 --> 00:46:29.632 nor do they talk to us easily.  
NOTE Confidence: 0.827946781666667  
00:46:29.632 --> 00:46:30.808 What's your thought?  
NOTE Confidence: 0.827946781666667  
00:46:30.808 --> 00:46:32.768 Should we be collaborating and  
NOTE Confidence: 0.827946781666667  
00:46:32.768 --> 00:46:34.667 doing this together as a team?  
NOTE Confidence: 0.827946781666667  
00:46:34.670 --> 00:46:36.010 Should each institution try to  
NOTE Confidence: 0.827946781666667  
00:46:36.010 --> 00:46:37.350 do it its own way,  
NOTE Confidence: 0.827946781666667  
00:46:37.350 --> 00:46:38.988 what how should we move forward?  
NOTE Confidence: 0.915857974  
00:46:39.790 --> 00:46:40.740 Oh, that's a great question,  
NOTE Confidence: 0.915857974

00:46:40.740 --> 00:46:43.064 so you know why reinvent the wheel  
NOTE Confidence: 0.915857974

00:46:43.064 --> 00:46:45.399 if you're going to start the wheel,  
NOTE Confidence: 0.915857974

00:46:45.400 --> 00:46:47.246 I'll continue it with you, right?  
NOTE Confidence: 0.915857974

00:46:47.246 --> 00:46:50.648 So, for example, what we did is.  
NOTE Confidence: 0.915857974

00:46:50.650 --> 00:46:52.490 We just leverage Redcap,  
NOTE Confidence: 0.915857974

00:46:52.490 --> 00:46:55.720 so we're able to leverage all of the  
NOTE Confidence: 0.915857974

00:46:55.720 --> 00:46:57.580 HL seven information and then deposit  
NOTE Confidence: 0.915857974

00:46:57.580 --> 00:46:59.850 it into Redcap just by hashing it.  
NOTE Confidence: 0.915857974

00:46:59.850 --> 00:47:03.170 So there are ways to create a better  
NOTE Confidence: 0.915857974

00:47:03.170 --> 00:47:05.080 interface to consolidate the data,  
NOTE Confidence: 0.915857974

00:47:05.080 --> 00:47:07.600 so I'd say like the hard question  
NOTE Confidence: 0.915857974

00:47:07.670 --> 00:47:10.112 of Epic not talking to Allscripts  
NOTE Confidence: 0.915857974

00:47:10.112 --> 00:47:11.333 that's very difficult,  
NOTE Confidence: 0.915857974

00:47:11.340 --> 00:47:13.818 but an easy stepping stone be  
NOTE Confidence: 0.915857974

00:47:13.818 --> 00:47:16.262 identifying someone else with epic and  
NOTE Confidence: 0.915857974

00:47:16.262 --> 00:47:18.613 creating a platform of almost like a



NOTE Confidence: 0.915857974  
00:47:18.613 --> 00:47:20.720 registry of all the data to deposit.  
NOTE Confidence: 0.915857974  
00:47:20.720 --> 00:47:22.754 And then analyze and maybe sharing  
NOTE Confidence: 0.915857974  
00:47:22.754 --> 00:47:25.250 the cost of a data scientist.  
NOTE Confidence: 0.915857974  
00:47:25.250 --> 00:47:25.610 Great  
NOTE Confidence: 0.853408683333333  
00:47:25.620 --> 00:47:27.798 thank you doctor clear. I think.  
NOTE Confidence: 0.853408683333333  
00:47:27.800 --> 00:47:29.208 I think I did. Was able to unmute  
NOTE Confidence: 0.853408683333333  
00:47:29.208 --> 00:47:30.615 you if you want to ask your oh  
NOTE Confidence: 0.920424268571429  
00:47:30.650 --> 00:47:36.380 OK, so let me just OK so. One  
NOTE Confidence: 0.967029631428571  
00:47:36.390 --> 00:47:37.909 of the things that you pointed out,  
NOTE Confidence: 0.967029631428571  
00:47:37.910 --> 00:47:40.790 and it's certainly true is that  
NOTE Confidence: 0.967029631428571  
00:47:40.790 --> 00:47:43.318 consumer wearables are like taking  
NOTE Confidence: 0.884774142  
00:47:43.330 --> 00:47:47.018 the world by storm. And and there are all  
NOTE Confidence: 0.884774142  
00:47:47.020 --> 00:47:49.668 sorts of devices, the aura ring and you  
NOTE Confidence: 0.978292765  
00:47:49.680 --> 00:47:51.940 mentioned some of them.  
NOTE Confidence: 0.978292765  
00:47:51.940 --> 00:47:54.300 But a lot of the devices out there  
NOTE Confidence: 0.9093929625

