

David ([00:04](#)):

Hello, and welcome to today's episode of Hemorrhagic Stroke and Fireside Chats, where we address unique rural and regional barriers to care, the hub and spoke relationships within health systems, and best practices as patients transition through their systems of care. My name is David Wheeler. I'm a neurologist and director of the Stroke Program at Banners Wyoming Medical Center in Casper, Wyoming. And I'm the host for this podcast series. Today, we're joined by doctors, Rick Dalyai and Stuart Johnson from the Vidant Medical Center in Greenville, North Carolina. Gentlemen, welcome to the podcast. And if you wouldn't mind please, starting with you Rick, could you tell us a little bit about yourselves?

Rick ([00:41](#)):

Yeah, sure. I'm an endovascular neurosurgeon at Vidant Health in Greenville, North Carolina. Been here about six years. Before that I did my training and neurosurgery residency in endovascular neurosurgery at Thomas Jefferson University Hospital in Philadelphia. And I had done my schooling in Boston at Tufts University.

Stuart ([01:02](#)):

I'm Stuart Johnson. I'm the director of Stroke and Neurosciences. I've been a nurse at Vidant Medical Center for just over 14 years with neurosurgical critical care and also critical care transport. That's my background.

David ([01:13](#)):

Fantastic gentlemen, thank you very much for joining us this morning and we can't wait to hear more about stroke care in and around Greenville. Maybe we can start with whoever is more comfortable telling us about the community that your hospital is in and the surrounding communities that you serve.

Stuart ([01:27](#)):

So, Vidant Medical Center is the comprehensive stroke center here in Eastern North Carolina. Vidant Health serves 29 counties, so it's about a third of the North Carolina and we have a population in our service area around 1.4 million. We do have a system of non hospitals that consist of us as the Comprehensive Stroke Center. We also have four primary stroke centers, three that are acute stroke ready, and one is pending survey for primary stroke center. We also have nine other regional hospitals in the service area that transfer patients to us. And we also have a critical care transport service that includes five aircraft and six ground units. And we receive patients from about 30 different EMS agencies annually.

David ([02:08](#)):

It sounds like a fairly complex system of care that you guys have been putting together. Are there a large variety of EMS providers within that system? And if so, how do you work with them to keep their efforts organized?

Stuart ([02:21](#)):

Yes, we do a constant regional effort here. As far as the hospital situations, we have regional stroke network that we've established on the Eastern North Carolina stroke network that allows all the different stroke coordinators from all the facilities in our region to participate and collaborate on

initiatives. And we also participate in our local county EMS quality meetings. That's just on a quarterly basis and we'll provide stroke updates and education. And we participate with the critical care transport monthly meetings, and also collaborate with them to standardize stroke protocols and treatments. And we've also put a tremendous effort with our regional hospitals to standardize all of our ED order sets for the acute stroke treatments.

David ([03:05](#)):

I would like for our listeners to learn a little bit more about approaches that you've taken within your system of care to provide ongoing education and what the structure is for that. So, one thing that we hear about sometimes is that there's an entity that oversees time-sensitive emergencies or stroke care for a given region. And other times those systems of care are built from the ground up by the hospitals that serve. So, how are things set up around the Greenville area? Is there an overarching organization that helps facilitate the communication or do you guys kind of, is it built from the ground up by you guys?

Stuart ([03:34](#)):

Well, it's kind of started off with Vidant Medical Center as the flagship center in the Comprehensive Stroke Center. And then a lot of the efforts, the collaboration, travels through Vidant Medical Center to ensure consistency of the care delivered at the different regional levels. Some of the initiatives we've taken is establishing a pre transfer [inaudible 00:03:55] management protocol for these hospitals and also the early activation for EMS with their abilities to activate code strips from the field. But some of the focuses we have are establishing blood pressure control, anticoagulation reversal agents, making sure that they're available in all formulary, at all the regional hospitals, hyperosmotic therapy and also seizure prophylaxis. That's our major holes as far as pre neuro critical care treatments.

David ([04:22](#)):

Perfect. I'm thinking that prehospital notification at the receiving facilities is a critical aspect of this care being delivered in a timely fashion. And I'm wondering, what does prehospital notification look like within your organization? How does that occur? What are the logistics of that?

Stuart ([04:38](#)):

EMS field activation, we encourage all patients with focal neurological deficits presenting within 24 hours to be activated. And that kind of cascades with the ischemic stroke, compasses the hemorrhagic stroke. EMS is utilized in the RACE score for stroke activation. As far as standardizing the treatments that are referral facilities, EMS must be met by the ED attending and a nurse on entry to the facility. And they will convey the patient directly to CT for that rapid imaging to identify if we are countering a hemorrhagic stroke. Obviously at the Comprehensive Center, we just have more availability of resources and have that stroke neurologist presence to gather therapy as well. And then the patient will continue. But in the community hospitals, with the lack of neurology presence, we do utilize telestroke services to get that rapid evaluation.

