

“That’s Understandable” Season 2 - Episode 2
Final Transcript
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Brendan (00:10)

Hello everyone and welcome to That's Understandable. I'm your host, Brendan McEvoy, US head of external communications at AstraZeneca. If this podcast has been enjoyable and informative for you, take a moment to like and follow on your favorite streaming service. And if you know anyone else interested in today's topic, be sure to share because our goal is to help everyone to better understand what science can do when we all work together. With that in mind, we are currently accepting nominations for guests for season two.

Could you or someone you know offer a unique perspective on scientific innovation, sustainable healthcare, or health equity? If so, check out our show notes for how to contact us.

Imagine this, you're watching the latest sci-fi blockbuster. The hero is wheeled into a futuristic operating room. Monitors and screens flash with 3D models of the hero's brain. There's something lodged just behind the hero's eye. A surgeon runs in wearing a headset that displays the hero's vitals and a feed from their endoscope. The music swells as the surgeon begins to operate and then suddenly the surgeon is transported inside the brain of our hero before the movie cuts to the recovery room several hours later.

As the doctor enters to explain that everything is going to be okay. The lights come on and everyone claps and cheers. If you think this scene could only happen in the latest superhero movie or space adventure, think again. Virtual reality, or VR as it's called, has been a real tool for medical professionals since the 90s when Dr. Barbara Rothbaum, then executive director of Emory Healthcare Veterans Program, began using VR to treat psychological disorders like phobias.

Today, VR is being used to facilitate advances in pain management, surgery, and surgical training, medicine development and innovation as well as supply chain management. And with great success too, a Harvard Business Review study found that using VR platform improves students' overall surgical performance by 230 % when compared to traditional training. While the National Library of Medicine reports that there is anywhere between a 66 %

Brendan (02:20)

to 99 % success rate when virtual reality is used to treat PTSD or post-traumatic stress disorder in conjunction with cognitive behavioral therapy. So virtual reality is a virtual miracle of modern medicine, right? Well, clearly it is driving some pretty incredible feats of medicine, but we're here to have a real conversation about virtual reality with two real healthcare professionals who use it. I'm happy to introduce our guest. First up is Dr. Dr. D'Amico.

Dr. D'Amico is a neurosurgeon at Lenox Hill Hospital at Northwell Health in New York City, where he treats brain tumors, spinal fusion, neck pain, and spine problems, among other conditions. Additionally, Dr. D'Amico is an assistant professor of neurosurgery at Hofstra University, specializing in surgical neuro-oncology with a focus on skull-based and endoscopic approaches. And joining Dr. D'Amico is Dr. Dr. Ackil.

Dr. Ackil is the Director of Simulation Education and Assistant Professor to the Department of Emergency Medicine, University of Vermont Health Network, Lerner College of Medicine. And he has more than 10 years of experience in the medical field as an emergency medicine physician and a professor of emergency medicine. Welcome to That's Understandable, Dr. D'Amico and Dr. Ackil. And thank you for being here today.

Dr. D'Amico (03:40)

Yeah, it's a pleasure.

Dr. Ackil (03:42)

Thanks so much for having us.

Brendan (03:45)

Great, so we only have a short time together, so I'll jump right in with some questions. So in my intro, I laid out what seems like a pretty outlandish scenario for the application of VR in healthcare. So in your opinion, is this just Hollywood fluff or are you seeing applications like the one described already in practice? Dr. D 'Amico, I'll start with you and then go to you, Dr. Ackil.

Dr. D'Amico (04:06)

Thanks, Brendan. And yeah, I want to just say thanks again for having us on here. It's a pleasure to talk about this. And it's something kind of near and dear to what I'm doing in my own practice. Actually, I think it's not that far -fetched at all. I think that we've made incredible strides in this stuff. And it's really important to understand kind of the terminology because VR can be a little bit misleading, right? So there's virtual reality where you're in a virtual environment. And that's the stuff that you've alluded to with the psychiatric.

treatments, things for PTSD and things like that where you're immersed in something. There's augmented reality where it's an image overlaid in what you see around you. And then there's extended reality or mixed reality, which is kind of the bigger picture of things. This is stuff that we're incorporating on a daily basis in operative kind of planning and actually execution as we get further and the tech gets better. And we're looking at it in a lot of the different disciplines that are involved in neurosurgery anyway to make patient outcomes, patient experience better.

Brendan (05:07)

How about you, Dr. Ackil?