00:47:54.850 --> 00:47:58.530 we have no idea about what they do,  
NOTE Confidence: 0.9093929625

00:47:58.530 --> 00:48:01.274 whether they are accurate and so forth.  
NOTE Confidence: 0.9093929625

00:48:01.274 --> 00:48:03.252 And there are some devices that have  
NOTE Confidence: 0.9093929625

00:48:03.252 --> 00:48:05.745 come out that are and more are coming  
NOTE Confidence: 0.9093929625

00:48:05.745 --> 00:48:07.536 out that are going to be able to.  
NOTE Confidence: 0.9093929625

00:48:07.536 --> 00:48:09.934 For example, on a ring be able  
NOTE Confidence: 0.9093929625

00:48:09.934 --> 00:48:12.210 to measure oxygen saturation,  
NOTE Confidence: 0.9093929625

00:48:12.210 --> 00:48:14.120 blood pressure, temperature,  
NOTE Confidence: 0.887855162857143

00:48:14.130 --> 00:48:16.727 you name it and and and it's  
NOTE Confidence: 0.887855162857143

00:48:16.730 --> 00:48:19.240 very important for that.  
NOTE Confidence: 0.887855162857143

00:48:19.240 --> 00:48:22.894 The validation data to be made available.  
NOTE Confidence: 0.887855162857143

00:48:22.894 --> 00:48:24.540 Before anybody uses it  
NOTE Confidence: 0.887855162857143

00:48:24.540 --> 00:48:26.750 for anything and and and  
NOTE Confidence: 0.971202662

00:48:26.760 --> 00:48:29.035 this is something that people  
NOTE Confidence: 0.971202662

00:48:29.035 --> 00:48:31.310 need to pay attention to.  
NOTE Confidence: 0.971202662

00:48:31.310 --> 00:48:33.774 Yeah, I couldn't agree with you more.

NOTE Confidence: 0.971202662

00:48:33.780 --> 00:48:35.270 Unfortunately, there is this conflict

NOTE Confidence: 0.971202662

00:48:35.270 --> 00:48:37.482 of interest by these companies that are

NOTE Confidence: 0.971202662

00:48:37.482 --> 00:48:38.826 creating these consumer technologies.

NOTE Confidence: 0.971202662

00:48:38.830 --> 00:48:40.730 They're almost like praying on

NOTE Confidence: 0.971202662

00:48:40.730 --> 00:48:42.630 the patients like little pariahs.

NOTE Confidence: 0.971202662

00:48:42.630 --> 00:48:44.190 Yeah yeah, they're just like OK.

NOTE Confidence: 0.971202662

00:48:44.190 --> 00:48:46.444 This will generate a lot of revenue

NOTE Confidence: 0.971202662

00:48:46.444 --> 00:48:48.429 and they almost don't care how.

NOTE Confidence: 0.971202662

00:48:48.430 --> 00:48:50.600 Like if it's proper if it's appropriate,

NOTE Confidence: 0.971202662

00:48:50.600 --> 00:48:51.810 because then if they did,

NOTE Confidence: 0.971202662

00:48:51.810 --> 00:48:53.506 they'll need FDA approval,

NOTE Confidence: 0.971202662

00:48:53.506 --> 00:48:56.050 which creates many obstacles more time,

NOTE Confidence: 0.971202662

00:48:56.050 --> 00:48:56.680 more money.

