

Speaker 1: [00:01](#) Quality Improvement in the Time of COVID-19 is brought to you by the American Heart Association, with support from Novartis Pharmaceuticals. As physicians, scientists, and researchers worldwide struggle to understand the COVID-19 pandemic, the American Heart Association has developed its COVID-19 CVD Registry, powered by Get With The Guidelines, to aggregate data and aid research on the disease, treatment protocols and risk factors tied to adverse cardiovascular outcomes. For more information, visit us at heart.org/covidregistry.

Sandy Doss: [00:30](#) Hello, and welcome to the American Heart Association podcast series on Quality Improvement in the Time of COVID-19. My name is Sandy Doss, and I'm a cardiologist at the University of Texas Southwestern Medical Center in Dallas. In addition to clinical work, I spent a lot of time thinking about systems approaches to improving quality of care. Today, we're going to talk about another aspect of quality improvement in the time of COVID 19.

Today, I have the pleasure of hosting Dr. James de Lemos, professor of medicine here at UT Southwestern, as well as co-chair of the steering committee of the AHA COVID-19 CVD Registry and executive editor of the top cardiology journal, Circulation. Today, we'll talk about some of the exciting work coming out of another AHA registry, Get With The Guidelines - Stroke, that was presented at the ISC as late-breaking science. So, James, can you tell us a little bit about your background and what your approach is to large data set research? What can we learn from these kinds of studies?

James de Lemos: [01:25](#) Yeah. Thanks, Sandy, I'm a general cardiologist. I do have a fair bit of experience working in large registries, including those from the AHA. I've learned over the years, these registries can have really powerful roles to help us understand how care is being delivered in different areas or even in different institutions in the US. And for registries like the Get With The Guidelines - Stroke registry, that registers such a huge proportion of the strokes that occur in US hospitals.

They also offer the opportunity to actually serve as a surveillance registry, so that you can really track what's happening with stroke care in large proportion of patients with stroke in the US. And that can really be advantageous when you're trying to think about, well, how did the pandemic affect stroke care in general? And even more specifically, for example, how the pandemic might affect the care of individuals that had concomitant stroke and COVID-19.

Sandy Doss: [02:21](#) So before we get into the details of the study itself, I was struck by the panel of authors that were assembled for this. Can you talk a little bit about how such a diverse group of experts from all over the country and Canada were assembled for this?

James de Lemos: [02:35](#) Well, lot of credit to Greg Fonarow, who many of our listeners will know has really been instrumental to the entirety With the Guidelines program, and has been really the leader of the Get With The Guidelines - Stroke panel. And he put together the team, with some of his junior colleagues to many of the national stroke leaders to do this. I was fortunate to be a small part in this program, but really, the credit goes to this large and dedicated team of stroke researchers that have worked for years in the Get With The Guidelines - Stroke Registry, as well as the AHA professionals that we've worked with on the COVID registry, people like Joe Williams, Jason Walchok, Heather Alger, and Christine Rutan, all of whom are coauthors on this, but have been leaders across the AHA portfolio. As you and I know, these are the same people that we used to really launch the AHA COVID registry, but they work across the whole portfolio.

Sandy Doss: [03:32](#) Yeah. I'll have to shout out to the AHA folks as well. They've just done phenomenal work with us on this project, and nothing would have been possible without them. So, can you tell me a little bit about the background of this study and this research question, and what led you to ask this question?

James de Lemos: [03:48](#) Well, I think you'll recall, and we certainly saw many of these papers from circulation, that in addition to all the work that was being done about the effects of the virus on various cardiovascular and neurologic outcomes, there were emerging data suggesting indirect effects of the pandemic on, number one, the incidence and severity of the presentations of cardiovascular disease and stroke in hospitals across the world. So the idea that, for many reasons, including fear of coming to the hospital, that there may be fewer presentations of people with heart attacks and strokes. And if they come to the hospital, they might present later in their disease course with greater severity.

