

International Perspectives on Stroke Triage, Diagnosis and  
Treatment

A Webinar Series Presented by the American Stroke Association and  
the Society of Vascular and Interventional Neurology

Episode 4:

Treatment with Thrombectomy

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[The webinar will begin shortly, please remain on the line]

>> The broadcast is now starting. All attendees are in listen only mode.

>> Welcome everyone. Thank you for joining us for our four-part webinar series international perspectives on stroke triage, diagnosis and treatment. This is the final episode in the series, treatment with thrombectomy I'm the associate portfolio advisor for the American stroke association. Before starting today's program I will be going over a few important items.

This webinar is drawn the percentage by the American stroke association entities aside of vascular and interventional neurology. Well there are no CE's available for this webinar series certificate of attendance will be available for each live webinar you participate in will be accessible through the follow-up email you will receive Pickles webinar is being recorded and the recording will be available by early next week at the latest.

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The moderators and presenters for this episode have shared the following disclosures.

You will have the opportunity to submit questions by typing them into the questions pain of the control panel. You may send in your questions at any time during the presentation. We will collect these address them during the Q&A session the end of today's presentation. Are moderators for this episode -- Dr. Santiago Ortega -- research interests include cerebral hemodynamics, neural imaging as a selection tool and developing novel intravascular devices and approaches to treat hemorrhagic disease.

He serves on the Board of Directors for the side of vascular and

interventional neurology and serves as the vice chairman for MT 2020.

Then Waldo Guerrero is interventional neurologist completed his narrow endovascular researcher he fellowship at the University of Iowa and is currently an assistant clinical professor in the Department of neurosurgery at the University of South Florida College of medicine. Noted that he will be moderating the audience submitted questions say may receive a message from him through your attendee control panel. I will not pass it over to introduce our panelists today.

[See slide]

>> Think it's a great honor for me to present this last series of this joint effort by the American stroke association and the SVIN. Our panelists today cannot be better we have the leaders international leaders in the field . Dr. Jovin, Dr. Yavagal, and Dr. Silva.

I'm going to start introducing our first speaker Dr. Jovin. He does not need presentation is all the snow and however I must say a few words about him as my role of moderator. But he is currently the chairman of the neurology department at the Cooper University. He is a professor of neurology and surgery and director of the institute. We know him for his work in early window trials such as -- as well as the late Indo trials. As done he has written over 30 articles on the topic and serves on the editorial board in numerous medical journals. Is our honor to start this webinar with Dr. Jovin.

>> Thank you for the kind introduction thank you to the American Heart Association and SVIN to invite me to give this talk is an important talk because as you can see many of the patient's or most of the patients that we come across do not need guidelines -- so next slide please.

Let's look at I'm sorry it looks like my mouse now it's working. So that to the guidelines currently say? If we look at the level of evidence or class of

recommendation, one, basically patients should receive thrombectomy if they have a modified ranking scale zero-1. ICA or M1 occlusion, age over 18 years, score of six or greater, aspect score of six or greater and treatment initiated within six hours of symptoms onset in patients meeting these criteria.

And then all the other things that we many times come across such as low aspect scores, low stroke scale scores, M2 occlusions and so on and so forth these are category 2 B and NA 6-24 hour time window we have is class one category of recommendation 1 patients 6-16 hours who meet donor diffuse imaging criteria which require a sophisticated imaging infrastructure. Not every hospital can do these studies.

I want to point here there is a bit if I were to have written the guidelines, I would have said that either put 6-16 hours with patients with an stroke scale score of greater than co-10 or I would have gone up preferably a bit of gone up to 24 hours the basis for this recommendation for class A or are two studies that are concurrent. -- Scores of 6-9 was only diffused and diffused did not and will scores in the patient 24 hour time window so consistency sake would've dictated that either patients with 6-9 would be excluded in the 6-16 our time window or more generously, the time window had been extended as catacomb 1 of 6-24 hours but I didn't write the guidelines. I just want to point out that there are some inconsistencies here. And there's a lot of other features where these patients appropriately are not in category 1 and these are a lot of patients that we come across in our daily practice.