NOTE Confidence: 0.971202662

00:48:56.680 --> 00:48:59.200 So I'm wondering if there's a way that

NOTE Confidence: 0.971202662

00:48:59.266 --> 00:49:01.594 we can almost meet in the middle and.

NOTE Confidence: 0.971202662

00:49:01.600 --> 00:49:02.748 They want to work.  
NOTE Confidence: 0.971202662

00:49:02.748 --> 00:49:05.265 Google Nest Hub did with the ASM because  
NOTE Confidence: 0.971202662

00:49:05.265 --> 00:49:07.471 Google could have easily said, OK,  
NOTE Confidence: 0.971202662

00:49:07.471 --> 00:49:09.326 you're having this sleep disturbance.  
NOTE Confidence: 0.971202662

00:49:09.330 --> 00:49:11.718 Try drinking chamomile tea at night,  
NOTE Confidence: 0.971202662

00:49:11.720 --> 00:49:13.208 but instead what it did is  
NOTE Confidence: 0.971202662

00:49:13.208 --> 00:49:14.200 it tried to partner?  
NOTE Confidence: 0.971202662

00:49:14.200 --> 00:49:15.808 You know there's a valid attempt.  
NOTE Confidence: 0.971202662

00:49:15.810 --> 00:49:17.966 It tried to partner with the ASM  
NOTE Confidence: 0.971202662

00:49:17.966 --> 00:49:20.765 to say to deliver like proper sleep  
NOTE Confidence: 0.971202662

00:49:20.765 --> 00:49:22.940 hygiene based on external factors.  
NOTE Confidence: 0.971202662

00:49:22.940 --> 00:49:24.895 So something as consistent something  
NOTE Confidence: 0.971202662

00:49:24.895 --> 00:49:26.850 as simple as consistent sleep  
NOTE Confidence: 0.971202662

00:49:26.913 --> 00:49:28.833 times which we all know will  
NOTE Confidence: 0.971202662

00:49:28.833 --> 00:49:30.530 help improve insomnia and sleep.  
NOTE Confidence: 0.971202662

00:49:30.530 --> 00:49:31.988 So that's something that I think

NOTE Confidence: 0.971202662

00:49:31.988 --> 00:49:33.270 that's a good stepping stone.

NOTE Confidence: 0.971202662

00:49:33.270 --> 00:49:35.270 But I couldn't agree with you more that

NOTE Confidence: 0.971202662

00:49:35.270 --> 00:49:37.284 there's no way that we can control

NOTE Confidence: 0.971202662

00:49:37.284 --> 00:49:38.739 this wrath of consumer technology.

NOTE Confidence: 0.90678364

00:49:42.740 --> 00:49:44.183 Great thank you. Other

NOTE Confidence: 0.90678364

00:49:44.183 --> 00:49:45.667 questions from the audience.

NOTE Confidence: 0.913585218461538

00:49:45.670 --> 00:49:47.080 If you'd like me to unmute

NOTE Confidence: 0.913585218461538

00:49:47.080 --> 00:49:48.789 just if you send me a message,

NOTE Confidence: 0.913585218461538

00:49:48.790 --> 00:49:50.527 I can do that for you or otherwise if

NOTE Confidence: 0.913585218461538

00:49:50.527 --> 00:49:52.227 you type your question in the chat,

NOTE Confidence: 0.913585218461538

00:49:52.230 --> 00:49:53.340 I'd be happy to ask it.

NOTE Confidence: 0.75323856

00:50:06.860 --> 00:50:07.530 The question.

NOTE Confidence: 0.835512658333333

00:50:14.040 --> 00:50:16.038 Our team is unusually quiet today.

NOTE Confidence: 0.835512658333333

00:50:16.040 --> 00:50:18.980 I think you answered probably

NOTE Confidence: 0.835512658333333

00:50:18.980 --> 00:50:19.468 everyone's questions.