And there were hints of this in acute MI care that we saw, from Italy, early on that suggested that MI rates were lower, maybe, but that people were, at least, presenting later. This was buttressed by other observations that were more distressing, suggesting higher rates of death at home, including sudden death, that suggested that people were inappropriately trying to ride out their cardiovascular symptoms and potentially stroke

symptoms, and therefore only coming in when things were very advanced, sometimes dying at home and sometimes come to the hospital very late, where they had more severe presentations.

And so there's been concern that the pandemic may have not only the terrible toll of via the direct effects, but these indirect defects, in which people are not getting the care that they should get for their cardiovascular disease and stroke, including acute MI and the various forms of stroke. The other piece of this that's important and interesting to study is whether the care that people actually receive when they get to the hospital. And this is the area, of course, Eddie [Pierso 00:05:32], expert in whether the care they get when they get to the hospital is up to standard with regard to timeliness, administration of therapies and tests within time ranges that we would expect for acute MI stroke, and then, how the presentations might differ in the COVID era.

Sandy Doss: [05:50](#)

So the study's looking at acute ischemic stroke, which is specific subtype of stroke. The rest of this discussion, I'm just going to call it stroke, but just to clarify to the audience that that's the subset that we're talking about. You alluded to some of the potential for avoidance of care or delays in care, and we'll get into that in a second. But was there anything that you a priori expected about COVID to be causal in terms of stroke? Would there be a causal relationship there?

James de Lemos: [06:15](#)

Yeah. Great question, Sandy. There are reasons to believe it might be. As many of our listeners will know, COVID's been associated with prothrombotic state. There's a thought that the virus itself, and the inflammation that occurs as a function of COVID infection, may drive thromboses. These have been seen really all over the body. We've documented many of these in our own AHA COVID registry, but deep vein thrombosis and pulmonary embolism rates have been higher than one typically expects in hospitalized patients. And in addition, thrombi in other locations, including within the chambers of the heart.

In the brain that may represent embolization from cardiac sources or a de novo thromboses and intracranial arteries. So there is a thought that the prothrombotic milieu may lead to more ischemic stroke. And then there's another piece to it, which is that the virus seems to infect the endothelium and cause inflammation of the endothelium, which may contribute to thrombosis in situ, meaning they that don't embolize from

other areas. So there has been a lot of interest as to whether COVID patients may have higher risks of ischemic stroke.

Sandy Doss: [07:25](#)

Thanks. So there's two interesting comparative groups. One is people with, versus without, COVID that presented to the hospital with stroke, and the second interesting comparison is people who presented with stroke in the pre- versus post-COVID era. Taking either one of those groups or populations on is at your choice. Can you tell us a little bit about the effect of COVID on the timing of time-sensitive treatments, either diagnostic procedures, like CTEs or door-to-needle or endovascular therapies?

James de Lemos: [07:54](#)

Well, yeah, maybe first I'll talk about the time course analysis. So what the team did first is looked at all the strokes that occurred in 2019, over the period from February to April or May time period, and then looked again during the first COVID year, and simply to ask the question, were the rates of reported stroke different and were the timeliness metrics different? And what we're seeing, and these are huge numbers, because this Get With The Guidelines - Stroke Registry, like I mentioned, records a huge proportion of US strokes, but it was 40,000 patients in 2019 and 40,000 patients in 2020.

And what they saw was a lower rate of stroke presentations during the COVID year, about a 15% lower rate of presentations. Which reflects one of two things, either that people aren't coming in when they have stroke or that people are having fewer strokes. And I should've mentioned earlier, one of the interesting hypotheses that's been raised, at least with regard to myocardial infarction, but could be analogous in stroke, is that some of the processes that went around quarantine, including less air pollutants, may have actually contributed to a decline in the risk of myocardial infarction and stroke. So it's possible that because fewer cars were on the road, people were at home and there was less pollutants in the air that stroke and myocardial infarction rates may be lower.

So that may explain, I think, a small part of the lower rate of stroke, but the larger part is probably that people just didn't come to the hospital for symptoms in 2020, because they were worried about coming in. But I would say overall, the message with regard to the findings from the hospital perspective was pretty favorable. The patients did present with a slightly higher severity of stroke and, obviously, a small proportion of these individuals COVID positive.