Sorry. We overslept and? That's the question. Because when we go strictly by these criteria, level I recommendation, we run the risk the concern is always that we can be over selecting and if you look at the thrombolytic trials that will use in our daily practice to treat patients, you can see that if we look at the number needed to treat which of course expresses the efficiency of a treatment, the treatment effect, the more liberal we are with exclusion criteria, so basically just use a time window, any scan, any vessel

occlusion you don't care about these things. We have a number needed to treat in the 10-14 range. And as we become more restrictive especially DAW and and diffuse we have these incredible treatment effects that are very very strong but every time that we had the stream and effects we need to ask ourselves if we are not leaving patients outside who may still benefit from treatment and from that standpoint I attended recently the meeting where there were healthy debates of what the upper margin of treatment effect would be sorry the lower tolerated or accepted margin of treatment effect. And we all agreed that should be 5% which is a number needed to treat of 20.

So we have a ways to go from 2.7 and in DAWN and DEFUSE to find acceptable treatment we under treat with deprived we deprive patients of the opportunity to have a good outcome so let's take a look at if we look at the American Heart Association guidelines eligibility, what Mohammed patients fall within these guidelines?

We looked at this question when I was at the University of Pittsburgh and looked at the large number of patients that were studied during DAWN over 2500 patients and in the 0-6 hours patients with proximal large occlusion 6% only met criteria and in 6-24 hours just about one third. The bottom line is that one out of two cases with occlusion just the proximal proximal large vessel occlusion patients only 60% over a zero-24 hour time window fall into the guidelines so we will actually deal with a lot of patients who have occlusions entered don't fall into the guidelines.

So I don't necessarily agree with many with this gentleman from a political standpoint but I really like his quote, there are known and the unknown unknowns and let's summarize what we know in thrombectomy within the 0-6 hour time window we know it is a highly effective treatment. We need, we know that the rate of good outcome system not good enough we know the benefit is highly time-dependent and present in all subpopulation studies included in the studies we've done so far. We don't know, we don't need sophisticated imaging, proof of mismatch and things like that in the

0-6 hour time window. There was no major safety concerns but there are still things we need to find out and these are the patients we come across in our daily practice that are outside of the guidelines. There are many trials that are addressing these issues. For instance, largest infarct, midsize vessel occlusions, patients with pre-existing disability, mild stroke severity, the largest infarct, patient with basilar occlusion given recent trials that have not been able to show benefit with which we all believe there is but we don't have a category 1 evidence for that.

There is procedural and. Procedural aspect which is what kind of devices to use whether we should go with anesthesia versus awake how do we manage blood pressure, glucose and anti- thrombotic whether we should do primary stenting in certain patients, these are all things we still need to sort out and whatever decisions we make they are outside of guidelines.

We need to understand whether advanced imaging is not whether it is helpful or neutral behalf to understand and reflect on whether advanced imaging is harmful because we may leave patients outside that would still benefit and we are spending too much time trying to find these answers.

The need for thrombolysis whether t-PA or T and K at thrombectomy centers. Beyond the six hour time window we have even more questions. We know this is highly effective in patients with this criteria but maybe they are way too strict and can we liberalize these criteria?

Benefit is less strongly associated with time to treatment. We do have some time to do these tests but we really need to be that sophisticated?

Benefit is not associated with the mode of presentation whether wake up witnessed versus unwitnessed. There is no major safety concern.

Things still need to sort out his patients and populations not meeting Dawn and Defuse criteria. Milder stroke severity, larger infarct that is particularly an important issue. What is the upper limit of infarct in a 6-24 hour time

window there is still benefit? And an optimal imaging modality for mismatch do we need the sophisticated CT, MRI etc. or do we just do away with a plain CT with an aspect score?

Is there harm in subpopulations for instance largest infarct? Are we harming them if we treat them? And there is a procedural aspect -- this is all outside the guidelines.

