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Pressing Play: Do Video Games Have a Role in Healthcare?

Dr. Lisk:
You are listening to *NeuroFrontiers* on ReachMD. Video games: when you hear the term, you might think of Nintendo, X-Box, PlayStation or any other number of popular gaming consoles at home. But the rise in gaming in medical education has become a much bigger and faster-moving phenomenon than you may know. And if you're not already gaming to improve the aspects of your clinical practice, then get ready because you might be pressing play sooner than you expect.

I'm Dr. Jerome Lisk, neurologist and movement disorder specialist. Joining me to review the evolving roles of video-gaming in the healthcare settings is Dr. Eric Gantwerker, a practicing pediatric otolaryngologist and the Medical Director for Level EX, which is a Chicago-based company that develops video games to improve clinical decision-making skills. Dr. Gantwerker, welcome to the program.

Dr. Gantwerker:
Thanks so much for having me. Great to be here.

Dr. Lisk:
So, to start us off, let's get some background on the rise of video gaming in the healthcare professional space. What are the primary use cases for gaming technologies in medicine today, and how have those applications changed much over time?

Dr. Gantwerker:
That's a great question. I think there's two aspect to games that really have been topics of conversation. The first is the technology. And if you look at the technology in software that's being used today in video games, there's actually a lot of artificial intelligence being used, there's a lot of what we call procedurally-generated content, so it's actually the computer generating different shading and different lighting and things like that. And we see that being used in a multitude of different areas, including high-fidelity graphics for simulation, we see it that actually some of the content being generated in actually surgical planning use cases, we see it a lot in actually the virtual reality space, where people are doing a bunch of different things, from digital therapeutics to actual training modules. And so we see a lot of that.

The gaming psychology, I think, is a little bit less, I won't say "sexy", but, you know, less talked about, but it's just as important. I think one of the things that we do is we use both technology and psychology to try to advance the practice of medicine through play, which is our mission, but you can see it as any kind of gaming type experience, whether we're using it for education purposes or for engagement purposes. And the psychology is actually the real special sauce that's in games that we can apply to healthcare today.

Dr. Lisk:
Let's take neurologists, such as myself, as a test case for gaming applications. What's been missing for those of us who've never been exposed to simulation training or other digital educational platforms?

Dr. Gantwerker:
Yeah, I mean, there's a whole world out there and I think people would be surprised to know that people who play games, the average age is over 30, so I think people think things are not games that they actually do on their phone and do their everyday lives, not realizing they're actually playing games. But I think one of the things to really open our eyes to, as healthcare professionals, is the power of games.

We live in a world where just now, a video game was approved to actually treat children with Attention Deficity/Hyperactivity Disorder. I mean, imagine telling somebody that ten years ago that we were gonna have video games as digital therapeutics and people would be

like, “You’re crazy. That would never happen,” but it just got approved by the FDA. And now we see more and more training modules as well as opportunities to do things like virtual reality pain distraction, we see lots of different use cases for desensitization to phobias in virtual reality. And again, gaming technology and the psychology of games can be use cases within all of those different areas. And I think as a healthcare professional, it’s really important to open your eyes and see what’s out there, see what’s innovating.

Dr. Lisk:
So, let’s dive into video gaming experiences themselves. How realistic are the simulations being developed these days? And is the realism what we’re after in most cases?

Dr. Gantwerker:
That’s a great question and the idea of realism and fidelity is actually a huge topic, both in the simulation space and in the gaming space. There’s some literature that shows that high fidelity, actually, in certain cases actually just detracts from the learning and the education. But I will tell you that for the right purpose, fidelity can actually add a lot to the experience along engagement, as well as analyzing certain aspects of the patient or the specific scenario.

So, imagine if you’re trying to operate on the eyeball, which is the example we always give, and it’s really choppy graphics and you can’t really see what you’re trying to see when you’re trying to operate, or you’re trying to see certain little nuances about ticks and things that people have. And imagine trying to see like a small computer program trying to do that thirty years ago versus now, and the technology’s advanced tremendously. And if you take a video game off the shelf that’s fifty dollars today, you can see the level of graphics and the level of detail that they can convey, and that level of technology is available in healthcare simulation, if we know how to tap into it and get the right talent.

Dr. Lisk:
Is there a physiological angle to gaming that sets it apart from the traditional education, whether that’s through the in-built reward mechanisms or something of that sort?

