

Ray Rogers ([00:07](#)):

I'm Ray Rogers.

Annie Evans ([00:08](#)):

And I'm Annie Evans, co-host of today's episode.

Ray Rogers ([00:11](#)):

You're listening to Fix This, a podcast exploring tech ideas and solutions to some of today's largest challenges.

As technology evolves, so does our access to healthcare. During the COVID-19 pandemic, hospitals created tools to monitor bed capacities, spin up call centers to streamline communications, and meet with patients virtually. Meanwhile, we as patients have learned to attend virtual checkups, use patient portals to receive our lab results, and so much more. All of these advancements have technology at their core, and these expanded services in access to virtual care are now cemented into the healthcare landscape.

Annie Evans ([00:47](#)):

In response to the pandemic when resources, including doctors' time and expertise were stretched thin, the US Army Telemedicine & Advanced Technology Research Center or TATRC and Deloitte, began building an Amazon Web Services (AWS) based telehealth application.

Ray Rogers ([01:04](#)):

The cloud powered application is called the National Emergency Tele Critical Care Network, what's also referred to as NETCCN. The application is built on AWS services including AWS Wicker, which enables secure communication with end-to-end encryption to connect patients and clinicians who could offer critical care from virtually anywhere.

Annie Evans ([01:23](#)):

To learn how NETCCN is impacting patients and clinicians' lives, Ray chatted with Matt Quinn, science director at US Army TATRC, and Danial Adams, health technologist from Deloitte. Take a listen.

Matt Quinn ([01:37](#)):

Hi, I'm Matt Quinn.

Dan Adams ([01:38](#)):

Hey, I'm Dan Adams.

Ray Rogers ([01:40](#)):

Sometimes referred to as NETCCN, how did the idea to start it actually come about and how did the project get rolling?

Matt Quinn ([01:47](#)):

Our commanding general of medical research and development command called TATRC and said, "Hey, we have some funds for COVID, and what can TATRC do?" And if you can remember back to March

2020, early days of this pandemic when we really didn't know much, we saw huge surges of COVID cases and huge demands, resource constraints in places like New York and Seattle, to care for these really sick patients. And at the time we imagined that not just well-resourced places like those would be struggling with enough critical care expertise, but lots of places around the country that lack hospitals with intensive care units and those kinds of doctors would be even worse off. And so we envisioned a set of solutions, a digital health ecosystem, in fact, that would allow us to extend that expertise from anywhere to anywhere and that it would be scalable from an individual patient all the way up nationally. And again, at the time we envisioned one region helping another region. So, if there was a surge in the southeast, that the northeast or that the southwest could assist and that it would work in places that were relatively austere.

Ray Rogers ([03:14](#)):

I imagine that there were a lot of challenges or opportunities that popped up when first starting to conceive of NETCCN and putting all of the pieces together. Can you tell us a little bit more about what some of those challenges look like and how are you able to overcome them?

Matt Quinn ([03:30](#)):

We have this offer that there is funding available to run with this, and fortunately we had in place at MRDC something called Other Transaction Authority or OTA, and this is a way of acquiring things outside of the federal acquisition register, outside of normal contracting processes. And so we came up with three lines of effort. One of them is and was NETCCN, the digital health ecosystem. The second line of effort was really about building capability and capacity on top of that. We called that Virtual Hospital, and it's something that we in the military have been working on to give us additional capabilities around evacuation of soldiers during large scale combat operations and during mass casualty events. So thinking about autonomous systems.

([04:26](#)):

And then the last piece and perhaps the most important and the most challenging is what we call data to decisions, or taking the data from those multiple NETCCN teams and many NETCCN missions, again, scaling it from single hospital all the way up to national support and providing leaders at Echelon, including clinicians, with what we call situational awareness or better decision making. This involves both running an operation center but also informing those to our left right up and down how NETCCN is fitting into the broader response.

Dan Adams ([05:04](#)):

I think we've realized very quickly that we're not going to be able to create the whole solution up front in that first sprint. So any technology decision that we made, we had to be prepared to be able to walk away from it and quickly adapt something new. And we also knew that we couldn't spend too much time on the commodity technologies or technical capabilities like getting audio and video to work, to making sure that we had scalability in our databases, in our infrastructure. That wasn't a worthwhile investment of our time. We wanted to spend more time on the mission. And the second part was we could not have a divide between the functionals on the team and the developers on the team. We needed to have our clinical director, Dr. Ronghapa sitting with ... at the time I was the lead engineer, sitting with me as we were building this thing.