But I think the impressive thing for the neurologic community is that overall timeliness metrics, the things that we measure to look at the quality of stroke care, things like how long it takes to get the CAT scan, how long it takes to deliver TPA or endovascular treatments, were really minimally impacted. The only thing the COVID, the door-to-endovascular treatment time was slightly longer, but really, only by about four minutes, which I think I have to credit all the hospitals that are participating and the efforts that they took to make sure that they were delivering the best stroke care they could in the context of all the changes that were going on in these hospitals over the course of the pandemic.

The other favorable things in this first analysis they saw were no differences in the rate of administration of fibrinolytic therapy or endovascular therapy overall. So once people got to the hospital, care wasn't being withheld because of all the process changes related to taking care of COVID patients. And then, when they looked at in-hospital mortality, that was the same as it had been in the pre-COVID era. There were a couple of interesting findings, so people spent less time in the hospital and were less likely to be discharged to a rehabilitation center during the COVID period. Which, of course, reflects the pressure on the hospitals for beds. I'm sure, to care of the COVID patients.

So that stroke patients were moved out of the hospital quicker and were less likely to go to rehab, because there were obvious issues with rehab placements in the COVID era, and so more people went home. And whether that might contribute to a lesser, full recovery from strokes during the COVID era, we really can't determine. But overall, I would say that a very favorable message for overall stroke care in the US during the pandemic. I was encouraged, but worried, of course, by the fact that fewer people were coming in with strokes, suggesting, again, that there was fear of the hospital during that time, as you and I both know.

Sandy Doss: [11:43](#)

So thanks for that, James. Can you tell us a little bit about the people who had stroke with concomitant COVID?

James de Lemos: [11:50](#)

Yeah, absolutely. So what the team looked at, subsequently, was a direct comparison during the COVID year of those people that had strokes with or without concomitant COVID infection. This was an interesting analysis. I think one really important point is that only about one in 40 of the strokes occurred in the setting of COVID. So we lost track of what we normally take care

of. But it's important to remember that most of the strokes and the vast majority of the heart attacks that occurred, even in our terrible year of COVID, occurred in patients without COVID.

But, like I said, about two percent of the strokes occurred in COVID-positive patients. Those patients were younger, they were a little bit more likely to be Hispanic or non-Hispanic blacks or more ethnic minorities had COVID-related strokes than non-COVID strokes. Which, I think, almost certainly is explained by the much higher proportion of black and Hispanic individuals that have had COVID and COVID requiring hospitalization.

And then there were some important differences in the strokes that occurred with COVID. One of the big ones is that a much larger percentage of the strokes with COVID occurred in the hospital, really, in the setting of a known COVID infection. So 90... of the non-COVID strokes occurred outside of the healthcare setting, only 70% of the COVID strokes, meaning 30% of them either occurred during the hospitalization or in some kind of chronic care facility. Suggesting the point that you brought up earlier, the possibility that COVID itself and the thrombotic milieu with COVID may have contributed to the stroke, and the stroke was actually a complication of the COVID 19 infection.

These patients, as I mentioned, were a little bit older, obviously, this was occurring in the context of COVID, and these were much more severe strokes. There's a scale that the neurologist used to assess the stroke severity, and it was twice as high in the group that had stroke with, versus without COVID. And then, the other important difference is that a larger proportion of the COVID strokes occurred due to obstruction in large blood vessels, which suggests, again, that prothrombotic state that might be related to COVID.

Sandy Doss: [13:55](#)

So what do you think explains the much higher stroke severity? Do you think it's just the magnitude of the initial infarct or is it other factors as well?

James de Lemos: [14:05](#)

Yeah, that's a great question. I'm not sure. I think some of it is that they're large-vessel strokes, and so those lead to larger infarctions and more loss of brain tissue. But I think as well, they may be more difficult to recognize, because some of these strokes that occur in very ill COVID patients may be missed and diagnosed later because of all the other issues that are going on with those patients, including in the hospital, some of these

patients being critically ill and potentially isolated. I think we should keep in mind that there are indirect effects of isolation, whether it's in the hospital or at home, that may have contributed to delays in diagnosis of symptoms and signs that are not directly related to COVID.

