Dr. David Wheeler (00:04):

Hello, and welcome to today's episode of Hemorrhagic Stroke Fireside Chats, where we address unique rural and regional barriers to care, the hub and spoke relationships within local health systems, and best practices as patients transition through their systems of care. My name is David Wheeler. I'm a neurologist in private practice in Casper, Wyoming, and the medical director for stroke at the Banner Wyoming Medical Center.

Today we're joined by Dr. Gmerice Hammond from Washington University in St. Louis School of Medicine. Dr. Hammond, welcome to the program. And please tell us a little bit about yourself.

Dr. Gmerice Hammond (00:37):

Well, thank you for having me today. I'm excited to talk about this important topic. As you mentioned, I'm here at Washington University in St. Louis. I'm a cardiologist. And my focus is mainly on inequities in care. And so this topic is germane to my area of study.

Dr. David Wheeler (00:54):

Wonderful. And Dr. Hammond, I understand you had a paper come out recently addressing stroke outcomes in rural settings. Would you mind giving us a little overview of that study?

Dr. Gmerice Hammond (01:05):

Sure. So we examined the outcomes of over 790,000 stroke patients, and we found that there were significant inequities in the care that stroke patients received and in the clinical outcomes for stroke patients, according to where they live. So for rural patients, we found particularly rural patients were half as likely to receive clot-busting therapies for strokes where that should be given. And we also found that they were one third as likely to receive endovascular therapy. And that means when you go in and have to remove a clot that's blocking blood flow to brain cells.

And then we also found that they were much more likely to die in the hospital after a stroke compared to their urban counterparts.

Dr. David Wheeler (01:53):

Wow. Those are really concerning findings, and definitely indicates some very significant needs for systemic changes in how we deliver healthcare in the rural settings.

Dr. Gmerice Hammond (02:02):

Absolutely.

Dr. David Wheeler (02:03):

So I understand that this paper specifically addressed acute ischemic strokes. But I wonder, do you think that these findings would be applicable in the care of hemorrhagic stroke patients as well?

Dr. Gmerice Hammond (02:14):

Yeah, absolutely. I mean, although three of our primary outcomes were, as I mentioned, receiving medicines to break up clot or receiving therapies to remove clot physically, we also looked at mortality. And the mortality data that we report on is relevant to all stroke types. So 70% of the patients in our study had acute ischemic stroke, but 30% did not. And so a significant proportion of the patients that we

looked at had hemorrhagic stroke and other kinds of stroke. And so the mortality outcomes and some of the secondary outcomes really apply to all stroke types, including hemorrhagic stroke patients.

Dr. David Wheeler (02:47):

Right. So your study makes it really clear that for a variety of reasons, outcomes for stroke patients in rural settings are worse than their more urban counterparts. Did your study give us any specific insights into what might be the causes of these worse outcomes?

Dr. Gmerice Hammond (03:04):

This was an administrative study looking at administrative data from hospitals, and so you're not really able to make any conclusions about the causes. However, for the outcome of mortality, as I mentioned, looking at the rates of endovascular therapy and the clot-busting intervascular therapy, looking at how different the rates of those therapies were for rural versus urban patients, we feel comfortable saying that the lack of appropriate therapy had a lot to do with the differences in mortality for the rural patients.

Dr. David Wheeler (03:38):

So when you're looking at the differences in care between rural and urban and suburban settings, did you identify any gaps in terms of the availability of technology or other resources that might also have played a role in the differences in outcomes?

Dr. Gmerice Hammond (03:53):

Yeah. So in this particular study, we didn't examine the technological capabilities of the different hospitals. That data is not really available in the way that you might need it to be in order to make some of these conclusions. But we do know from other studies that hospitals in rural settings lack the neuroimaging technology that's important for stroke. So that includes things like having MRI availability, cerebral angiography, CT. And so that visualization of the neurologic deficit is critical to make it the appropriate diagnosis and then getting someone to timely care.