Dr. Ackil (05:09)

Yeah, thanks again. Just want to echo very happy to be here and this is very exciting conversation. A lot of my work around education involves procedural training. So I'm an emergency physician, not a surgeon, but we do a lot of bedside procedures and including, you know, central lines, lumbar punctures, things like that. And one of the things that's extremely exciting for us is seeing

Like Dr. D 'Amico referenced, the technology really explode around educational tools for these kinds of things on many levels. One in particular that's sort of near and dear to us up in Vermont is the sustainability aspect. When we train hundreds of residents every year on central lines and new attendings, there's an extreme amount of waste involved with all that equipment. You know, needles can be recycled and so on, but...

Ultimately, we're producing a large amount of waste and in any amount of waste reduction that virtual reality and a lot of these, you know, augmented reality, Oculus headset trainers that are out there and the software that's being developed is a huge win for us.

Brendan (06:24)

That's interesting. I didn't think about the sustainability piece. So if I simplify it, is it sort of the equivalent to, we've all had sort of some sort of game on our iPhones, right, of, you know, pretending to be a doctor, you know, is that, you know, going through some sort of procedure that it's walking you through? Is this, is the simulation essentially avoiding an actual, you know,

trying something out or testing something or learning something on a... I don't know if it's a cadaver or if it's some sort of artificial device or body part or something like that. Is this eliminating the need for that and thus the point around the waste?

Dr. Ackil (07:01)

Correct, or certainly minimizing the need for excess use of kits or these procedural kits, one, they cost a lot of money. A typical central line kit, for example, is about \$150 and is about a pound or two pounds of trash after being utilized for a training session. And I think there is a need to get hands on real equipment and get that tactile feedback, but...

Certainly for introductions to procedures and initial background steps and training order of operation things, the virtual reality space is a huge win, not only for the waste aspect, but also for faculty hours and staff needed to do this training.

Dr. D'Amico (07:51)

Yeah, Brendan, I think you make a great point though. The waste part is a huge part and this is definitely saving. I mean, not to mention a resident or a tech, right, a medical technician can do the procedure a hundred times and generate nothing, right? Just keep going through it until they get rote memorization of the steps. And they're actually physically seeing these things in front of them and placing them where they need to be. And as the technology and the imaging get better, this is becoming more and more kind of realistic.

And so I think that's a huge component. And then, you know, you and Dr. Acker both mentioned cadavers. I mean, from a surgical, from a neurosurgical training aspect, cadavers are humans. We have to get humans that have died into a lab and they're expensive and you can only use them really once and they're critical to training. So a lot of these augmented reality systems now have these virtual anatomy setups where you can pull apart a human being and the relationships are accurate, right?

And sometimes they're a little cartoony, sometimes they're not, it depends on which one you're doing, but the relationships are what really matter. And so before you go in and you do that actual cat -of -error dissection, you've maybe dissected this 50 times, right? Five times, 10 times, whatever it is. And that, there's a huge wind to that in the education space without a doubt, as well as the waste space.

Brendan (09:04)

And just one additional follow up question is how realistic is the simulation? I would imagine you don't go from sort of a simulation to directly onto a patient, right? So I would think there's, is there like an in-between where you're going from the simulation into maybe a more realistic testing environment before you actually are to interact directly with a patient on a procedure?

Dr. D'Amico (09:29)

So, you know, in the neurosurgery space right now, the systems that we use, the virtual reality one that offers simulation, there's different systems and all of them offer different components, right? So the ones that offer simulation, those simulations are still artificial looking. You know, I joke around a lot that I think the video game companies should get involved with the surgical, you know, AR companies because, you know, video games have gravity, right? They've established algorithms to represent gravity. And in the surgical world or in the medical world, we don't really have that yet.

And so graphics wise, it's all evolving. It's all getting better, but there's definitely a difference in the neurosurgical space. I use a lot of 3d representations of images. Um, so like an MRI that'll, I

can rotate around in space and manipulate. And that doesn't look like a brain, right? It looks like an MRI, but it's a 3d MRI that I can manipulate and it's dynamic versus just a static image.

Brendan (10:23)

Dr. Do you have anything else you wanted to add on that that topic?

Dr. Ackil (10:27)

Yeah, this is really exciting to hear Dr. D 'Amico's take on things. And I agree. There's a lot of research behind medical education theory in general, and gamification is really something we should be embracing. You know, as parents, we were before the podcast talking about our children and we always, oh, screen time's bad, screen time's bad. And I think we have to sort of get past that and focus on the content. And screens are how we learn, screens are where we read. And...

