Empowered Patients, Efficient Practices: Continuous Clinical Improvements

Presenters: Rene Gifford, PhD, CCC-A, Jacob Hunter, MD; Phillip Chang, MD

Good morning, good afternoon. Good evening. Thank you, everyone, for attending today's webinar that is part one of AB's empowered patients efficient practices webinar series. Today's topic is continuous clinical improvement. My name is Laurie Hambrick.

I am a principal education specialist on the global education and training team at Advanced Bionics.

I'd like to start by reviewing the goals and objectives for today's course. After this course is complete, you will be able to identify one change that you can implement to improve your clinical efficiency, one strategy that you can utilize to get candidates into your clinics, and one AB resource to help CI candidates connect with you. Now, of course, we'll be telling you more than one of each of these things, but our goal is for you to have at least one takeaway. I'm really excited about this five part webinar series on clinical efficiency. And based on our registration numbers that are really, really high, I think you are too.

Now, the topic of clinical efficiency really seems to be a hot topic in our field today. And it is important because we know that cochlear implant centers all over the world are very busy. Even though cochlear implant utilisation is still quite poor, it's estimated that less than 10% of people who could benefit from a cochlear implant have one. And of course, those are really significant unmet needs. We have a number of recipient or candidates who could potentially benefit, but they're not making their way into our CI clinics.

And how can those of you in the clinics open up your schedules to see more patients while making it easier for recipients to receive the care they need? Well, during this webinar series, I hope we answer some of those questions. And actually, I won't be answering any of them. I'll be speaking with your peers who are working in cochlear implant clinics. The CI professionals that we have on this webinar series will share how they have overcome challenges that they face in their cochlear implant clinics, and also share how they have implemented changes to improve efficiency and to empower their

patients to have an active role in their care.

Now, before we dive in and I hand things over to today's guests, I'd like to ask you a question via a poll. So, Anna, if you will push out the first poll, what is the most common way that your CI recipients connected with your clinic? Through a physician in your practice, from a physician outside of your practice, from a local hearing care provider, word of mouth from another patient or in some other way? I'll go ahead and give you, say, ten more seconds to get your answer in the.

Okay, Anna, will you share the results?

Ah, I think this is quite common. The greatest percentage is through a physician within your practice. So I think you'll be happy to hear today that we are going to talk about how to make connections with other hearing care professionals to try to get more people connected to your clinic.

Now I'd like to ask today's presenters to go ahead and introduce themselves. Doctor Hunter, would you like to start?

I guess where I'm at, it's good afternoon. My name is Jacob Hunter. I'm the otology neurotology division chief and cochlear implant program director up at Thomas Jefferson University in Philadelphia, Pennsylvania. Doctor Gifford, hi, everyone. I'm Renee Gifford.

I'm a professor of hearing and speech sciences at Vanderbilt University Medical center. I'm also a clinical audiologist and former director of the cochlear implant program here. Thank you. And I'll take a moment to introduce our final presenter. He's actually based in Australia, which means he couldn't be here with us live.

I hope he's having some really good rest right now. We will have a video clip from Doctor Philip Changdeh. He specializes in ear surgery in children and adults with training and interest in tympanomastoid surgery, cochlear implants and acoustic neuroma surgery. He serves as the clinical director for a pediatric cochlear implant program called the Shepherd center and an adult program called hearing implants Australia. All right, I'd like to kick off today's discussion by asking you a question, Doctor Hunter, what are some of the biggest challenges you encounter with getting the right cochlear implant candidates into your clinic?

Well, I mean, I think that's a question why we're all here to try to answer and I don't know if we're going to be able to provide that, the solution for everybody. And I think for every patient, that's a little different and for every practice that we work with, that's going to be a little different. Just like we should treat each patient individually. I think each practice and their struggles in getting those patients into our clinic differ. And so it kind of depends.

I mean, we'll get into this a little later in my discussion, but I approach my general ent partners in our practice differently and maybe a little aggressively to better educate them and when a candidate might be or a patient might be a candidate, whereas it's a little less aggressive depending on the relationship I have with the ENT in the community. And I don't. I mean, I am open to meeting anybody. I mean, I want to be that resource for the community audiologist as well. I utilize that regularly in my previous practice.

And so I think any ability to have a relationship enables a conversation to be had. And that conversation can potentially help a patient out to seek the needs that the patient has. And we'll go into that, and I'll talk about that a little later on. Some of the strategies that we've employed, at least to Thomas Jefferson, to be able to explain, or at least try to get that ideal patient in and maybe grease the wheels. This is actually a figure from just a hearing care approach out of a UK study, which I think is very applicable one to the entire hearing loss journey, but it's also very applicable to cochlear implants.