David ([05:31](#)):

It seems that the utilization of telestroke is a critical element in all successful systems of care that we've encountered. I wonder if you guys could tell us about over the years of developing this program, what are some of the barriers you've encountered, maybe first starting with improving coordination of care

amongst the emergency medical providers? So what barriers have you had to overcome in order to build a successful system?

Rick ([05:54](#)):

For hemorrhagic stroke, the biggest overall barrier is the neuro cynicism and stuff that, with newer therapies and better outcomes that we're having on these patients and that kind of historically cynical viewpoints for care. And we really ramped up our system six years ago with a message of coordination of the care and intensive care and timely care within the fashion of having good outcomes with hemorrhagic stroke and ischemic stroke. I think that, particularly for our area, a couple of barriers are the distance that patients are coming to our facility in relatively rural areas. So if flight isn't working, we're often dealing with two and three hour drives since you're coming from such a large area. I think those are two of the biggest barriers. And then there's a community outreach and social determinants in a rural area. Specifically, we've seen in our data with racial disparities, particularly those in the forties and fifties. So those are the things that specifically for in Eastern North Carolina that we have seen and had to overcome or work to overcome.

David ([07:07](#)):

I'd like to turn next to your quality improvement processes. And what are the systems that you have in place to provide feedback, both for your referring hospitals and to your emergency medical providers?

Stuart ([07:19](#)):

So, we have monthly feedback system that follow up letters that go to the referral facilities. This will also capture the patient's hospital course, any treatments they received, their disposition, and any feedback as far as recommendations. One thing we look at is the blood pressure management while at the facility. And then we continue on with same followup style with EMS region. We do provide direct feedback to the leadership of EMS agencies at the county level for them to continue their QI as well. One of the things that we focus on with them are patients who arrive to the ED and are not a prehospital activation, usually activated shortly after they arrive. It was just the educational opportunity to follow up with them and allow them to further educate with their providers to go ahead and activate that patient's stroke.

David ([08:09](#)):

Does the data acquisition happened at the local facilities or is everything coordinated through your hub facility?

Stuart ([08:16](#)):

The data collection is a little bit of both. The regional facilities will break down their data, but the Comprehensive Center here, we abstract all the data for the region and then provide it back to them where they'll drill down into their own cases and evaluate for any improvements that they have for opportunity.

David ([08:34](#)):

Does your system or region have a central repository for this sort of data? Is there a registry in North Carolina?

Stuart ([08:40](#)):

No, we've utilize, just get with the guidelines for those purposes.

David ([08:45](#)):

Let's now talk a little bit about treatment of hemorrhagic strokes when they arrive first in the outline facility, and then as they're transferred to the hub, or if they start at the hub. We'd like to understand a little bit about who's on your treatment team and what the care process looks like within your facilities.

Stuart ([08:59](#)):

As far as at the hub, when we look at, the patients are admitted directly to the neuroscience ICU, usually for a minimum of 24 hours and those are for your lower acuity, just coincidentally findings. But while in the neuro critical care unit, they will have oversight with the attendings, APP's, and the obviously nursing. Neurosurgery is notified and consoled either before the patient arrives or immediately upon arrival. We also have critical care trained pharmacists, one's actually particularly neuro critical care trained, that will participate with the patient care daily. PT, OT, and speech. We'll evaluate the patient within 24 hours if they're medically appropriate. And obviously we have respiratory therapy involved.

I think one of the huge participants in the cares case management, especially on these patients who may end up having a prolonged stay or possibly some enhanced discharge needs. And they will be following the patient daily and then weekly after if they have a prolonged stay. And as the patient transitions to the step-down units, that's whenever rehabilitation services are consulted, and then they'll participate in progression of care rounds, which will be multi-disciplinary that will have rehab services, PT, OT as well. And then respiratory, just looking at any barriers to discharge and how to identify them and address them as quickly as possible.

David ([10:22](#)):

Out of your facility, how are decisions made in terms of treatment patterns, about whether surgical intervention is appropriate or not? Who takes the lead on those decisions and then how do you involve other team members as appropriate?

Rick ([10:37](#)):

Collaborative. I mean, we have a great relationship with our neurointensivist, so we're both on arrival made aware of the patient and discuss the care. If it's an intraparenchymal hemorrhage, [inaudible 00:10:51] hemorrhage, we have endovascular neurologist as well. So when he's the lead for intervention, then we'll have a endovascular neurologist neurosurgeon if there's need for CSF diversion and the neuro critical care team. So it's pretty collaborative as far as evaluating those patients and making decision for evacuation or for the types to go through that. Specifically with ICH evacuations, with the teams with don't have residents or fellows. So our advanced practice practitioners are also involved in that system with evaluating the patients for scoring and for volume sizing and between the different teams work very well together.

David ([11:33](#)):

To facilitate communication amongst these team members, have you used any technological solutions to improve that communication or make it easier on the team members?