Yeah, augmented reality, virtual reality is the future and any sort of gamification of delivering an educational platform is going to be well received by today's learners. And yeah, I think just back to the cadaver piece that Dr. D 'Amico mentioned, it is an extremely complex, complicated process for an organ donor or a human who has decided when they pass on.

they would like their body to go to science. There's unbelievable amount of hoops before that cadaver specimen is in an anatomy lab. And we have fairly limited access up here in Vermont, to be honest, and any sort of sharing or, you know, really utilizing the cadaver for physicians and surgeons that are going to be training is highly desirable.

for just sustainability and efficiency. Another thing I'd like to add to, you know, we think about virtual reality as always being in a headset and then completely engrossed in another environment. I think there's many layers to the technology boom that's happening. In particular for our training, we're very excited about the 3D printing models that exist, particularly for a lot of these high acuity, low occurrence procedures.

that emergency physicians may have to perform. We work in a fairly rural environment where, you know, our level one trauma center, we have neurosurgery, but, you know, the next closest neurosurgeons may be a hundred miles away. So often a lot of the sort of critical airway procedures, you know, emergency childbirth, these simulators that are being developed now in 3D printing are extremely high fidelity. And that's what we're fairly highly invested in continuing to stay on the cusp of that.

Brendan - Transition 1 (13:00)

I was really surprised by the sustainability benefits of medical training and prep with VR and AR. As both doctors spoke, I started to realize just how incredible this technology is and wanted to hear more. Especially about what it was really like using VR and AR to assist with something like brain surgery or in training a student to perform a procedure correctly.

Brendan (13:24)

Dr. D 'Amico, you earlier you were talking about, you know, how you're using augmented reality, I think is the more appropriate in your as a neurosurgeon or in what you're the procedures you do. Can you help just to kind of bring it to life? Like what, what does it actually look like? Like our procedure, how would it be used? And just kind of considering our audience or myself, you know, like, For those of us who haven't been in an operating room or you're very familiar with sort of the most common, I'll say, neurosurgical procedures, how does it look?

Dr. D'Amico (13:29)

So I primarily do tumor surgery. I'm a neurosurgical oncologist. I do brain tumors and spine tumors for the most part. And traditionally, the way I would look at a case that gets presented to me is on a two-dimensional screen, right? There's something called an axial, a coronal, and a sagittal cut. And I basically make a 3D representation of the imaging one layer at a time, you know, millimeter by millimeter, until I've got a 3D representation in my head. And over the course of training, which is, you know, seven years plus fellowship plus practice,

you start to be able to understand what that 3D anatomy is going to look like. You can almost see the brain or the tumor itself in your mind as you're, you know, looking at the scans. But it's a conversive way to look at things and it's not really intuitive because that's not how the world is, right? And so the way I use augmented reality right now is it starts in the planning phase. Instead of, you know, when I'm planning a surgical procedure, I upload the MRI and it gets a 3D representation that

now is floating in front of me. So like, imagine you're looking at me right here and you know, we can see each other, the audience at home can't, but there's a brain floating in front of me. And it's three dimensional. And I can zoom in or zoom out as much as I want. And I can rotate it in space. And I can all of a sudden start to see the complex anatomical relationships. So blood vessels that are very small coursing over the tumor that are going to be in my way on my approach. All right, I can better identify where my bone needs to be. And one of the important things about

about these mixed reality systems is that there are layers. This is digital information, right? So any digital information that I can put on an MRI machine, I can put on this layer. And so I've started, I do a lot of research in something called connectomics, which looks at the functional connectivity of the brain. And I can now actually overlay maps of function, brain function on this 3D representation and get an idea of the tumor's relationship to really important, not just anatomic things like nerves and vessels.

but function, right? And so you, you know, the joke is kind of like, you know, baseball players, I guess not a joke at all, actually, but the conversation is that baseball players, if you imagine the pitch coming at you and swinging, you get better at baseball. And there's some sort of rehearsal ability that we get from just seeing it over and over and over again before.

Dr. D'Amico (16:52)

So prior to a surgery, I spin this image around, I'm usually alone in my office, just rotating my hands in the air wearing funny goggles. But I get a really good 3D representation of what I'm about to do. And these things are accurate. And like I said, they're layered. And that's a really important component. Then you do your surgery, you tend to see, you know, it looks like brain, it doesn't look like an MRI. And it's realized right in front of you. But you've seen it all. So you know where things are, you know where that critical artery is, you know where that function is. And then the other thing we've started to incorporate is, you know, sharing that with the patient.