([06:04](#)):

And we needed to have our developers know as much about the business and the mission and the workflows as much as our functionals did. And I think it was a learning curve for some folks on the

development team because we're used to getting the requirements, nice workflow diagrams, everything laid out so we can go directly, start coding and building out the system. But we had to break away from that mold. Developers had to spend time talking about the users understanding the mission, understanding the clinical impact of the different decisions and be empowered and have the autonomy to make workflow decisions as they're making changes to the application.

Ray Rogers ([06:40](#)):

What did those early days of the initial launch look like versus where NETCCN is today?

Matt Quinn ([06:46](#)):

Within, I think a day or two of deployment, we had actual clinicians using the system in Guam, both military and civilian. And we had helped someone, a nurse who was left with multiple, very sick, intubated COVID patients and no attending doctor to help her. The attending doctor was off coding another patient and she pushed the NETCCN button, and low and behold, she was able to reach someone in San Diego who talked her through virtual diagnosis of something called attention pneumothorax, and then treatment of it. And this is pretty dramatic stuff and it saved that person's life. What we've done since then is to try to move from individual hospital support or clinician support into a system of systems. One of the things that has been important about this and how we couldn't do it without cloud, and without multiple teams and partners, and without a real radical inclusion mindset with this is to improve as we go.

([07:59](#)):

All of these applications and tools that make up NETCCN and everything around them have been improved many times on an agile basis as part of this. We learn as we go, and I don't know how many times I use the metaphor that, we're building the airplane as we're flying, for this. But we get feedback from users, both virtual and distant. We get feedback from the program teams, we get feedback from operations and we just take that and put it back into the system so that it works better. And one of the amazing things on lots of these is that we started out with almost competing teams looking for missions, looking to deliver better, and we've built a team of teams as this works through and that really is going to be the model for the future. I think of NETCCN as a response framework and also for military medical concepts for the future.

Ray Rogers ([08:57](#)):

I think that's a really important point, that it's not just the military that's using NETCCN, but also there are civilians also using NETCCN. What does that experience look like for a provider and the patient?

Dan Adams ([09:09](#)):

Most providers' ideal technology experience is going to be a zero-technology experience. People aren't going into medicine because they really like working in lab systems or in EHRs (Electronic Health Records). They want to practice medicine, they want to take care of their patients. This is just a means to the end. So the experiences they pull up starts before the app. They have a patient in front of them, they have a real world problem, they need help solving it. They pull out their phone from their pocket or they walk over to the nearest workstation, they see who is on duty for that given problem, whether it's a remote critical care doc or pulmonologist or a cardiologist, they see who's on duty. They may not have ever interacted with them before, which is important because before this tool, you're using your natural network, of that one clinician that you worked with that you noticed in San Diego or is in another hospital that you know you can go talk to them and get your problem solved.

[\(10:07\)](#):

But for this, it's just based off the problem at hand and who is available for a given specialty. Maybe you start by sending a couple text messages, an image of the patient, some of the patient information, and then you quickly jump onto that audio and video call. And this is where video starts to become a little bit more interesting, especially if you're dealing with care in an austere environment like a natural disaster or a combat zone. When you're that local provider on the ground and you're in a disaster environment and you have that call with a remote expert, they may not know what you mean when you say a resource constrained environment. They may think it's just an underfunded clinic. But once your camera goes on and that remote expert can see what that scenario looks like or whether it's a combat zone and they're wearing a flak and Kevlar and they're in the back of a truck or in a safe house or it's in a disaster environment and it's utter chaos behind there, that video tells that remote expert a lot of things.

[\(11:02\)](#):

It signals to them how many other members are on the team, what are the types of ... Can I order labs? Can I order other different types of tests or what type of material that I need to work at hand? And then that's the experience right there connected between that local provider and that remote expert. And we can stay just there, but then that local provider's going to be going away. That remote provider is also going to be going away. We're going to have to do a patient handoff and that's where the documentation comes in, making sure that you're documenting about that patient. What did you do? What did the remote expert tell you? None of that can be within the chat. And then you're just adding another provider as the remote expert is leaving or the local provider is leaving, or you're documenting directly in the patient so that you have that continuity of care as that local provider takes a break, they're handing off to the next person and the remote expert, we're having a shift change on the remote expert side.

Ray Rogers [\(11:51\)](#):

And so much of this relies on can it scale, is it reliable and is it secure? How is the cloud helping you to meet those three requirements really?