Coming from countries where the systems of care are not sophisticated and patients come to the hospital beyond the six hour time limit we were especially excited we felt that is going to be very important to establish the 24 hour time window because it will help a lot of patients outside of these countries with more sophisticated systems of care where patients come late to the hospital and it really breaks my heart when where used to go before the pandemic of course giving talks in China or India were never in talking to people and hearing that we don't treat patients beyond six hours because we don't have CT perfusion or MRI or automated software programs. The question is do we really need these sophisticated imaging studies? I would be better off especially in those places where there is no sophisticated imaging to just go with the plain CT and from that standpoint this is a study that I'm very excited about was recently published his work that myself together with other collaborators and colleagues from UPMC have done when I was there we looked at patients who came in and had all the sophisticated imaging modalities but we also admit otherwise DAWN criteria in the window barely hostile to aspect scores and we found that almost 80% of patients with aspect 6-10 meet the criteria in the time window so another words almost all patients with good aspect scores in the 26 hour time window meet the Dawn criteria. The mismatch diminishes with time but even at 24 hours, 25% of patients with NIH scores greater than 10 and proximal occlusion still meets the Dawn criteria making it an argument favor of treating those patients beyond 24 hours. And the proportion of positive Dawn criteria by aspect category is constant in time.

So as I tweeted about it, the bottom line is that within 6-24 hours and

especially given this incredible number needed to treat that strong benefit -  
- it is reasonable to assume -- a lack of CPT or MRI should not deter  
thrombectomy beyond six hours. Aspect is good enough. Challenging the  
6-24 hours in terms of imaging is to find the upper limit of infarct where  
there is still benefit perhaps in conjunction with age but I think that the  
evidence is accumulating that just a plain CT is enough in terms of patient  
selection but again it would be nice to have level I evidence in support of  
that we can ever get it Trump exceeded 4.4 hours as I alluded to there were  
a lot of patients who still have mismatch before the 24 hour time window  
so again at UPMC we did treat some of these patients and believe in the  
concept of mismatch and we compared these patients treated beyond 24  
hours with the Don intervention arm patients and found that the outcomes  
are comparable and certainly better than we would've expected based on  
the natural history of this disease. So in summary I would say for the ones  
who are facing the problem as we do is I showed an almost the majority of  
patients, the majority of patients if we include the more -- I'm outside of  
the class one recommendation how shy approach the problem and keep in  
mind that you have an interventional suite you have interventionalist on-  
site, you have the option of offering a thrombectomy. Not treating is an  
active decision. Not sending the patients to thrombectomy is also a  
decision and that also can be detrimental to patient outcomes of the way I  
approach this is number one is it safe? Do we have any kind of evidence  
that this approach is safe. Then what is more likely? We don't have level  
one evidence that we have some evidence and that is where we as  
physicians come into play our own judgments. Based on the available data  
what do I feel as a physician that is more likely to offer treatment? Do I  
think there is benefit is it neutral or is there harm? And again am I going to  
deprive the patient of a good outcome opportunity I don't treat? Are the  
resources justified? Is this something I think is cost-effective? At the society  
level that is an important question to answer.

And finally, always always discuss this with patients if you can or family and  
we need to tell them sometimes that these things are outside of the  
guidelines or class one recommendation. Discussed pros and con's and see



and be guided by the patient or their family. And with this I'm going to end. Thank you very much.

>> Thank you so much, great presentation I'm sure a lot of questions are going to come up during the discussion. Our next speaker -- also does not need introduction however I have to say a couple of nice things about him before we start. Dr. Yavagal -- that the University of Miami -- he is well-known for his research in - at the oversee Miami as well as [indiscernible]. Over the last he is one of the co-authors of the 2015 vascular stripe guidelines which is a cornerstone in our field and participated in the DAWN trial. Over the last three or four years he has been concentrating on the thrombectomy treatment. A global platform that is trying to implement mechanical thrombectomy throughout the world. Thank you.

>> Thank you so much for that very kind introduction. Thanks to Ajay and SVIN for inviting me to speak on this topic, geographical disparities and barriers to thrombectomy access, a global approach to address the mechanical thrombectomy gap.

This should extend really the aim that Dr. Jovin mentioned getting more patients to benefit from thrombectomy these were numbers -- I think closer to reality than what we have from the global burden of disease statistics from 2016 which is more 13.6 million strokes but given the lack of data collection globally, the number of 17 million strokes per year is more likely and out of these anywhere from 20 to as high as 40% of the ischemic strokes here which are possibly 80% of the 17 million our large resolution strokes and these are the strokes we can substantially modify their outcome. And because those strokes contribute to about three fourths of all the long-term stroke disability burden even though they are 20-40% of all ischemic strokes, having them treated and their disability resolved or reduced with substantially contribute to decreasing the stroke burden.