Because now the patient, when I show the patient a two-dimensional image on a screen that it took me seven years to learn how to read, the patient has no idea what they're looking at, right? And MRIs are reversed and you're upside down and the patient doesn't understand how to put that in 3D space. So now all of a sudden I get to show them their brain and I put it aligned with that however they want to and where their critical areas are. So it improves their understanding. And then in the post-op setting, things like rehabilitation, right? There's people studying now.

putting actual immersive goggles on and taking you out of the hospital, taking you into a different place and, you know, to what Dr. Ackils said before, gamifying it a little bit, right? You're not just going up one step with physical therapy in the hospital, you're climbing Mount Everest, right? Or something a little more difficult. So there's a lot of different use techniques for it. That's how I use it practically for surgical planning. And it's remarkable. The accuracy, the precision of it. And that ability to see the surgery without opening anyone up is a really cool and I think fundamental component of this.

Brendan (17:53)

And how do patients react? I mean, are patients sort of surprised that this is being utilized or, in advance of their procedure, or are they just surprised it's being utilized in general? What's sort of the...

Dr. D'Amico (18:04)

Yeah, I mean, I don't typically put the goggles on the patient. It would just, it would take a long time. So what I do is actually, I will record the image. So there's an image on a screen and I'll record the rotation and I'll point things out with like pointers on the screen or whatever. So they see a 3D representation. I think that's most important. They don't need to be walking through their brain, right? But I think that just seeing that 3D representation and accurate 3D representation, is enough and people have looked at this. I think that there's a huge opportunity for just, you know, increasing, you know, patient understanding and patient experience because you're really, you're bringing them into their care more, right? It's immersive. That's the whole point.

Brendan (18:43)

Yeah, that is very cool. Dr. Ackil, what is, kind of in a similar vein, what is your student's reaction? Do they sort of come in knowing that VR is gonna be a component of their training, or is that sort of a surprise to them? And what's that interaction, and how do you sort of gauge their experience as they're acclimating to it?

Dr. Ackil (19:09)

Yeah, a lot of the training modules I've done in the past, my fellowship, my background is in ultrasound training and a lot of the software that was out there we were using sort of took the role of a direct observation and observed clinical skill that was being performed in...

And some of the software now can give you feedback in terms of your hand motion efficiency, number of movements, the path that you're moving with some of the ultrasound training. So for some of our learners, when we were doing those things, it was eye opening to them. Wow, I'm really sure being inefficient with some of my hand movements. Some of our surgeons up here did a similar project where they had their, the orthopedic group had their residents wearing GoPro cameras as they were doing procedures.

And that's a great concept to get feedback and learn from, but extremely time intensive. So I think again, as the technology grows and a lot of these monitoring devices have artificial intelligence that can give you that sort of feedback on efficiency of procedures is exciting. But yeah, our learners, yeah, we're still working on how to incorporate things more and more every day.

Brendan (20:29)

In my intro, I had cited the Harvard Business Review study that was related to VR platforms improving students' overall surgical performance by 230 % compared to traditional training. I'm curious, do you have reflections as you've sort of experienced both, I'm sure, a world prior to VR being introduced and to now seeing it with the students? Do you see, you know,

anecdotally or maybe even more data driven. Does that resonate with you that there's more accuracy in procedures, sort of post education with a VR versus without?

Dr. Ackil (21:07)

Yeah, I would say the old adage was see one, do one, teach one. And that was how learners would always just go through by experience. And there wasn't really a great way to validate or perform a competency assessment along the way. So it's very exciting, I think, for them in a lot of ways to go through a procedure in the simulation lab. And I think like everything, whether you're

you know, doing brain surgery like Dr. D'Amico or, you know, flight simulators. This is the new training platform is high fidelity simulation and certainly, you know, it's a great on-ramp, but I think the sort of blending and incorporating it with practice on certainly humans, but to get you to that initial point of initial competency to be safe.

and safe to do this with live patients is the key here.

Dr. D'Amico (22:09)

And we've looked at this in neurosurgery also, you know, that a lot of the data comes from other surgical subspecialties and medical subspecialties as a whole. But within neurosurgery itself, people have looked at it and, you know, there are benefits to surgical outcomes, which is a really hard thing to actually count and argue, but improve performance and learning for the trainees. And there's enhanced cognitive and spatial awareness after doing this, because again, you're seeing the way this looks. The difficulty with anything educational.

from a medical standpoint is you can imagine that AR technology is not free and investing in education provides really long-term cost benefits, but nothing in the short term. So you're asking always for a really big investment in something that's not going to see maybe a measurable result for years. And so that's always kind of the controversial part of how do we get more partnership with these companies? Because, you know,

They're sometimes selling you a very expensive piece of technology that's very advanced and there's no immediate ROI on that, right?