Also, the availability of surgical suites that are important for administering some of these very technical therapies. And then lastly, having access to an intensive care unit. So we know that those kinds of environments, intensive care units, surgical suites that have the kind of technological capabilities. We know that those are less available in rural settings.

Dr. David Wheeler (04:51):

Along the same lines, Dr. Hammond, did your study reveal whether there were differences in outcomes for rural patients who had access to remote neurologic care? So in other words, was the presence or absence of a telestroke system of care in their setting relevant to the outcomes?

Dr. Gmerice Hammond (05:07):

We did not have access to that particular data. However, we do know based on some other data and other studies that have been published, that the density of telehealth and some of the other technological capabilities that I mentioned earlier is much lower in rural areas. So this study was not able to examine that, but we do know that to be true from other work.

Dr. David Wheeler (05:32):

Thank you for that. So drawing from your study, as well as your personal experiences and your interactions with your colleagues, are there any broader conclusions that you're able to draw that those of us working on the development of systems of care might focus on as absolutely necessary to begin the work of improving care for people living in rural settings when it comes to stroke care?

Dr. Gmerice Hammond (05:56):

Well, I mean, when it comes to stroke care, as you know, time is brain cells. And so a lot of the interventions really need to be focused on reducing the time from symptom onset to interaction with a skilled and available professional. Meaning a neurologist or a neurosurgeon that can intervene. And so everything along the pathway from first having the onset of symptoms to that interaction are areas where we can intervene.

So for example, creating more access to mobile stroke care. So mobile stroke units that can actually intervene in the ambulance to get folks to an appropriate stroke center. Oftentimes, rural patients are picked up in an ambulance as you would suspect. And unfortunately, because there's a lack of understanding by the EMS technicians about the stroke symptoms, they may be dropped off at a center that's not capable of managing stroke. So having access to telemedicine in the ambulance would be helpful. So expanding technology, even outside of the walls of the hospital.

And then, of course, once within the hospital, one of the most important things is to increase the density and the availability of neurologists. We know that those who are in areas where the prevalence of neurologists is higher, have better outcomes. So those are some of the most important things that we should be working on.

Dr. David Wheeler (07:29):

Sure. Yeah, those are really valuable observations. I appreciate that. One of the things that arises from that, those sets of observations for me, is the idea that the true growth of good systems of care really relies on our ability to improve collaboration between hospitals and stroke centers, EMS providers, the community. And some of these programmatic limitations lie outside the purview of the clinicians, there's not a whole lot we can do to change the behavior of our communities.

But I bet that in your research and in your thinking about these projects, you've probably form some ideas about what our elected officials and city and county administrators might be able to do to help us build these programs. And I wonder if you could share your thoughts in that regard.

Dr. Gmerice Hammond (08:21):

Yeah, absolutely. One of the areas that I study is really how policy plays a role in reducing healthcare inequities. And for sure, as you said, I mean, stroke is right there in the center of demonstrating to us some of the areas where we could improve. One of the things that's very helpful for stroke care is incentivizing care coordination and care standardization. We know that when you standardize care, that you get improved outcomes for many groups that have inequitable outcomes. And that's patients who are lower income, patients who are rural patients, and also racial and ethnic minority.

So standardizing care is critical. And two of the ways that we can do that, so participation in ACOs, accountable care organizations. That has been associated with greater improvements in standardization of care. Things like incentivizing hospitals to become stroke certified centers. These certification programs have been associated with better stroke outcomes. So expanding those and incentivizing hospitals to do that.

Policy plays a very important role by using financial incentives to guide and direct what hospitals focus on. And so making sure that we are reimbursing for and financially incentivizing the things that we want hospitals to start doing, such as coordinating care and coordinating care delivery.

And I would also say that standardizing intrahospital telehealth, I think is critical. Because if you have the ability to intervene, if you've got a CT scanner and a stroke unit outside of the hospital, that can really help with a rural patient who's many, many, many miles away from a certified stroke center.