What we know though is that not only is this large burden largely unaddressed but it is also unfairly distributed. 80% of all strokes are in the

low and middle income countries that have 20% of resources. And that is a major geographical and resource disparity that mission 2020 aims to address and what we also know is that mechanical thrombectomy is overwhelmingly effective and this has been established since 2015 and extended to low and middle income countries by the large team which includes Dr. Silva who will speak next. This treatment is effective in low and middle income countries as well. And the efficacy is overwhelming. It is similar to antibiotics or even more powerful therapies in medicine and the gap that exists in implementing this treatment to eligible patients is what mission thrombectomy is aiming to address. Mission thrombectomy 2020+.

We also know that even though mechanical thrombectomy is highly expensive upfront, all the analyses to date of mechanical thrombectomy in high income as well as middle and some low income countries has shown a high degree of cost-effectiveness. This study from Saudi Arabia is really telling that although the investment is high the estimate of changing from a traditional non-thrombectomy system to a thrombectomy system even of the costs go up the cost savings are close to about \$600 million over 15 years and this is because of the cost savings from the patient not been disabled and the care not needed for disabled patient once they receive effective treatment with thrombectomy.

We also know that this treatment is not only inaccessible in low and middle income countries but even in the US which is a leader mechanical thrombectomy and the richest country in the world the gap is large and I will show you the numbers. Initial estimates were around 100,000 but now we know from or recent estimates that they are close to 200 maybe even 250,000 in the US and in 2016 only 20,000 were done. What about the rest? Of course they want if you go to a very conservative estimate of 10% the yield of LVO -- so the gap in thrombectomy access with a lack of thrombectomy for eligible patients is just immense. And that needs to be addressed. We also face in a big way is the time sensitivity of this treatment. Even in the US only about 63% of all populations have a 60 minute access to thrombectomy so the access to this treatment really has

two major challenges having the treatment given to the patient in a timely manner and the fact that this treatment is not widely geographically available when you look at globally. Even in Western Europe Western Europe has much better actors than eastern Europe so the geographical disparities are everywhere for thrombectomy and need to be addressed. When you look at all the numbers of thrombectomy since 2015, the data is very telling. We will start with the US data it really went up dramatically and doubled from 2015-2016 with the publication of the guidelines. And then started to slow down and I will show you this is not uncommon with new treatments and even as of 2019 only 48,000 were done in the US whereas the range is around 200,000-250,000 with estimates currently.

Worldwide this number was around just under 100,000 in 2016 and went up -- so there globally was a fairly steady increase between 2016, 2017 and 2018 and in 2019 there possibly was a slight slow down and the projected number for 2020 is in the range of 230,000 thrombectomy. That turns out to be our that we set in 2016 for mission thrombectomy 2020.

I want to address how we envision this but what we did in 2016 was develop the idea and start this campaign where we would be an umbrella campaign for global efforts to increase thrombectomy access and revision was to integrate disparate knowledge of barriers, to access worldwide and to double the axis to thrombectomy every two years globally and by that metric we have aimed for 202,000 thrombectomy worldwide just starting from 2016 it looks like we may actually end up reaching that. So this was the simple metric that was set and who based it on known principles of treatment access. Whenever a new treatment is approved, it takes about 20 years to get to 50%. This is the Everett Rogers model. A paper from 1964 called diffusion of innovations. I'm sorry the reference did not get in here but we wanted to move that curve to the left using public health interventions and I will come to that in a second.

We wanted to change that from 20 years to 10 years in developed countries as well as developing countries. How we want to do this and I'm going to

skip a few slides here is used public health interventions and why are we take this approach? It's well established that for a treatment to be considered in need of public health intervention these are the criteria that must be met.

The large health burden and getting larger. The burden is to distribute it unfairly. Is a highly effective and safe treatment for the condition and is cost-effective and there must be substantial evidence that upstream strategies could substantially increase access to the effective treatment and I will talk about upstream strategies and such strategies are not yet in place.