Brendan (23:14)

Yeah, that's that's interesting point. You know, I guess an inaccurate assumption, right, is that, oh, this is most hospitals would just have this technology or be able to adopt it. And obviously that's a very naive thinking just given we know that healthcare in general is expensive, right? From the to become, you know, become a physician to, you know, obviously operate a huge hospital health system, all of that. So yeah, it's naive to think that this could just be easily deployed at every hospital or that every physician or hospital leadership team would adopt this technology.

Dr. D'Amico (24:47)

Yeah, I think we need people like Dr. Ackil providing evidence, right? Showing that people get better faster, that there's less waste. That's a cost save. That's an immediate cost save. That's a big cost savings. And that's a great argument, especially for the procedures that are done with these disposable packets, you know, on an everyday measure. And so that's a super important part. And then the other part is just collaboration with the industry partners and just having them kind of buy in also and understanding that, you know, their investment.

the investment of other companies into them is going to be a hard thing to measure. And that's been the biggest issue I think that we've had with it here. And number two, this is training. I mean, this opens up the possibility of training people all over the world, right? This isn't like a local thing only. I'm not just training my residents and Dr. Echols not training his. As the technology gets better, all of a sudden you have a virtual simulation that someone in rural sub-Saharan Africa can learn how to do the procedure and just on the internet, right?

Is saying the internet, does that make me sound old? The internet, what do we call it? What do we call it nowadays? The web online?

Brendan (25:41)

I think that was better than if you had said World Wide Web. So I think the internet...

Dr. D'Amico (24:54)

Yeah, I appreciate that. Yeah. But no, but I think there's a really, that's an even harder thing to measure, right? How do you measure a reduction in disparities in medical training internationally? And that's why I think that, and Dr. Ackil said it in the beginning. This is here. This is happening. It's the future without a doubt. There's no going back from it. But it's a very hard thing to measure and therefore it's a hard thing to go to your administration and say, hey, I need \$250,000 or whatever it is, \$50,000, \$20,000, whatever. It's hard to, it's like going to your mom and asking for an allowance, but you haven't made your bed, you know, got nothing to prove it.

Brendan (25:35)

There's one topic that you just touched on, Dr. D'Amico, that I definitely want to put in the parking lot, because I want to come back to it, and that was sort of around this maybe increase in accessibility or potential broader social impacts. I want to come back to that. One of the questions I realized I failed to ask both of you is how long ago did you start to incorporate either augmented reality or VR into your work? So, Dr. D'Amico, I'll start with you.

Dr. D'Amico (26:02)

Um, so actually the company that I use, um, which I don't know if we want to say names around, but it's a company called, uh, Metavis. The founder of Metavis is a neurosurgeon and he and I are, um, we're the same kind of year. We kind of were colleagues, you know, through training and whatnot, but at different institutions. And so, um, you know, he founded this and went initially into the neurosurgery space, um, where, you know, neurosurgical procedures are, they tend to be.

you know, a combination of microscopic macroscopic and there's a lot of delicate anatomy and all of a sudden you can visualize this with really high fidelity. And then the part about layering different things on it becomes really important because we use a lot of weird, you know, functional tests and things like that. Or sophisticated, not weird, I guess is a better thing. But so I started using it probably around five years ago, but I wasn't able to get it installed officially because of the problems I was addressing until probably about a year ago. And now we're kind of accelerating in terms of what our use is going to be like and how we incorporate it into the cases. And so now I really aside from like a spine tumor where I don't really need it yet, although I think there is utility there, I use it on pretty much every brain case that I do. And so it's a daily occurrence.

Brendan (27:19)

So I guess now you probably would have a hard time picturing a world without this technology then. Is that fair?

Dr. D'Amico (27:29)

Can you imagine a world without GPS? Could you go back to paper maps? Right? So paper maps were accurate. They were great. They did a great job. And then GPS came along, right? And all of a sudden you had this layered, high fidelity, extremely accurate, updatable and connectable technology that there's no way to go back from that, right? And so this stuff exists. It's not there yet, right? It's not.

you know, ways telling me that there's a tire on the side of the road as I'm driving past it. But but it's going there and that's where it's going to get. And and that's the power both of technology. Right. And the advances in technology, which are going to, you know, the rapid introduction of AI over the past year or so is going to speed things along. And it's the you know, the benefit of just, you know, people being innovative. Right. I think I forgot who said I'm going to butcher the quote. I think it was like.