NOTE Confidence: 0.835512658333333

00:50:19.468 --> 00:50:20.688 I think it was terrific.  
NOTE Confidence: 0.948420316666667

00:50:23.200 --> 00:50:25.441 I'm just looking to see that there  
NOTE Confidence: 0.948420316666667

00:50:25.441 --> 00:50:27.247 was a question about how this  
NOTE Confidence: 0.948420316666667

00:50:27.247 --> 00:50:28.682 is different from discriminant  
NOTE Confidence: 0.948420316666667

00:50:28.682 --> 00:50:30.550 analysis or factor analysis.  
NOTE Confidence: 0.948420316666667

00:50:30.550 --> 00:50:31.994 How does machine learning  
NOTE Confidence: 0.948420316666667

00:50:31.994 --> 00:50:33.799 different from that differ from  
NOTE Confidence: 0.948420316666667

00:50:33.799 --> 00:50:35.510 that that type of analysis?  
NOTE Confidence: 0.948420316666667

00:50:35.510 --> 00:50:36.590 Any plots there  
NOTE Confidence: 0.838033048333333

00:50:36.740 --> 00:50:39.330 now? Sorry, I don't quite know. Yeah,  
NOTE Confidence: 0.856652173846154

00:50:40.270 --> 00:50:41.796 OK, you did specifically say that at  
NOTE Confidence: 0.856652173846154

00:50:41.796 --> 00:50:43.219 the beginning you give a disclaimer,  
NOTE Confidence: 0.856652173846154

00:50:43.220 --> 00:50:46.090 so that seems like a tough one.  
NOTE Confidence: 0.856652173846154

00:50:46.090 --> 00:50:47.965 So what's your next step  
NOTE Confidence: 0.856652173846154

00:50:47.965 --> 00:50:49.815 in your in your project?  
NOTE Confidence: 0.856652173846154

00:50:49.815 --> 00:50:52.005 So I think that's really interesting

NOTE Confidence: 0.856652173846154  
00:50:52.005 --> 00:50:53.794 that that that radiation therapy  
NOTE Confidence: 0.856652173846154  
00:50:53.794 --> 00:50:56.440 you know is a potential risk factor.  
NOTE Confidence: 0.833814761666667  
00:50:58.660 --> 00:51:00.826 So you're obviously gonna publish that.  
NOTE Confidence: 0.833814761666667  
00:51:00.830 --> 00:51:02.314 Where are you going to go from  
NOTE Confidence: 0.833814761666667  
00:51:02.314 --> 00:51:03.730 here with that? Would that work?  
NOTE Confidence: 0.913927206666667  
00:51:04.510 --> 00:51:05.770 Thank you, that's a great question.  
NOTE Confidence: 0.913927206666667  
00:51:05.770 --> 00:51:08.560 So I do want to establish a site so you  
NOTE Confidence: 0.913927206666667  
00:51:08.633 --> 00:51:11.209 know right now we we use a stopping,  
NOTE Confidence: 0.913927206666667  
00:51:11.210 --> 00:51:12.695 but there are times in  
NOTE Confidence: 0.913927206666667  
00:51:12.695 --> 00:51:13.883 the stopping is imperfect.  
NOTE Confidence: 0.913927206666667  
00:51:13.890 --> 00:51:15.146 It's a simple measure,  
NOTE Confidence: 0.913927206666667  
00:51:15.146 --> 00:51:18.158 but I I think the best step is to find  
NOTE Confidence: 0.913927206666667  
00:51:18.158 --> 00:51:20.664 like designate a website and then have  
NOTE Confidence: 0.913927206666667  
00:51:20.664 --> 00:51:22.855 this algorithm available for kind of  
NOTE Confidence: 0.913927206666667  
00:51:22.855 --> 00:51:24.967 like a scoring tool that clinicians  
NOTE Confidence: 0.913927206666667

00:51:25.032 --> 00:51:27.688 can use an input for their cancer patients.  
NOTE Confidence: 0.913927206666667