This is a paper from early 2000s that establish the criteria for public health interventions for any treatment and MT meets the and what are upstream interventions? There economic, political and community factors that need to be modified to substantially increase access to treatment. And so we have steadily worked on operationalizing our mission and goals and we are basing it around three access pillars. We want to address the pillar of information and diagnostic access which is availability of information about LVO, diagnosis and triage pick physical access -- and then of course the big barrier is financial access to clear addressing how insurance and public health payments or public payments can be available in a timely manner and so we have been working on interventions that address these barriers them going fast here. Bear with me and we have set up a structure that is fairly flat but can actually become a pyramid when needed. You have the co-leadership committee from the US and we have a global cochairs committee that works with the executive committee that is now over 200 members which are stroke and interventionalists from around the growth. This reaches each region for implementing the goals there is a country liaison from the US and the regional subcommittee has a stroke and interventional chair and members and then we have been very privileged to have liaisons or collaborations I should say with AHA and other organizations and leaders in the field. We have --

We have established now close to 82 regional committees in six continents

and this is a work in progress. We are able to finally launch in September one month ago and this has rapidly gotten in place and we have a clear action plan for these committees. The activities that 2020 has done up until now is expanded the GC to more than 200 members. We have done a survey of the impact of COVID 19 on stroke and developed a global stroke coordinator committee and just released internally the white paper for health policy makers [see slide].

They will conduct a regional survey and analysis of the structure and volumes in the next two months and design public health interventions based on the principles I mentioned below for 2021 and adopt a very exciting smart phone app for global thrombectomy tracking. And I'm going to rush here in the interest of time. I mentioned to you the white paper. We are working on increasing infrastructure by certification and also developing a payment method and then we are working on with the Society for interventional surgery to establish a baseline for rural access to stroke thrombectomy in the US.

This is in each has popped up when the interventional entered it.

The ultimate goal to reduce death and disability from acute ischemic stroke. We hope to see a goal of 202,000 thrombectomy met by 2020. It seems it's going to happen and we will continue to double up every two years and in the public health intervention for MT 2020 are being implemented at global and regional levels. The innovative payment methods as well as certification. So with that I will end and I think you all for your attention.

>> Thank you I have the pleasure of presenting our next speaker Dr. Silva associate Professor of neurology in Sao Paulo. She is also one of the key investigators is my honor to present Dr. Silva is an honor to have you.

>> Thank you so much for the invitation to be here. I'm going to speak but international perspectives on stroke triage, diagnosis and treatment specifically about Brazil.

Specifically cost and system organization and speak on the opportunities to increase access to stroke treatment considerations in accessing mechanical thrombectomy in various regions of the world.

Latin America we have more than 600 million inhabitants in Latin America with 200 million people living in Brazil. We have very different perspectives and different states of the country. Stroke still the cause of death and many country in South America so it was the first cause of death in 2017 and now it is the second cause of death so it's a major important public health problem.

We have many neural emergency gaps in Latin America. Stroke is one of the most important so the critical care Society Journal so specifically addressed the different perspectives in political situations and health systems in all Latin America and talked about the different emergency needs specifically stroke so we can see here that in Brazil we are the country with more stroke units but we have 200 million people so we have got to be and there were some situations there were some countries in Latin America that don't have access to --

In Brazil we are one of the two countries in South America to have a national stroke program so our Minister of health does recognize stroke is a major public health problem so it's not intravenous thrombolysis is not available. It's not paid by the public health system because it's a huge problem. We need the government to assume that problem to pay for thrombectomy.

We have just like living beside slums living beside a rich neighborhood and we have to find out how to treat patients and get stroke treatment available throughout the population. We have a huge dichotomy and this happens in all Latin American countries when we divide the public and private health system. So we map out the mortality for stroke in the city. We have 20 million people living in Sao Paulo and seven years stroke mortality was

higher in the district with low socioeconomic levels. And one very striking thing was that stroke mortality in the seven years did go down but not in these districts so stroke is actually a social problem not only in Brazil but in several countries in the world.