Henry Ford, who said, you know, if I didn't invent the car, if I asked people what they wanted, they would have asked for faster horses, right? And so, you know, that's ridiculous. And that's kind of the concept here, right? You can make my resolution of my screen better, but I'm still looking at a two -dimensional image. This is outside of the box, and the people, hopefully in the future, are gonna think even more outside of the box about how to use this stuff. And it's the next level.

Brendan (28:51)

It's a great analogy, definitely puts it into perspective. Dr. Ako, how about you, how long ago did you start using this in your education, educational journey?

Dr. Ackil (29:01)

Yes, we've been using, I guess what you could call virtual reality for quite a while in terms of our, the high fidelity mannequins that we have, that can do all sorts, you can control their airways, spasm their vocal cords, make their tongue swell. And, you know, like Dr. D 'Amico mentioned, it's just continuing to evolve and it'll be exciting to see, I mean, so many of these innovations that we, we deal with and not only the medical world, but just education world in general comes about through.

students asking the right questions and sort of pushing the envelope. And it'll be exciting to see where, you know, this next generation of physicians and medical professionals that really grew up with, you know, computers and tech and have some software background really take these things. But yeah, we, you know, we're trying to sort of constantly evolve and always looking for new ways. But again, yeah, to Dr. D 'Amico's point, it's hard to ask.

you know, for tens of thousands of dollars for some of these systems where you can't prove an immediate impact. But what we try to do is incorporate into our already existing simulation training programs. And we've seen a significant reduction in central line associated bloodstream infections just by having a really standardized training program. So I think as these virtual reality platforms get incorporated into more standardized simulation and more standardized planning, it'll.

it'll offload a lot of the sort of human work hours involved, the waste and the benefit certainly will follow. So.

Brendan - Transition (30:39)

It was clear that both Dr. D'Amico and Dr. Ackil believed that these technologies revolutionized how they trained and cared for patients. The advantages provided over more traditional

methods were night and day as they described how much they rely on VR and AR. Which made me ask: what did they see as the future for these technologies?

Brendan (31:02)

You're kind of, in many ways, kind of shifting my mind to the future. So how do you, how do each of you think VR or augmented reality may be used in the future? Are there new applications in the medical profession that are maybe either in the infancy now that maybe five, 10 years, you might see sort of drastic differences or?

Maybe they haven't been introduced, but you could see just in your experience how they might over time be leveraged in newer different ways. Dr. D'Amico, I'll start with you.

Dr. D'Amico (31:36)

I mean, this is all I dream about, right? This is I sit around and think about, you know, how are things gonna change? And it's hard when you're constrained by the reality that you know. And I think this is the issue with adoption of technology sometimes. I think the two things I mentioned are huge, right? Upgradability. We're in the digital age, everything's digital, right? And that means that we can upgrade it. So as new things come along, as AI gets more incorporated into things like interpretation,

you know, specifically and then recommendation even who knows, you know, we're going to be able to always be at the forefront and then that connectivity component of it, which is that, you know, if there's an upgrade here in New York City, there's no reason that Dr. Ackil doesn't have it in Vermont immediately, right? That's incredible. Or again, you know, to go back to South America or India or wherever, you know, it's global. So I think those are huge components that are just broad statements about how tech I think moves forward in terms of the actual

VR, AR, mixed reality technology itself. You know, the idea here is that you can, it's the layers, you can keep layering. So you can get the computer now to identify those blood vessels. I don't need my eyes anymore, right? It's going to color them red so I know exactly where they are, or veins are blue, it's even another layer. It'll tell me again where that functionality is. What's the percentage risk I'm going to damage it based on its reading of MRIs, multiple MRIs, things like that.

I think those are just kind of easy, low -hanging fruit. We can probably do it now if you have the right programmer just working on it, right? And then you just have to go into robotics. You have to think about how are robots incorporated into this. Because once you have this incredible representation, there's no reason that something else can't do this. It's a mechanical act. And there's judgment involved. And so if AI gets good enough to be able to have accurate judgment, sure.

But I think that those are kind of the futures that I see immediately. But again, I'm also not the guy to ask. I think the younger generation, like Dr. Ackil mentioned, growing up with video games, growing up with screens, they're gonna have a lot more insight into where to put these images and how to use them than someone like me will.

Brendan (33:48)

That's interesting, yeah, who knows what this young generation right now might come up with over the next five, 10, 20 years.

Dr. D'Amico (33:57)

It's super exciting.

Brendan (33:59)

Dr. Ackil, how about for you? As you think about the future, what are your hopes or what do you potentially see on the horizon?