Dr. Gantwerker:
Absolutely. There’s actually a very deep social psychology and cognitive psychology of learning that games have really tapped into. And I think you alluded to it, you know, the idea of reward and frustration that balance that happens in all of the reward centers in your brain that actually increase the dopamine release when you get excited when there’s a positive. And there’s actually a whole discipline within gaming that really understands how that reward mechanism works, how the balance of reward and frustration needs to be in order to achieve what we call a flow-state, which is that state of intense concentration when you’re most efficient learning. And that happens in games all the time. You can imagine, you know, playing a game and hours and hours pass, or if you have children, hours and hours pass, not even knowing that you didn’t go to the bathroom, you didn’t eat, you don’t even know what time of day it is. Those are the flow-states that we can hopefully achieve if we tap into that reward and frustration; those reward centers in the brain using gaming technology.

I don’t see healthcare professionals playing ‘til two in the morning, three in the morning; it would be wonderful for our company, but, I do see long sessions of engagement because instead of it being a boring lecture or some conference that you’re falling asleep at, it’s a game that is specifically designed to activate the reward centers of your brain. And to motivate you, intrinsically motivate you to continue to go.

I always talk about the fact that games are an opt-in experience. You have to be intrinsically motivated and engaged in achieving those reward center moments; otherwise, people would put the game away and there is a very, very deep discipline that figures up how to do that and with the right cadence. This is also the reason why slot machines are so addicting, and I don’t need to tell a neurologist why, but you can understand that that same psychology goes into any type of game that gets developed.

Dr. Lisk:
For those of you just tuning in, you’re listening to *NeuroFrontiers* on ReachMD with Dr. Jerome Lisk. With me is Dr. Eric Gantwerker from the medical video gaming company, Level EX, to talk about the rise of video games in clinical education and practice.

So, Dr. Gantwerker, let’s space out a few minutes, which I mean, literally since I understand your team got to go on NASA’s radar for training astronauts to handle medical issues in space. What can you tell us about that?

Dr. Gantwerker:
Yeah, that was a fantastic project that we went through a grant-funded program through the Translation Research Institute for Space Health, and basically through that opportunity, we had sort of a multi-stage program, but the first was trying to reimagine how the different anatomy and physiology changes in space. And so, we actually custom-built a platform to represent the different organ systems and the different disease states and how they change from terrestrial to deep-space missions and microgravity. That was a fantastic

experience working with the NASA subject matter experts, as well as the TRISH folks and sort of the next phase of that is to try and create experiences where we actually represent different disease states or different incidents that might happen along their space mission. And create just in time training for the astronauts on how to handle those different scenarios that are emergencies that they can't possibly train on in the time that they have between now and when their space mission launches.

Dr. Lisk:
If we consider the traditional protocol when there's a medical emergency in space, the norm seems to be communicating to Mission Control that there's a problem and for medical teams to advise remotely. But it sounds like these gaming technologies are aiming to change that. How so?

Dr. Gantwerker:
Exactly. You know, most of the missions to the moon and even now, some of the other missions that you're seeing, there's a response delay, right, so ten, fifteen minutes there and ten, fifteen minutes back. When you have an emergency scenario and people are in deep space on their way to Mars, that communication time goes up to forty-five minutes each way, so you can imagine if somebody has an emergency that needs some kind of urgent medical attention, an hour and a half is not gonna pass and still be able to solve that problem expeditiously. And so using mobile technology and our expertise, we can create just in time training modules that can actually train them on these scenarios, as well as while they have downtime they can actually train while they're in flight and while they're actually on their way to Mars. And so using our mobile technology and all the different things that they'll have at their disposal, they can actually learn en route, as opposed to their terrestrial time when they're trying to learn everything else that they need to know.

Dr. Lisk:
OK. Let's come back to Earth for a moment, regrettably, and talk about medical education in the era of COVID-19. COVID-19 has changed everything, as far as delivery of services. Have you seen any changes in the pickup of educational gaming technologies during quarantine periods? And does simulation training fill any gaps caused by the pandemic itself?

Dr. Gantwerker:
That's a great question, I mean, the COVID pandemic has changed a lot of things for us. And I think technology has been, sort of, at the core of that. You and I having a teleconferencing experience that now is almost ubiquitous, we almost use the term synonymously with the entire technology, it's become so popular. And you can see that medical conferences are being replaced, you can see a lot of medical conferences going virtually. And people try and imagine how to create these conferences and these experiences in a virtual world because of COVID. You know, we talked earlier about telemedicine and telehealth and how that technology has been widely and rapidly adopted at all healthcare facilities. From an education standpoint, we are, again, seeing how can we use these teleconferencing softwares to try and replace educational losses from in-person didactics and in-person conferences. I think gaming technology, specifically can be a great opportunity to fill that gap.