Dan Adams [\(12:02\)](#):

From a cloud side, being able to use auto scale on our EC2 and RDS instances, be able to have an underlying infrastructure that we don't have to worry about, whether it can handle the load. Scaling almost isn't at the forefront of our thought process because we take for granted some of the capabilities that we have for AWS. From the security side, it's a little bit of a two edged sword because things are so easy and in the cloud I can spin up another server, I can open things relatively easily. So it's the ease of use of security and being able to have a lot of the security abstracted from us so that we don't have to go back to the commodity areas of technology. We already inherit those from the AWS platform. In the beginning, we weren't initially using Wicker, but as we were working with our AWS teammates and we saw that this platform had ... from AWS had recently gone through an ATO and it had a lot of the core services that we needed from an audio and video call, from text message exchange and had the ability for us to bring in workflow.

[\(13:04\)](#):

We worked AWS to include this, and because it already had an ATO from the Department of Defense, we were able to start testing this against some of our legacy workflows thanks to the work that TATRC did on some real world military exercises. So, I think the first exercise that we took it out on was called Operation Gunpowder where we were doing prolonged casualty care with different third year medical students and we had some students using Wicker and some students using our legacy NETCCN platform.

And because we had included that austere environment, disaster medicine workflows into the Wicker platform, and we had a technology service that just worked, now not only are we inheriting the infrastructure scalability, but we're also inheriting application level controls and application level consistency and performance. It made it that much easier for us to guarantee a good service and build trust with the end users.

Ray Rogers ([14:01](#)):

And so trust is one of those things, of course, that speaks to the success of NETCCN. How else are you measuring success of the program and how many people or environments have you been able to support from 2020 to today?

Matt Quinn ([14:17](#)):

Through the pandemic, I said we've had over 60 missions. We've had over a thousand unique patients who we've supported. We've delivered over 5,400 patient days of care and we've had over 390 caregivers that we've supported directly. Most of the hospitals that we've supported are what are called critical access hospitals, which are the smallest category. We've had a few hospitals that are large ones, and it was really exciting to see how they could open another intensive care unit with virtual staffing through NETCCN. We helped another large hospital during the Omicron surge that was having some real staffing issues, especially around specialists. And we just filled in at night so that some care specialists could get some sleep. We helped community hospitals, but from there we took on some additional missions. One of them was with EMS in a county in Florida, and if you remember, monoclonal antibodies were revolutionary, were really transformative.

([15:38](#)):

If they were delivered in time to people, they could keep them out of hospitals. And the EMS in this county in Florida was delivering monoclonal antibodies, but they also required that the patient be monitored for an hour afterwards. With NETCCN, and in this case, downloading it directly by patients, it was delivered. It allowed those EMS folks to give more monoclonal antibodies and to offload the monitoring to others. Since then, we have supported the president's initiative to make it easier to get antiviral drugs at places like long term care centers through having virtual consultative services for some of these new antiviral drugs against COVID and to actually do the evaluation and prescribing where there isn't one at, for example, a long term care center or a health center.

Ray Rogers ([16:40](#)):

Looking forward, how do you see NETCCN improving the lives of everyday citizens as the solution continues to mature and grow?

Dan Adams ([16:48](#)):

COVID-19 expressed a lot of the faults in our national healthcare system. We also saw through what our clinicians did or what we were able to do with empowering those clinicians through with technology. And NETCCN is a good example of that, of where our healthcare system can work and what are the types of technology systems that we can use to make it work just marginally better. And those marginal changes, those marginal improvements, those have a big impact to that patient in Guam, to what we're doing to prepare for the next conflict and the medical needs that'll be needed in the future of warfare. So I think it's NETCCN and the projects like NETCCN, because this is going to be a team sport on how we improve with technology, our national healthcare system using these technologies, using these

innovations, and using the lessons learned that we've gathered over the last 20 years to make an impact to improve how we deliver healthcare and the overall health of our country.

Matt Quinn ([17:50](#)):

When we first started this, and I remember this first briefing because I was just like ... Number one, I was back in the military again after some time and we were briefing our commanding general at Medical Research and Development Command, and he said something so wise, he said, "You'll know you've succeeded when you change the force structure," meaning you know you've succeeded when we cannot use as many boots on the ground clinicians, that this is just built into the system. We're not quite there yet, but as we demonstrate capability and capacity of the system and we gain trust and we get the data to make rational decisions about where to allocate resources through our care delivered through NETCCN combined with care delivered in other means, we can really do that. And as we apply that to our national response infrastructure, as we apply that to military healthcare, it's really going to be transformative and allow us to really make decisions like we never have before.

Annie Evans ([19:07](#)):

If you liked today's episode stream, episode 62, Improving Transplant Patients Outcomes Using AWS to learn how else the cloud is helping to scale healthcare services and save lives. And remember to join the conversation on social media with #FixThis by AWS.

Ray Rogers ([19:25](#)):

A huge thank you to our guests, Matt and Danial, and thank you for tuning in. If you liked today's show, please remember to subscribe, rate, review, and share. We'll be here on the next one.