I mean, at the end of the day, we're trying to get patients in our offices that want to talk about cochlear implants. And I'm comfortable if that's just having a conversation about what is a cochlear implant, what's the rehabilitation process, what's the surgery to, okay, like, let's schedule surgery. What do we need to do to do that? What imaging studies do we need to do? What medical checks do we need to do?

Any discussion? But I recognize those patients getting in there, a number of barriers. And so what this study highlighted were the barriers across the entire hearing loss journey. It's gonna take a patient to understand that they might have some hearing loss or a family member that identifies that they have a hearing loss. And when we wanna get to the cochlear implant side of things, it has to take the patient who's willing to say, listen, the hearing aids aren't working in for me anymore.

I wanna talk to somebody about a cochlear implant. It takes the hearing healthcare provider, whether that's the audiologist, to recognize, listen, I don't know if I can aid them anymore. I wanna get them in front of somebody that can talk to them about a cochlear implant. And that might also speak to their I physician, whether that's their Ent or family practitioner, general practitioner, to be able to say, listen, these hearing aids are not meeting the demands that you need. We need you to talk to about somebody from a cochlear implant perspective.

And some patients are mean, like surgery might be the concern, age might be the concern, other medical issues might be the concern. Or they have colleagues or friends that find that the cochlear implants weren't beneficial for whatever the reason. So these various barriers come into play that realize or that lead to these patients kind of falling out of the pipeline, the leaky pipeline. So when in reality we talk about the barriers, the poor utilisation rate, I mean people are kind of being pulled off at various stages for various reasons. And when we think about that, what can we do to maybe better support those areas of leak?

So we'll talk about it a little. But educating that, the ENT, educating the community audiologist as to when might be a good time to consider a cochlear implant referral. What about like an age related issue? I think the oldest patient I've ever implanted is 97 years of age. I mean some providers are arguably, you could say, practicing maybe some outdated medicine to think that cochlear implants don't work.

I've heard this recently, that cochlear implants don't work in patients over 80 years of age. Yeah, there's literature 1015 years ago exploring such outcomes, but now that's kind of old hat. We recognize that's not an impediment anymore. It's something to talk about, but it doesn't mean that we can't proceed with surgery. I think we're all going to talk about this and I understand Doctor Chang will as well.

But what is the utilisation? I know Laura, you mentioned 10%. This is probably the most updated paper that Doctor Nasseri and Doctor Carlson published utilizing some data from, I think it was from idata research. And with idata research, they only looked at patients with just profound sensory neural hearing loss. They did not account for kind of residual hearing or SSD or potentially pediatric age.

And so they estimated that if we just considered old school qualification standards, just profound hearing loss, you're looking at a. I believe it was a 12.7% utilisation rate of cochlear implants. I mean there's some data that Donna Sarkin and Doctor Kurag Buchman published now ten years ago in 2014, that suggested that rate was six or 7%. But what doctor Nasir and Doctor Carlson did is they took data from the us census to estimate the percentage of patients that might actually have profound hearing loss in their poor hearing ear to account for those patients that might now be SSD candidates. Now that that is becoming more popular or commonly accepted with insurances.

What about residual hearing? Being able to provide patients the options of actually using both a hearing aid with a cochlear implant, an acoustic component, so that we're actually able to implant people maybe earlier on in their hearing loss journey and then the younger age population that we're

implanting. And so they came to an estimate of about the utilisation rate is 2.1%. I mean, at the end of the day, my research and my interpretation literature is geared focused on what can I do to improve patient counselling. And that's a very easy number to explain to patients.

That's a very easy number to talk to. My potential referrals to say, really, one out of every 50 cochlear implant candidates are actually getting a cochlear implant. What can we do to change that number? And I think Doctor Gifford is going to go ahead and talk about some of these similar barriers, but that goes back to that penetration, low utilisation. What I mentioned in that first slide that people are slipping through the cracks.

I think there's a number of impediments that patients have age, concerns about the surgery, concerns about the recovery process. And when I say concerns about the recovery process, the buy into the recovery process, I mean, this is not flipping a switch. We patched a hole. This is. I don't want to say no pain, no gain, but it does take some work to get some benefit out of that.

And I think it's part of our job to, um. To take down those barriers. I mean, it's easier when I'm talking to somebody about a brain tumor that I feel my priority is to talk them back from the ledge. But I think that same priority goes to when I'm talking about somebody with a cochlear implant. But this is something that we do regularly.