00:51:27.690 --> 00:51:29.610 And I've spoken to a lot of oncologists  
NOTE Confidence: 0.913927206666667

00:51:29.610 --> 00:51:31.383 and just being at Sloan Kettering  
NOTE Confidence: 0.913927206666667

00:51:31.383 --> 00:51:33.243 and they find that sleep disturbances  
NOTE Confidence: 0.913927206666667

00:51:33.298 --> 00:51:35.098 are highly prevalent in their group.  
NOTE Confidence: 0.913927206666667

00:51:35.100 --> 00:51:37.572 And now they're coming to realize that maybe  
NOTE Confidence: 0.913927206666667

00:51:37.572 --> 00:51:39.817 insomnia isn't just related to their disease.  
NOTE Confidence: 0.913927206666667

00:51:39.820 --> 00:51:40.738 It could be,  
NOTE Confidence: 0.913927206666667

00:51:40.738 --> 00:51:42.268 but there are other disorders  
NOTE Confidence: 0.913927206666667

00:51:42.268 --> 00:51:43.461 that they can consider,  
NOTE Confidence: 0.913927206666667

00:51:43.461 --> 00:51:45.848 but they just don't have that access.  
NOTE Confidence: 0.913927206666667

00:51:45.850 --> 00:51:47.908 So something as basic as sleep apnea  
NOTE Confidence: 0.913927206666667

00:51:47.908 --> 00:51:49.559 that they can think about,  
NOTE Confidence: 0.913927206666667

00:51:49.560 --> 00:51:51.948 especially if their patient had radiation  
NOTE Confidence: 0.913927206666667

00:51:51.950 --> 00:51:54.086 to the head and neck or other patient,  
NOTE Confidence: 0.913927206666667

00:51:54.090 --> 00:51:54.616 was obese.



NOTE Confidence: 0.913927206666667

00:51:54.616 --> 00:51:56.457 And but they're just not quite sure

NOTE Confidence: 0.913927206666667

00:51:56.457 --> 00:51:58.327 they can just easily use this tool.

NOTE Confidence: 0.88027574

00:51:59.120 --> 00:52:00.540 Terrific, I think that's wonderful.

NOTE Confidence: 0.88027574

00:52:00.540 --> 00:52:03.260 Thank you. Alright.

NOTE Confidence: 0.88027574

00:52:03.960 --> 00:52:05.502 So if we don't have other

NOTE Confidence: 0.88027574

00:52:05.502 --> 00:52:06.530 questions from our group,

NOTE Confidence: 0.88027574

00:52:06.530 --> 00:52:08.231 I'm just gonna thank you for a

NOTE Confidence: 0.88027574

00:52:08.231 --> 00:52:08.960 really terrific presentation.

NOTE Confidence: 0.88027574

00:52:08.960 --> 00:52:11.534 It was really wonderful and I'm sure

NOTE Confidence: 0.88027574

00:52:11.534 --> 00:52:12.769 you'll get some other questions.

NOTE Confidence: 0.88027574

00:52:12.770 --> 00:52:14.022 As with your email,

NOTE Confidence: 0.88027574

00:52:14.022 --> 00:52:15.274 probably some private questions

NOTE Confidence: 0.88027574

00:52:15.274 --> 00:52:17.338 about how to set up some of these

NOTE Confidence: 0.88027574

00:52:17.338 --> 00:52:18.753 interfaces and how to actually do

NOTE Confidence: 0.88027574

00:52:18.753 --> 00:52:20.704 things on a on a nuts and bolts basis,

NOTE Confidence: 0.88027574

00:52:20.704 --> 00:52:22.176 but thank you so much for your time.

NOTE Confidence: 0.88027574

00:52:22.180 --> 00:52:23.050 Really appreciate it.

NOTE Confidence: 0.9420121875

00:52:24.080 --> 00:52:25.288 Take care. Bye bye.

NOTE Confidence: 0.841530492

00:52:27.530 --> 00:52:28.980 Bye bye everybody. Thank you.