Dr. Ackil (34:08)

Yeah, I think like Dr. D 'Amico mentioned, a lot of what we do is real -time interpretation. You know, at EKGs, for example, there's a pretty amazing program out there using AI called the Queen of Hearts. And I don't want to get too much into their specific product, but it can help offload a lot of the cognitive burden for us while you're on a busy shift trying to manage, you know, 20 patients at a time.

The radiology imaging interpretation, I think there's going to be a huge boom in artificial intelligence and interpreting CAT scans, MRIs, x -rays. So that's going to be exciting in the sort of day -to -day clinical work that I do is to sort of see how those types of tech advances change things. As far as education goes, yeah, I'm really excited to see the virtual reality environments change. I mean, you can...

What we do a lot of is we create simulated clinical experiences and we write scripts essentially, try to throw curve balls at our learners and see how they react and see how they think. And there's no reason we can't create a script and sort of, you know, it'll be a much more immersive experience for them and really truly choose your own adventure sort of clinical scenarios and see how they react.

And I think that'll be exciting as the software becomes more available and hopefully some of these prices come down a little bit. We can incorporate more and more.

Dr. D'Amico (35:40)

Also, you know, just to throw one other thing in there, it's everything we're doing is being digitized, right? So patient lab values are being digitized. The notes are being digitized. My camera, so, you know, we use a microscope or something called an exoscope. That's a digital camera. That's digital video feed that can all go into this and all be used to make this stuff better. So the simulations can be, you know, based on real surgery that the camera captured and then, you know, modified. So.

I really think that the future of this is pretty wide open. It's extremely early. As good as we've gotten over the past few years that this has been around and available, it is very, very rudimentary in terms of where it's going.

Brendan (36:22)

Yeah, I mean it's exciting to think about. So obviously we've talked about the impact of VR and AR specifically in the, you know, in the healthcare setting and the direct impact it would have on a patient, also on, you know, physicians in training and then ultimately on a patient. You also, Dr. Ackil, you mentioned and then...

Dr. D 'Amico, you elaborated on the sustainability component too, so there's other benefits there. One of the things, Dr. D 'Amico, you started to talk about that made me start to think about this sort of broader social implications or we hear a lot about within healthcare, the issue of inequity or lack of accessibility. Is there a world where we could have a technology, you know, in New York City that maybe is somehow leveraged to a, you know, another country that maybe, you know, couldn't necessarily doesn't have the same level of accessibility or is not able to afford it? Is there any benefits you see there that this is maybe helping to improve or overcome some of the barriers to health equity.

Dr. D'Amico (37:24)

Yeah, 100%. I mean, it's a clear representation or simulation, if you will, of what we do here. Right. And it doesn't have to be me. I mean, you know, it doesn't have to be Dr. Ackily. It can be, you know, the world's leading expert on something extremely rare, where all of a sudden, you know, somewhere else has access to that. They have access to the treatment planning, the thought process. I think, you know, it democratizes access, right? It just makes it more equitable, more level playing field.

Now there's trouble with that, right? Because not everyone, you need internet access. You need it to be online, right? You need this tech that is still currently pretty expensive. And you need people to invest in education and want to. But yeah, no, without a doubt, just you can be brought in to an operating room on Mars if you want to, right? Just virtually and see how, you know, whoever's up there is doing surgery.

Brendan (38:19)

Yeah, anything to add, Dr. Ackill?

Dr. Ackil (38:23)

Yeah, as far as the sort of health equity piece, you know, we feel very strongly up here. You know, we're a network of six hospitals. We have the sort of so-called mothership, the Level 1 Trauma Center in Burlington, Vermont, and then several outlying community hospitals. And in some of these emergency rooms, it's, you know, eight beds and one physician. So to bring the sort of...

you know, level one care out into the community is a huge mission of our network. And we feel that simulation in general is a means to that end. And it's already, you know, I can give you a dozen anecdotes of particular cases where, you know, a patient had a, you know, life-saving procedure done in the community that 10 years ago, never in a million years would they have tried without the simulation training programs that we're doing. And I think,

Yeah, certainly making these things digitized, deliverable remotely and getting education so they don't, you don't have to train everybody at the mothership and then go back up. But trying to bring education to the community is a big mission of what we do and that in virtual reality in the future is going to be a huge part of that.