Sandy Doss: [14:48](#) Yeah, I think that's a great point. I mean, I think by and large, the nurses have been heroic, but nursing contact with patients has been, would have necessarily had to be down compared to what it normally would be. And we, for a very long time, had no family in the rooms, et cetera. So it's quite possible that something bad would happen and it would take a little while for us to even alert to it. So I totally get that that may have also been associated with increased severity. So what did we learn from our stroke COVID experience, either good or bad, with respect to systems of care, systems of stroke care?

James de Lemos: [15:22](#) Well, not surprisingly, the timeliness metrics, how long it takes to get the CT scan, how long it takes to get TPA and endovascular treatment, were longer in strokes accompanied with COVID-19, which obviously, reflects the extra precautions necessary to prepare the environment, and the medical personnel and the patient, to undergo these procedures when they're under a COVID-related isolation procedures. So there were modest differences in this, and I think the other piece of it could have been, as we've talked about, the delay to diagnosis. It may have been harder to make the stroke diagnosis. But there were important differences in door-to-CT and door-to-reperfusion time in the COVID-positive patients, about 20 minutes extra for each of these.

Sandy Doss: [16:08](#) So let's say the president puts you in charge of preparedness for the next pandemic, in terms of systems of care approaches to either MI or stroke or both, what are the things that you would require or recommend that we do to be prepared next time?

James de Lemos: [16:22](#) I think we learned a lot in the beginning. And I would say that our initial fear reaction in the hospitals with regard, in particular, acute AMI and stroke are time-dependent therapies that require rapid systems of care delivered emergently to achieve optimal results. And I would say there was a period in our hospitals, didn't last long, four to six weeks or so, where we didn't deliver our usual excellent evidence-based care due to concerns about exposure to healthcare personnel.

And what we learned, very quickly, was that these procedures could be done safely in a timely fashion, with the healthcare team protected, with appropriate personal protective gear and precautions taken. And I think the next time this comes up for an infectious illness, like COVID, I think we'll be much better prepared. I don't think we'll ever be caught short of PPE like we were at the beginning of the pandemic in the US, and I don't think we'll have to go through the same process of re-engineering our care pathways. What we'll do is use our care pathways with heightened caution and personal protective equipment right from the beginning. But obviously, we had some tough lessons to learn.

The other piece of it is, that we've got to do a better job next time of reassuring the public that the hospitals are safe, and it took us a while to do that. And I think some patients died at home, because they didn't believe the hospital was a safe place. None of us knew, really, what was going on back in March, and the first part of April, what was coming. But I think the next time this comes up, we'll be better prepared. We'll know that we can do our work effectively, safely, and quickly, and we'll have enough personal protective equipment to do that.

But we'll also make sure the message gets to the public that no matter what's going on with the infectious illness, the rest of these medical conditions, they're going to continue to occur at their usual rates in patients. I need to know that the hospital is safe and that we're open for business and that we can deliver care to them safely and not expose them to any pathogens that might be contagious.

Sandy Doss: [18:22](#) Awesome. Well, thanks for that. Are there any questions that I should've asked you, but didn't? Anything that you wanted to say on the subject?

James de Lemos: [18:29](#) I would highlight the power of the registries and congratulate the Get With the Guideline team and, particularly, the stroke team for creating a data source that has become part of the fabric of stroke care. This is the most successful of the AHA registries in part, in the sense that it is in the most hospitals and captures the largest proportion of strokes.

And it really allows for almost an active surveillance program of stroke in the United States, so it's a really powerful tool. Really a credit to AHA and to this team of dedicated volunteers that has kept this going for so long. And I'm not taking any credit myself, any long-term role in the stroke registry, but I'm really

impressed with what's been done and what's been maintained over the years.

Sandy Doss: [19:16](#) Well, thanks very much. Appreciate your time. I enjoy talking to you and I appreciate your coming here and sharing your perspective as a leading clinical scientist. Thanks very much.

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