We do it multiple times per day, that multiple weeks per year. I mean, this is not something that happens just once for that patient. It's that one time, or if it's that other ear, it's that two time, second time. I can appreciate the concerns and the apprehension that they have, but it's relative. And trying to give them reassurance and comfort that, hey, listen, you're not old.

It's always great to tell an 80 year old individual that you're not old. Most of the time they don't hear that. To understand that that's not a contraindication to surgery. And I think that's the goal in trying to build

the referral networks, is trying to find those leaky spots in the pipeline to plug so we can increase the referrals, which is going to increase the utilisation. So I understand doctor Chang also speaks from the barriers from Australia.

So why did Laurie, you play this video from Doctor Chang? The big barriers were a delay in accessing a device. By time and quite often, our patients had been through six primary practitioners, four and a half audiologists, six hearing aids, two and a half ENT surgeons, and about eight years of delay before accessing a cochlear implant. We also had the tyranny of distance, that there was two standards of care. There was the care of the city metropolitan patient, which was significantly better than those of the country regional patients.

And that was another barrier, using outdated implant criteria, thinking that implantation was only for children, or profound hearing loss, or bilateral hearing loss, that implants could not be done in the context of previous ear operations or many ears disease. In other words, what you've all been saying about awareness. The other barrier was that we were using outdated means of assessment, that relying on assessment by a two dimensional audiogram with a touch of speech discrimination in the corner. But we know that assessments now are multidimensional, they're four dimensional. We look at functional listening, we look at quality of life, we look at a medical input that looks at the clinical scenarios of these patients like we do in children.

And the surgeon has the forethought to read the tea leaves of that patient's hearing and predict what is going to, what's going to happen in the future. And the last barrier was what we're going to talk about when it comes to remote care. That one of the limitations was us, was ourselves, were our own clinics, which were traditional, centralized, meaning all the patients needed to come to our clinics in the city, because those models were more self serving for the clinicians than serving for the patients we were caring for.

So you all can see that there are significant barriers to cochlear implantation all over the world. And many of the barriers are the same, whether someone is in the US or in Australia. And in order to learn more about the barriers, you can click on the link to the PubMed link to the article that was just posted in the chat and you can see learn more about specifically some barriers that were identified in Australia and the UK. So, Doctor Hunter, in the face of all of these barriers, what can someone do to grow a cochlear implant program?

So, good question. So, to give a little bit of background about me, I was actually originally, I trained at Vanderbilt University with Doctor Gifford, I guess now ten years ago, and got recruited to UT southwestern in Dallas, and was at UT southwestern in Dallas for seven years, where was already an established cochlear implant program. But being a former baseball player, I took the analogy of my job is to keep the rally going. That was my job at Vanderbilt as a fellow in my job at UT Southwestern. Get on first, move the runner over.

Let's keep things going. But I was recently recruited to Thomas Jefferson now about two years ago. I've been here for about 15 months with the goal of growing the cochlear implant program. We are in a different playing field, so to speak, than Vanderbilt and UT Southwestern. So it provided a new set of challenges.

I mean, we're not talking several hundred implants per year. We're talking from a program that was traditionally doing somewhere between 20 and 30 a year. And so that has been a big challenge in charge for my new position, to be able to turn a Thomas Jefferson, to turn this region into a busier cochlear implant program than what I was familiar with both at UT Southwestern at Vanderbilt. And I think what I echo here, state here, is your experiences shape who I am. So I got to see Doctor Gifford and doctor Haynes and understanding the growth there and what doctor Roland had done in UT southwestern and grow from that.

But then now I'm kind of in a unique position where we're not these, I don't want to say large behemoths as a negative, that we have a little bit more flexibility and ability to kind of maneuver things on a small scale before we ramp things up. And so let me advance. At the end of the day, everyone is here. I mean, we can look at it a couple different ways. At the end of our day, my job, specifically, my job is to improve the quality life of my patients.

But big picture here is we want more people using cochlear implants and to do more cochlear implants. We want program growth. We want to have larger programs. I've always struggled with. I struggled this with in Dallas, is like, why can't an audiologist?

Why can't audiologists screen everybody? Well, that's not realistic. I mean, we people are cutting back on post activation visits to get more patients in, but you're not going to be able to identify a patient if you don't screen. On the flip side, we don't want to be qualifying 100% of patients because we're nothing. We're not sensitive.