Brendan (39:35)

So our time is coming to a close here. I know we've really only scratched the surface. And so, you know, I'm hopeful that we can discuss this topic more in a future episode, or at least I'm sure I know I'm going to start probably down a Google path after this, as I'm sure our listeners will. But I'm thinking about to our listeners, right, who are potentially...

or hopefully future medical students or are, you know, I don't want to say, you know, could be people who are currently, you know, receive some sort of diagnosis, right, or are potentially needing surgery. From your perspective, Dr. D'Amico, what advice, if you think there's any sort of hesitant, like I'm coming from a hesitancy standpoint, if there's any hesitancy to a patient who might, be, become aware of augmented reality or virtual reality in their procedure, what sort of advice or what would you give to them to maybe ease any concerns that they have or anything in that realm that may be a barrier to them pursuing the best care because of maybe new technological advances and an adverse reaction to that.

Dr. D'Amico (40:43)

It's a hard question. I don't think, you know, from a student, from an education standpoint, from a learner, I would just say embrace it, right? You're busy. It's hard to tie new things. It's hard to struggle with that learning curve. Trust me, neurosurgeons don't want to be considered not an expert in something, but put on the goggles, see what it looks like. Okay. You know, we published on this actually from here where people felt, oh, it may offer a benefit. And we polled all these residents across the country. And then we polled...

people who had access and the numbers of who thought it was beneficial were statistically significantly higher because just putting it on and experiencing it for that one minute is automatically going to change your insight into it or your perspective on it. From a patient standpoint, you got to trust your doctor. This isn't doing your surgery. And so it's a tool. So it's belts and suspenders. It's another way to look at things.

that are going to give you another way to measure things. And just like, you know, the the old see one, do one, teach one, there's a surgical adage, which is measured twice, cut once. And so this gives you a better way to measure.

Brendan (41:56)

Dr. Ackil, anything to build on there?

Dr. Ackil (41:58)

No, just I'll add, I think, you know, for the future learners out there, the future medical students and future physicians, it's an exciting time to be training and just the we're very lucky in this country, we have open access to sharing over the Internet and there's no real content filters. And just, yeah, excited to see what's next. So.

Brendan (42:23)

Awesome. So I know I said that was the last question, but I feel obligated as someone who is quite fascinated by medical dramas. And I'm sure you probably get this question a lot. Without naming any single TV show out there, how accurate are some of these medical dramas on TV in terms of the, you know, how they're.

you know, how they're reacting in these situations that they're put in, in, you know, ER situations or other medical situations. I'm just, I'm curious how, from your standpoint, how accurate those medical dramas are.

Dr. D'Amico (43:03)

Dr. Ackil, you go first. This is your world.

Dr. Ackil (44:07)

Yeah, I'd say the shows can be somewhat accurate. I think in reality, people are probably more tired and less good looking. But.

Dr. D'Amico (43:19)

I mean, you have to throw it in there. It's 100 % accurate. The hospital is not full of beautiful people.

Dr. Ackil (43:27)

And I'll add they have, you know, there's like one surgeon who's operating on the brain, the heart, you know, if that was only possible, but yeah.

Dr. D'Amico (43:38)

Yeah, yeah, there's a whole team out there. It's not one person, it's not five people on there, you know.

Brendan (43:42)

All right. I'll watch those shows at the green itself from now on. And I have to say, I don't want to make you both blush, but I think we could have done this podcast as a video because you say all doctors aren't good looking, but you know, on camera here, I don't know. I think you're not making a good case.

Dr. D'Amico (43:59)

Brendan, I don't know, man. Brendan, you're giving me a little Ryan Reynolds. Give me a little.

Brendan (44:07)

Oh, okay. I will take any and all compliments.

Dr. D'Amico (44:09)

Shame for the viewers, but.

Brendan (44:11)

Yeah. Well, I just want to thank you both so much for your time, for your insights. We covered a lot of ground here. And like I said, I think we only scratched the surface. So hopefully the listeners here will explore this further. But really, so sometimes medical technology moves so quickly, it can feel like we're living in a sci-fi story.

but it's encouraging to see how these advances are making a real difference for patients. I'm thankful, Dr. D 'Amico, Dr. Ackil, and really for all the other healthcare professionals like them who are adopting new tools and techniques to improve outcomes. I know these experiences, I know the experiences they both shared have helped me clear up some of the questions I had and hopefully, listener, you've gotten a clearer perspective about the role of virtual reality and augmented reality in medicine. And as always,

Hopefully this made healthcare a little bit more understandable. So thanks again, Dr. D 'Amico, Dr. Ackil for joining us.

Dr. D'Amico (46:03)

Thank you guys so much.

Dr. Ackil (46:05)

Yeah. Thanks so much for having us. This was fun.

Brendan (46:07)

Absolutely. And then thanks again to all of our listeners for joining That's Understandable. For more information about today's episode, be sure to check the show notes. Until next time, be well, be healthy, be understanding.