We start by making our government a partner with us with the physicians and neurologists and the associations for stroke and for neurology in the country and in 2000, 2012, we had our ministry recognized stroke is a public health problem and to sign a line of care for stroke. This is done by many physicians and you see here many neurologists that recognized stroke is a very important problem for the country and since then at least we have payment for -- thrombolysis. In Brazil. One thing was to prove that it was cost-effective so we did review of cost-effectiveness of thrombolysis and even the public health system it is we had very recent work showing that the cost of thrombolysis and the public in the private health system and you can see how different it is so we have 8000-\$12,000 per patient in the public health system treated with IV or thrombolysis. The cost goes up to \$30,000-\$40,000 if we are in the private health system so there is still a big difference in Brazil.

Many campaigns were done. EF 28 stroke denominations. this is from 2008 and we found out [indiscernible]. Is the name most recognized by our population and we are now using this term. We actually did any campaigns and now we are in October the month of stroke recognition so this is a translation from a scale called SAMU when you're trying to teach the population about stroke signs and symptoms. We have guidelines for thrombectomy so when did all the trials published we did but the right thing was to do but we knew the country was not paying for the treatment but we gotta published in the most important neurology journal for the country. But still our ministry of health did not realize they had to pay for thrombectomy. Many reasons they decide that's pay for it, the reasons for that the argument was that we could have many delays in diagnosis and transfer. We have a more vulnerable population and we don't have full procedure treatments. And lack of access to rehabilitation so our administer

of health decide to act for a randomized control trial which is the resilient [indiscernible]. This was best medical treatment. As you all know so the trial was positive we had very good results not only in the thrombectomy but we had good results in the timing for evaluation of patients like our door to needle time was reduced in both so those patients were well treated and this is the publication as you've already seen from resilient we had a sample size calculation of 600 patients and we finished --

Now we are actually dealing with our ministry of health making sure that we have these treatment paid by the public health system. During resilient we incorporated a lot of technology for the stroke centers involved which were 20 stroke centers in the country so we had some of the best ED scale and we translated [indiscernible] so that we could bring the patient to the right stroke center. We also used very simple technology like the giant application together with the fast ED app. This is a very cheap mode of making all the stroke team together thing able to see images and discuss cases and it was incorporated all over the resilient trial so this is a simple solution that can really help. To finish I think thrombectomy is just a couple of the iceberg there are many things we have to do many countries do not have access to thrombolysis -- all the quality indicators of treatment of stroke in our hospitals and we are actually working on a certification of hospitals for stroke victims because this is very important so thrombectomy is just a part and important part of stroke treatment so I will end up saying that we now have the answer from how we should treat patients with stroke 85% of the countries of the world which are countries like Brazil which have low to middle income so the previous trials showing that thrombectomy does work in developed countries but now we just have to put them in. Thank you for your attention. This is the team I'm very proud to be part of.

>> Thank you for such a wonderful presentation. Thank you to all the panelists. Think we have some time at least 10 minutes to go through and I invite the audience to please put your questions for the panelists since we don't have many questions at this moment I would like to start with a common question for the three panelists I would like to ask you if you



could choose one intervention that we currently are not performing don't have class one evidence at this moment that you really think is going to make a main difference in the treatment of acute stroke interventions for patients with LVO. What would that be.

I would use scales to estimate large vessel occlusion or algorithms that are AI based and only using a CT scan. Just simply simplify imaging. There is a paper in the last issue of Stroke showing that when you use CT perfusion patients hospitals that use CT perfusion treat 40% less patients that when you do a CT perfusion less 40% less patients get treated. Talk about over selecting and under treating. So I don't think it matters that much what you treat with, but just make it simple and accessible to everyone and that is the lowest common denominator which actually is not that bad in terms of selection is a plain CT scan. Every hospital has that and we should construct our systems of care based on simplicity.

>> I would echo that but I think the much more difficult holy Grail is a payment system that could work globally and I know that this sounds very fuzzy and hard to reach but I think it is really the CPR for the brain and in a lot of ways this could serve as a global health intervention that could be paid for with innovative ways so that payment which the biggest barrier and most of the world does not get in the way of preventing a lifetime of suffering or death so I would really say that even though in high income countries we don't see this issue at all it really has become very clear to me that either the lack of payment or the lack of timely payment because it is so hard to produce that much money in that short of notice when payments are out of pocket. Think this is a test case for all of us were patient advocates to develop systems that allow for rapid payment or underwriting of this treatment to save costs for the patient as well as society as a whole.