We're maybe being overly sensitive. We want people to come in. And so what I felt comfortable what we had at UT Southwestern, and I know Doctor Gifford and Doctor Holder, I think, published something very similar, was that for every four patients that we would see, three would qualify. And for every three that would qualify, two would pursue surgery and to be perfectly honest, I don't know if that's the right number. I don't know if that's too little or too much for us at that time, it made sense.

And we have a very similar number here at Jefferson. But again, we want to maximize the efficiency of those people coming in. But at the end of the day, we can't screen everybody. But on the flip side, if we don't screen anybody, we're not going to implant everybody. What can we do to improve upon that?

And that goes back to, I mean, I've literally had a partner under the impression that cochlear implants were eight channel electrodes that don't work in people over 80 years of age. So some of this is trying

to correct outdated information. And when I say it's correct outdated information, I'm not doing my job, or we are not doing our jobs as hearing healthcare providers to be able to provide that information to that provider. I mean, it's not the patient's fault that they didn't understand what I was telling them. Maybe I didn't do my job to accurately convey that information to the patient.

And so one of the first couple things that we did right when I came on board is we actually created a position so that we had an administrator specifically for the cochlear implant program. We had one in Dallas. And that enabled us to carry on a sports analogy, was maybe a point guard for the patient that helped the patient understand why are they seeing the audiologist? What are they going to be talking about with the surgeon? If we wanted to reach out with consumer specialists, help facilitating those conversations with the consumer specialists, what imaging studies they might need, or if they needed any surgery clearance visits before again, being that point guard, being that resource, to be able to help them through the process.

We also hired and promoted an audiologist to be the clinical coordinator to help to revamp our evaluation process. Our process coming in our post activation. We participated in the program efficiency course through the Institute of Cochlear Implant Training. And then we wanted to improve our care delivery model. As doctor Chang emphasized or showed, there was a significant delay from a patient calling the office.

And to be able to see a surgeon and audiologist, that wait time was three months and we felt that was inappropriate. So what we ended up doing, and we had the great fortune to be able to work with Sonova advanced Bionics parent company, who actually allowed us to borrow, I don't know what's a better term, the executive vice president of continuous improvement. And so we actually went through and broke down every single step it took for a patient to or a provider to call the office and ask that their patient be evaluated or they wanted to be evaluated for a cochlear implant and then understand that

process literally from beginning to end. I remember a project when I was in elementary school to write, like, how do you make a peanut butter sandwich? And you had to go into such detail to understand, like opening the drawer, pulling up the knife.

We wanted to look at every single decision making process. And while the details of this aren't important, the idea is that it is a complex process. Understanding the various people that are part of that role and some redundancy on that and understanding where potentially going back to that, a very original slide, where can people fall out? And so we highlighted a couple key areas in this entire process that we highlight in these yellow, I don't know how to describe it, yellow splash yellow, excitement areas where we felt that there were key areas that we could significantly cut down on the time. And understanding that these are the key areas, these are maybe key performance indicators to see if the new process is working.

As we saw, we actually targeted target is the keyword there. We wanted people to be. Within two weeks, somebody would call to be able to see a surgeon or audiologist. We're a unique setup. I don't know if it's so unique, but we have several different sites where you can do a CI evaluation, but only three sites where you're able to see a surgeon.

So that gives us some flexibility in terms of maybe having an evaluation at one site and maybe meeting with the surgeon via telehealth or in person at another site. But given those seven sites, we actually can't necessarily. Overall, we're not meeting our two week target, but now we have an understanding of why we're not able to. So in that process, as I said, we're able to track some metrics and some key performance indicators. What we were doing is understanding what the wait time was to that evaluation.

We get a weekly update on our availability in those weekly slots. How often are they filled? This actually provides great feedback to audiology on hearing aid fittings and diagnostics because if we're not filling

those, those slots, why are we not filling those slots? I mean, are we not reaching that population in that community? And then if we're not filling them, how can we maybe make the audiologist, how can we better make their time more efficient for the overall program in total?

But one surprising thing we came across was the booth availability. So bottlenecks so the way the scheduling process was set up, to be able to do an evaluation and be able to reserve the booth time, it required, like, like three planets had to be in. In phase to be able to line this up. And that was just did not make any sense. So we revamped the scheduling process so that it simplified it so that essentially, if a patient came in, we had booth availability, it wasn't being taken for a hearing aid or diagnostics.

