

**EDWARD C.**

This represents the first major all-inclusive update since 2013, in which I've served as a co-

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author on the guidelines. Acute stroke has been rapidly evolving in the last five years, largely through the development of endovascular therapies, where you go up and directly remove the clot using some form of the device. The other thing is changing stroke care in general is stroke systems of care. So we are recognizing that hospitals within a region need to collaborate to manage stroke patients most effectively. So we're starting to recognize the importance of stroke credentialing, stroke recognition in the pre-hospital setting, understanding the severity of the stroke, and then taking the patient to the most appropriate hospital based on that stroke's severity.

For tPAs, we have to look for means of opening up a blood vessel. One is our traditional means, which we've had since 1996, and that's a drug called alteplase. And that, we'd expanded the window some years back to go out to 4 and 1/2 hours for carefully-selected patients.

We've also started to remove some of the absolute contraindications to the drug based on 20 years of experience. And so the number of people who are eligible, who were not previously eligible, have now been expanded. And so more people are being treated.

More importantly, we recognize that door-to-needles, we call it, how quickly you administer the drug, is very important in terms of the patient's outcome. So we're developing these systems of care to ensure that we minimize any delays that would not only just delay the drug, but in some cases, the delays could actually prevent you from getting it. So building these systems of care within our region and within a hospital, to effectively deliver this in a timely fashion has become, an important part of the guidelines.

And so we established some new time benchmarks. It used to be that we wanted patients treated within 60 minutes. Now we want to continue to move that down, since we realize it's an attainable goal. So now, we went into 45 minutes. And ideally, we could probably drive it down to 30 minutes. And for every 15 minutes that you decrease it, more patients have a good outcome.

So endovascular therapy really came about in 2015 with the publication of five positive trials. And based on those results, we expanded the window with a guideline update out to six hours.

But now that we're using more advanced imaging means, such as MRI and CT perfusion, we're able to identify tissue that is still salvageable in the brain beyond the traditional six hours, which was all the clock-based inclusion.

So now we can get patients who wake up from the, stroke patients who are found down with a stroke within the last 24 hours. And if the imaging that we perform shows that are still salvageable brain, then we're able to go up into these large arteries and do what is called mechanical embolectomy for endovascular therapy. Those are patients who are not eligible for the drug, but are now eligible, since they have a large clot, to have the catheters remove the clot directly.

We have created all sorts of new processes that are more effective in getting patients through the entire system of care. So that starts with EMS bringing the patient to the right hospital. It starts with them telling us they're coming with advanced notification. With that notification, we can take patients straight to the CT scanner, because that's a rate limiting factor in determining eligibility for therapies.

Once we get that information, and the stroke team has met the patient there, we rapidly evaluate are they a candidate. If they are, we rapidly give them the drug. And then we very quickly look to see, is there a large stroke there? So all patients who come in within 4 and 1/2 hours, who meet alteplase criteria should get the drug.

But for that cohort that have very large vessels that are occluded, based on the DAWN trial and DEFUSE 3 trial, we perform additional imaging to see is there a clot, is it in a location that we can actually retrieve it, and is there still brain that can be salvaged? Opening up a blood vessel to [INAUDIBLE] brain, that doesn't do any good. But if there's still salvageable tissue, and there's a large clot, then we rapidly get the patients up to the cath lab, where they perform the embolectomy.

So in the past, we've actually looked at hospitals, in terms of being stroke centers, based on their infrastructure. And what I mean by that is we would say, do you have a CT scanner? Do you have an emergency department? Do you have a stroke expert, either in-house, or now by telemedicine?

But that's just really telling us you have the infrastructure, but it doesn't tell us how well you use it. So we're evolving fairly quickly across the country, with our credentialing and with

guidelines, to look at patient-centric outcomes. Not only do you have those tools and resources, but do they actually have meaningful outcomes to the patient? So if you have all of that, but don't use it effectively, the patients suffer.

And so we're going toward a more public reporting of your performance. CMS is wanting this, the public wants this, and it will help regional areas truly understand how well individual hospitals work within that region. For places like us, it'll help us guide who needs help. And for providers, it will tell you where do I need to place the additional resources. And when that becomes publicly available at the state level, it'll help EMS agencies understand where is the best hospital to go to.

With stroke care, if you look at it in the context of overall medical care, it really is in its infancy. And we only had our first acute therapy in 1996. And it was very slow to be adopted.

And in about 2006, we started seeing stroke centers being credentialed. We started to see an interest in stroke finally. And that's just 11 years ago. So I would say that the pace of system development has rapidly increased.

If you look at the telemedicine portfolio here at MUSC, it didn't exist until 2007. And now it's huge, and it's half of state hospitals on its backbone, and patients are getting great care. So the pace is quickening. And the big problem we have right now is, we have effective therapies. It's now getting the patients to the therapies in a timely fashion.

As a partner of mine says, we need to change the map of the Southeast, where we are in the Stroke Belt. We have these huge areas of high prevalence. We have huge disparities in care. We need to change the map, because we have services we can provide. It's just getting the patients to the right place at the right time.