>> I guess it's just part of making the procedure accessible to more people in the world so of course free country like Brazil if we have to pay for perfusion our health system, it's going to be another big cost so we can

do without it so that is part of making it accessible so with this number to treat on the results I think it's very clear this procedure is effective in any part of the world and I invite you to come to our country and to see what kind of emergency systems we have and what hospitals dissipate in Resilience. That procedure so effective that regardless of the hospital we just have to have a system to implement and I think that is the key so systems of care and in a country like Brazil, you cannot have a comprehensive stroke center in each, you have to have a plan to make sure that all patients that have struck they have access to specific comprehensive health hospital that can do thrombectomy and this is not easy it's not easy to organize like in the city with 20 million people to map out all of the hospitals and have access. And intervention available for everyone so that is the puzzle to solve.

>> If I make it back to the comment, I clearly reimbursement is an issue but you can make a comparison between stemi the number in Brazil in China whatever compared to the number of thrombectomy, there is huge differences in that procedure they have the same perhaps payment issues that we have certainly payment is a problem they have the simpler systems of care I agree that getting these systems of care also based on simplicity is perhaps the key. Together along with payment, no question but it is a missing piece of the puzzle here.

>> I don't want to prolong this question but I will point out it took about 25 years for stemi to reach access where it has and that is the big issue is that eventually people will pay for thrombectomy also but will take 25 years so if payment puzzle is solved earlier to get that shortened to half the time.

>> In Brazil it was 14 years to get the government to pay. It's too much.

>> There is a question from the audience about training in other countries. I think this is more to speak of do we have enough neural interventionist to deal with demand for thrombectomy and if not do we have to train others to do thrombectomy?

>> It is definitely a tough question and I'm sure my co-panelist will have their views but I do think that at least my thinking has evolved to a need-based training so and regions and countries where there is hardly an interventionist for hundreds of thousands of miles but there is a non-neural interventionist already there it would behoove us as a society to train them so they can quickly start doing these procedures after proper training whereas in cities and regions that there's already a number of neural interventionist available there would make sense to keep it to neural interventionist so I think the current rate of training thrombectomy specialist is too slow to meet demand. We have to think out of the box and this is done in other fields where a needs-based rule is formulated so that we can address diverse regions with a particular way of training.

>> I will speak for bacilli- have a specific point of view on that I think that the question is what is this training so I don't have any problem with anyone doing any procedure if the training is appropriate to my problem is there people they think because they do interventional cardiology they can train six months empty and the brain. Is very different circulation the decisions are very different and thrombectomy is not something to be done in a primary stroke center. That is why talks about the puzzle that is why we have all mapped out so I guess if the first question is do you really have two don't have enough interventional use so the country has to first answer this question and second what is the proper training for that it's okay but if the person is properly trained so not six months or seen people doing intervention that will allow you to do intervention because you know how to do it in the heart.

>> As far as whether we have enough interventionist across the world the answer is no but it's a Catch-22 situation. If you are building infrastructure you pay people, if you create the infrastructure for patients to be treated we will train people there is no shortage neurologists who want to do it there is no shortage of radiologists. If you look at the total manpower in the US comes to about 30, 40 strokes per year per operator. That is not much this not even one stroke per week so I don't think an outside of the US

training and manpower can be a concern but I don't see it as the biggest concern once you create that infrastructure as mentioned. You have to create the conditions for people to be treated.

>> The concept you've introduced about this possibility of clinical mismatch as you seem very simple image, has raised questions here. Can you tell us more about how with that how would you envision that how much would you give to the NIH in combination with the CT and how can we implement in a clinical practice?