Dr. David Wheeler (10:10):

Thank you, Dr. Hammond. Those are really valuable observations, and I'm sure provide some of our listeners with ideas about how to better advocate for their systems of care when speaking with decision makers and our elected officials.

I want to turn our attention back now to the role of telehealth in these systems of care. I mean, clearly this topic has come up several different times and in several different ways. But I wonder if you could share with us some experiences that you may have developed in recent months, wherein many of us have adopted and expanded our use of telehealth, and whether in your estimation, this is likely to have a positive impact on rural stroke care in the months and years to come?

Dr. Gmerice Hammond (10:53):

Telehealth is an important way to bridge this inequity gap. We talked about the importance of access to specialists. That is not a short-term solution. So that is going to require many, many years of work to increase the density of neurologists, in a county, for example. However, telehealth is an important sort of stop gap, in my mind, and an important way to bridge that quality gap because we know that it's cost-effective. So telehealth is a cost effective way to get access to neurologists and specialists when they're not physically present.

So I think that telehealth is going to play a critical role in reducing some of the inequities that we observed in this paper. Also, it's critical for reducing that delay in diagnosis. And that time to diagnosis is one of the most important factors for improving clinical outcomes. So I think you can't underestimate the importance of telehealth going forward for something like stroke.

Dr. David Wheeler (11:49):

I absolutely agree with that. And I think that our experience during the COVID pandemic pretty clearly demonstrated how we could continue to provide a high level of care to people who are less able to access our services in person.

And from an advocacy standpoint, really now is the time for us to be telling everybody we can and everybody we have access to, that the expansion and increased availability of telehealth services to the people needs to be carried out and carried forward into the future.

Dr. Gmerice Hammond (12:20):

Absolutely. I mean, even something as simple as providing an iPad. There's been some studies on having access to a mobile device in an ambulance is even ... as a way to deliver telehealth prior to getting to the hospital, as I mentioned before. Some things like that, that are so simple and very cost-effective that could dramatically change the outcome for a stroke patient.

It's not just about mortality, it's about morbidity. It's about the ability to function in life and to enjoy the quality of life that one deserves. And so it's such a straightforward way to address a very large problem. So it's something that we need to expand.

Dr. David Wheeler (13:01):

Absolutely. Turning our attention now to the patients in the charts and outcomes that you're evaluating. I wonder, within your data, were there noticeable or identifiable differences in the populations that were being treated in the rural versus non-rural settings?

Dr. Gmerice Hammond (13:17):

I think that's such an important question. Because as you know, I mean, there are patient level factors, there are hospital level factors, and system level factors that play a role in these inequities. The one thing that I think is striking, that's important for everyone to understand is that when we looked at the clinical comorbidity profile of the rural patients compared to the urban patients, there were not dramatic differences. So the clinical risk factors for stroke, such as hypertension, et cetera, some of the standard most important clinical risk factors for stroke were equally prevalent across patient groups.

Now, the one thing I will say is that obesity and smoking are things that are notoriously inaccurately reported in administrative data. So I cannot be sure that those were as similar as our data suggested. But our data suggests that there aren't dramatic clinical differences in clinical risk factors in terms of the prevalence of those factors. But what was very striking and is what's so important, I think, about these patient populations, is the prevalence of poverty.

So rural patients, or 60% of rural patients who are living with less than $43,000 a year. And that's compared to 30% of urban patients. So nearly twice the rate of really living in economic depravity. And that's critical. And that's a societal level issue. It's a policy level issue. But it definitely impacts this health inequity and all of the health inequities. And then we also found that Medicaid use was higher in that patient population, which just correlates, again, with poverty. But those were the most striking differences that we found in the patient populations.

Dr. David Wheeler (14:59):

Right. And that difference in economic status between rural and less rural settings really cuts across all territories in the United States, and seems to be playing an important, and probably causative role, in the very significant life expectancy numbers that we see in these settings as well. And I'm betting that things like stroke care play a pretty big role in that as well.