One of the things you saw during COVID-19 was all the people running to the stores to buy new gaming software and gaming platforms. We saw an unbelievable boom in downloads of mobile games because people were at home and people had downtime to do gaming. So I think a lot of people are looking to games for a lot of different reasons, but I think education is definitely one of them.

Level EX, in particular has gotten a ton of inbound interest from people who are used to normal traditional teaching mechanisms through conferences and events and asking us, "OK. how can we use your gaming technology?"

The other use is that when you are in person having didactic sessions in education, a lot of people could zone out and you know, you would notice them, whereas now, during teleconferencing, if somebody's muted or somebody's not on and they disengage, you may not know that. Gaming software is engaging inherently, and done correctly, it will, again, motivate people to participate, engage them in the experience and really bring to life whatever that content is. And so, we're seeing a huge boom in people turning to technology, as well as games, in general, both board games and different competition even, you see some of the audience response systems and even some of the teleconferencing software coming out with polling and competition, you know, trying to take elements of games and put it into those experiences and I think it's gonna be a huge game-changer, if you don't mind a pun.

Dr. Lisk:
Let's next go to talk about outcomes for a moment. It's a loaded concept, I know, but I'm sure it gets defined differently per game, if not per target user. But from a high-level view, what kinds of impacts have these games been making?

Dr. Gantwerker:
Yeah, so, you know, outcomes, as you alluded to is often very difficult, specifically patient outcomes from any kind of educational content is always very difficult to show because it's not pure variables and often there's a very large time gap between the education and the behaviors. We've seen a fair amount of some of the gaming companies as well, some of the VR companies are trying to show that

transfer. The transfer of learning to the actual patient care environment, and we've seen very good evidence that there definitely is transfer, and I think the simulation software has shown that there's transfer of simulation skills to the operating room, to the procedure room and to patient outcomes. I think gaming still has to show those outcomes and I think that we will start to see more and more of those studies start to come out. I think one of the great things about any software-based simulation solutions is that there's a ton of analytics and a ton of data that is generated by users. And I think that's something that traditional physical simulation has sort of not had the opportunity to do because mostly those studies were done through expert observers grading people. However, software-based solutions can actually tell you what decisions were made. They can actually tell you what order those decisions were made, how long until those decisions were made, what other things was the person paying attention to, we can do eye tracking with some of the certain softwares. So, you see a lot more robust data that's going to be coming out of the software-based gaming solutions that we can then adapt and actually try to use for outcome studies and actually track behavior, see how that behavior changes, and then ultimately tie that back to patient outcomes.

Dr. Lisk:
Last question for you, Dr. Gantwerker, what's next on your team's agenda? You are a growing company, and you look like there's tons of potential, any new educational territories you're moving in on or target groups you're looking to make better at what they do?

Dr. Gantwerker:
Absolutely. So, one of the things we try to do is we go into a new specialty and we try to advance our technology and our platforms. You know, we're building a giant toolbox to be able to face all the different educational content and mechanisms of disease that we can represent. We actually have a dermatology group and game that's gonna be coming out. One of the things we have also invested heavily into is our technology. So, we actually just launched our own cloud gaming platform called Remote Play, where we can actually represent a bunch of our different games in the cloud, which gives us tremendous opportunity to have multiple users in the same experience, you don't have to download anything onto your phone, you can use it through any teleconferencing software and again, try to replace some of the didactics with some of these gaming platforms, we can do that very, very easily and seamlessly integrated using our mobile play platform.

The other is trying to create remarkable experiences that people can talk about. We actually have more party game type experiences similar to some of the party games that became very, very popular during the COVID-19 pandemic. We have similar experiences where you have multiple users who are competing, answering knowledge questions and trivia questions and things relevant to their medical expertise and really focusing on that clinical judgement, that medical decision-making and creating experiences that are remarkable, that people become curious about, and people will talk about, and stimulates conversation.

Dr. Lisk:
Well, as a self-professed tech junkie, and one who's done a lot of gaming, I'm looking forward to checking in with you again on the latest developments in the industry. Thank you, so much for joining us, Dr. Gantwerker.

Dr. Gantwerker:
Thanks so much for having me. This was great.

Dr. Lisk:
For *NeuroFrontiers*, I'm Dr. Jerome Lisk. To access this and other episodes in our series, visit ReachMD.com/NeuroFrontiers, where you can Be Part of the Knowledge. And thanks for listening everyone.