>> I think just taking the Dawn model once you have greater than nine or greater you in the Dawn territory and all you have to do a substitute the core assessment that you obtain based on MRI or CT perfusion with a CT aspect. It turns out there are several publications now that suggests aspect score of seven or six -- you don't need to know whether the infarct volume is 32 versus 38 that is irrelevant. All you need to know is do you have a large infarct that is beyond the thresholds that we use in Dawn and Defuse and them reminding everybody that is for a number needed to treat two or 3. We are not even close to a number needed to treat 20 which is the accepted treatment effect. So you have a lot of leeway to be imprecise and you are still going to very likely have benefit so I would say for aspect score of 6-10, and I score of 8-10 we don't have 100% proof but it's very reasonable to assume that there is benefit, right? And the four lower aspect scores I think we need trials and we have to decide on an individual basis. I personally I'm a bit reluctant and if the aspect score is low then we can confirm with more advanced imaging because sometimes the aspect scores are falsely low and we can have increase in that area and that is where you can do a CT perfusion or MRI if you have it and look at see if there are collaterals in that territory if there are you can still go and treat and we have gone we are going to need to have this upper limit of infarct where there is benefit. We have randomized trials going on. But in the meantime we are faced with these cases and we have to apply our best judgment I would say that for NIH stroke scale scores 10 or greater and aspect scores six and above I do think that I be very very surprised if there was not very strong

benefit and by the way, this hypothesis is going to be tested in the continuation of resilient which is a spectacular concept again you can randomize these patients because the government is not paying for the device so that is where you leverage ideally they should pay for it but if they don't at least you conduct trials and we have the answers to these questions but in the meantime that is what I use in my daily practice when doing a CT perfusion or whatnot it takes too much time or delays me too much. And for lower scale scores these are slope regressors probably not that you are not going to pay that much penalty in terms of outcomes do an advanced imaging and if you don't have it again you use judgment and there's going to be trials coming out on 0-6 hours I'm sorry they go out to 24 hours and we will have answers from that. But I would say NIH greater than 10 with a good aspect score I think it's very reasonable to treat. And we are not the only center that does that many others do exactly that.

>> I agree that the absence of imaging I think with this therapy with this degree of we really have to think to implement protocols worldwide truly help as many patients as possible, not deprive patients from these treatments, any last question from the audience for the panelist if you don't mind? Can we ask one more question.

>> The questions have been answered.

>> I'm going to add one quick point. A very simplistic approach of just doing a CT and treating the patient that makes a lot of sense for lower middle income countries is paradoxically a big problem in those countries because patients are paying out-of-pocket. The families insist on a guarantee is what I've heard from all my colleagues in India that if they have a bad outcome or feudal outcome there is a lot at stake for the practitioner and not just for reputation but also for violence and this and that which should not be an issue but really is a pragmatic issue so they actually overslept in low and middle income countries for that reason at least currently so I think it is really this payment and supplying of selection all these things have to go together

>> Since you are practicing in a middle income country this moment, what is your experience with that?

>> It's not difficult to solve this problem because we don't have it paid by the government yet so if a patient comes to public health system it's going to be randomized and we already have more than 10 patients included so that is the good part of it and we don't have perfusion so there is no choice. I agree there is some selection for that at a private hospital on the other hand you see the difference in cost on the public health system in the country so it really depends on the physician and on the hospital if you have a farewell organized service so most of the private health systems do have the access to perfusion so I will tell you on the other hand insurance is paying you have no problem in the private health system. Sometimes you decide to treat and try and I Savior going to try anyway and treat patients anyway there is no reason doing the perfusion study were just losing time so the public health system there is no problem because we don't have to pay. In the private health system over selection does occur.

>> Thank you and unfortunately that is all the time we have for questions today. I want to say thank you to all of our panelists and moderators for sharing time and expertise with all of us. Additionally on behalf of the American stroke association I would like to thank collaboration on the series with SVIN. SVIN mission thrombectomy committee continues -- traditionally work on school to increase awareness and access to mechanical thrombectomy and stroke care globally through research and other initiatives.as a reminder this webinar was recorded and will be available on our website along with all the recordings of the three previous episodes. Tamara world struck a the American stroke association encourages you to join us for one [indiscernible] other upcoming opportunities in November include attending scientific sessions and SVIN annual conference. Both will be virtual events this year. Finally coming in 2021 merit heart association, the society of vascular and interventional neurology are joining forces to publish a new peer-reviewed Access Journal titled stroke vascular and interventional neurology. The journal is expected

to start accepting papers and publishing in early 2021. The new journal will be produced by monthly and available online. Once you leave today's webinar you will see a pop-up window with a short survey and we would appreciate if you would complete the. On behalf of the American stroke association, and SVIN at our moderators and panelists thank you for joining us today and have a great rest of your day.

[End of the program]