Dr. Gmerice Hammond (15:23):

And I just want to add too, to that point, this economic difference that we are observing this economic inequity, it's also really important to recognize that one of the important ways to reduce inequities in stroke outcomes is to reduce the incidents of stroke. We also know that the incidence of stroke is much higher in the rural setting and the rural populations.

And the incidence of stroke has everything to do with the economic disparities that we just talked about. Access and interaction with primary prevention and primary care. And then the structural and societal level factors that poverty bring to play in a patient's life, have everything to do with those inequities in outcomes.

Dr. David Wheeler (16:05):

For sure. Such as access to healthy foods, other issues like that. Anything else that you'd like to add into that?

Dr. Gmerice Hammond (16:13):

One of the things that we understand about socioeconomic depravity is the impact on stress levels, which has direct physiologic implications for cortisol levels. Direct physiologic implications for endovascular, so the vascular functioning. And so the functioning of the vasculature, the patency of the vasculature, both at the heart and in the brain, are directly related to things like stress, financial strain, environments where there's poor social support. And then the lack of education, which decreases a patient's ability to advocate for themselves.

And so all of those things together play not only a role in the kinds of physical things that the patient has access to, such as access to specialists and access to prevention. But also just the physiologic impact of poverty, which we know has deleterious effects on the cardiovascular system, including all of the arteries that feed the brain.

Dr. David Wheeler (17:17):

Absolutely right. So clearly, there are major economic disparities in the populations under study here. Were there also disparities in terms of representation of minorities or indigenous peoples, gender differences? Any other notable differences?

Dr. Gmerice Hammond (17:32):

So in this paper we did not flesh that out, but we do have another paper under review that will likely be published soon, where we did discuss those findings. And we did find striking inequities by race. We found that African Americans in particular, one of the most striking findings was there were glaring differences in their ability to be discharged home. And that is an important proxy for morbidity and patient functioning.

And we know that the morbidity burden among African-Americans with stroke is dramatically higher than that compared to their white counterparts. So there are definitely racial inequities that are exacerbated by rural residence, and we saw that in some of our subsequent analyses.

Dr. David Wheeler (18:23):

Thank you for sharing, especially sharing data under review. We feel honored at this time. So we talked a little bit about policy changes that we might consider or might advocate for that would help specifically with the improvement of stroke systems of care. I wonder if you might share with us your thoughts, on a broader perspective, in terms of advocacy or policy changes we might work for to help us deal with these other disparities in terms of economic, racial, and gender disparities that we're dealing with?

Dr. Gmerice Hammond (18:53):

I think that that's such an important point. Because we talk a lot about inequities in stroke outcomes, but that's assuming that the stroke has occurred, and overlooking the fact that we can prevent the strokes in the first place, which will have a greater impact on reducing the inequities in outcomes. And one of the most important ways to do that is to reduce the economic inequities that we have in this country. We have regional economic inequities, we have race-based, and we have gender-based. And there are many other forms of inequities that we struggle with in this country. But definitely advocating for a more upstream approach.

So how can we create more equitable environments? And that's going to be through advocating for education, educational equity. Which is something in the healthcare space we often don't think

about, but it's relevant to these clinical outcomes. So educational equity, making sure that there are jobs and opportunities for economic advancement in these environments.

And then, advocating for more representation and having a larger voice and presence in some of these populations, such that individuals who have the lived experience of either being in a rural setting or being a racial minority are present at decision-making tables and participating as engaged stakeholders as these policies are being made. And those are broader, sort of like more far reaching aspirational things, but I think that they're at the core of improving these inequities.

Dr. David Wheeler (20:23):

Dr. Gmerice Hammond, thank you very much for taking the time to share your expert insights with us this morning, as we work together to improve stroke care for patients with hemorrhagic stroke in rural settings. Thank you again.

Dr. Gmerice Hammond (20:36):

You're welcome. Thank you for having me.