Rick ([11:43](#)):

Well, we use rapid system more for our ischemic strokes. We have a system, a cortex, to utilize that's typically for a cortex text messaging type system between providers. But emergencies and stuff like that generally with the workroom. So those are technology that's leveraged is the cortex system.

David ([12:05](#)):

When a patient presents to one of your stroke facilities with intercerebral hemorrhage, are all of them transferred or are some of them capable of keeping those patients at their own hospitals?

Stuart ([12:17](#)):

No, we currently transfer all of our intercerebral hemorrhages and subarachnoids to the Comprehensive Stroke Center.

David ([12:24](#)):

You mentioned that you use telestroke services, is the telestroke program staffed by neurologists at the hub facility, or do you rely on other organizations to help out?

Stuart ([12:34](#)):

No, it is outsourced to another organization.

David ([12:37](#)):

And then when the transfer occurs, that would be the neurointensivists on site who would take responsibility for that transfer, is that how that generally works?

Stuart ([12:45](#)):

Correct, and one thing that we've done to streamline this process is create an automatic acceptance for our stroke population. So patients with intercerebral hemorrhage, non-traumatic, and also non-traumatic subarachnoids, any patient with large vessel occlusion or any patient who has received thrombolytics will be automatically accepted to the Comprehensive Stroke Center. And it's a one-call process for the referral facility. When they are called our transfer center will patch them in with neurocritical care for acceptance and simultaneously automatically dispatch our critical care flight service.

David ([13:18](#)):

Alrighty. So I'd like to turn our attention now to a transition for the patient from the acute setting to the post acute care. And I'd love to hear a little bit about what stroke rehab looks like in your community or the communities that you serve. So does everybody stay in Greenville for their aftercare? Do people tend to get sent back home to their own communities or some mixture of that?

Stuart ([13:38](#)):

There is a mixture. We do have a rather robust inpatient rehab facility here. We have particular neuro rehab with trained specialists, but we also have some referral facilities, preferred networks that have rehab services. It's kind of patient and family preference, but we do utilize our transitional care team to follow these patients throughout the process. Even when they are discharged to a non-Vidant facility, they will continue the initial consult, or call, and then they'll follow up with them weekly to make sure that the patient is getting everything they need.

David ([14:11](#)):

And that's all coordinated through the hub facility?

Stuart ([14:15](#)):

Correct.

David ([14:15](#)):

Got you. And then do you use a similar process then to provide feedback to the referring facilities about outcomes and disposition of those patients?

Stuart ([14:24](#)):

Yes, the transitional care team will follow up with those and provide feedback. And they're also utilized, especially in the initial call, whenever the patients first arrive at the referral facility, they'll call to make sure that everything has been met with discharge, whether it be paperwork, medication, reconciliation, whatever needs they may have.

David ([14:42](#)):

Wonderful. This has been a good overview of the stroke system of care centered in Greenville, North Carolina. I wonder if you docs have any additional information or thoughts you'd like to share about your program. What makes you unique or anybody you'd like to call out for their special efforts in supporting this program?

Stuart ([14:58](#)):

One thing I think that we should definitely discuss as well is JoAnna Keeter, while she might be on the call, but not participating, is our regional stroke and neuroscience coordinator. A lot of the credit can go to her as well as Dr. Dalyai for his regional efforts as well. I know that he's been on multiple calls with all the facilities. The biggest thing that we've found is helping us create the system of care is opening up that line of communication and allowing all the referral facilities to ask questions that go directly to the experts and minimizing the side steps that people may have to take to get patients accepted. And also just providing them with the feedback of outcomes these patients and it kind of guides them as well, just to keep everybody on the same page in a coordinated effort.

I think that everybody that's probably listening to this podcast recognizes the challenges that come with geography and weather and distance while trying to care for these rather complex patients. But I think that just communicating well with everyone and providing as much education and feedback as possible is something that's a challenge, especially with maintaining currency with guidelines as they're released and updating your treatment protocols is trying to stay up to date is a constant challenge.

David ([16:14](#)):

Dr. Dalyai, anything you'd like to add?

Rick ([16:16](#)):

Yeah, as a clinician working with administration and the resources brought to bear and having that team approach with everybody, really being focused on delivering high quality care and then measuring those

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outcomes and being aggressive about it when it's happening. That is relatively new over the past six to 10 years. But everybody's been very mission-focused and there's been a lot of significant efforts, both from area that's relatively, we're all a lot of small areas, community hospitals to work with and to partner, but generally at the end of the day, most clinicians want to do what's best for a patient, but with a lot going on and being able to provide that easy access for the neurovascular care has been great for the region.

David ([17:02](#)):

Thank you for joining us, Dr. Rick Dalyia and Dr. Stuart Johnson from the Vidant Medical Center in Greenville, North Carolina. Thank you for sharing your best practices and insights into rural hemorrhagic stroke care with us.

Stuart ([17:14](#)):

Thanks for having us.

Rick ([17:16](#)):

Great, thank you very much.