And that, that was extremely. Well, it was extremely powerful for us to identify. It is still a problem moving forward, however, understanding a bottleneck or the wait time was delayed at one site. We ended up then bringing in a portable audiometer. So for patients that we don't need high, like somebody that might come in with some ear pain, we might get them a portable audiometer, freeing up the booth space to do a cochlear implant evaluation to meet our two week metric.

The other thing that we've been able to identify, I think it's. I mean, I don't want to say it's unique, but the potential continuation of patients with Phonak hearing aid technology and the understanding of, like, listen, you could still partner your Phonak hearing aid with your a to b device moving forward. And I mean, I know there's been studies in the past looking at patient device selection. We are a site that leaves it up to the patient to decide to. But I think that it can be a barrier.

But I also. I mean, playing chutes and ladders with my kids, I mean, maybe it's also a ladder in some respects, being able to help facilitate patients that they. But you don't necessarily need to get a whole new computer, new technology that you're still going to be working with, some familiarity with a company that you've worked before. And I think that can be powerful for some patients because I think it can be a barrier to some, but as I said, it could be so a shoot to some, but it could be a lot ladder for

others. But this deep dive, which we called it a deep dive, a Kaizen event, allowed us to better understand our process from beginning to end.

Getting these people in, being able to help the referring providers with their patients, I think that speaks to at least my angle to this portion of the talk, and I'll wrap up shortly at the end of the day, building a practice, building a relationship. We want to be affable, we want to be available, and we need to be able. And so, I mean, I was raised, and this is really enforced to me when I was at Vanderbilt. But also the way I was raised is to treat others as I wish to be treated. And I want to convey that to the referring provider, whether that's a surgeon or an audiologist, that I would treat that individuals if it were my parent or if it were my wife or my kid.

And while this might seem old school, I actually think it still means a lot to a number of and referring physicians, being responsive, being able to say, like, I got your patients back, I got your back. Let me know how I can help. And so I came to Jefferson telling, I think everyone, including the implant companies, that I want to meet every single patient or every single audiology provider, every single ent within a. And you can remind, I came from Dallas in a three hour radius, and everybody said, no, you don't need to go 3 hours outside of Philadelphia. And while we technically haven't met everybody, I want to be able to put a face to my name, being able to say, like, listen, we are available for your patients.

And so advanced bionics was very helpful with that. So we've had patient education events where we'll have patients come in, either candidates considering surgery or patients who have already had surgery, that just, I mean, listen, honestly, we could talk about cochlear implants all day, talk about cochlear implants. And so that has been beneficial. We've had our consumer specialists help with that. And then we've also had a number of professional development.

They're really just dinners where we're there to get to know the referring practices and for them to get to know us, that we are here to help. We want to be able to help your patients, we want to be able to improve their quality of life. And while sometimes that one conversation leads to maybe we have yet to see a cochlear implant referral, and sometimes that means I. And a referral is a key point there. This is a hearing loss journey.

I don't have a problem saying, like, maybe this is maybe one, not a candidate, or if they are a candidate, maybe right now is not the best time for implanting the patient. Maybe we need to wait a little longer in their hearing loss journey. It's being able to support that relationship, develop that relationship, not only with the patient, but with these referring groups, the potential sources of these patients, so that the next time a patient comes through and they're not sure what to do, that they think of us, to be able to support that continuity of care for them. And then lastly, and it's a little delayed here, and this is going into Doctor Gifford's slides, trying to, I guess, build that relationship so that they buy into what we are offering the patients in our community. While the process isn't perfect, we have still some patients that come in that don't have a CI evaluation scheduled.

It's going back and following up with that physician. Hey, we can make it simpler to save them 2 hours. We can get them in the same day or not the same day. We can do the evaluation with the surgeon visit the same day, minimizing the impediment or the barrier for that patient to maybe come back. Because we've seen that situation where they don't have the evaluation, they drive 2 hours back home.

And it's just that barrier to get them back in to further that process up. But advanced bionics has been helpful with that, with our patient education events as well as the professional development events, and help fostering those relationships. But it's a work in progress. We're doing a second Kaizen event. I think we're planning for January to go back and see what we're doing and see what we can further improve upon.

Again, emphasizing this is continuous improvement. Thank you, Doctor Hunter. Gonna back up and just wanted to say something else on this slide real quickly. As doctor Hunter mentioned, it's so important to get the right candidates into the clinic for CI candidacy. This starts with education on the criteria.

And ultimately, as he mentioned, you don't want to have only CI candidates in the clinic, but having a higher percentage of CI candidates in your clinic getting those evaluated will improve the efficiency of the clinic. And I'd like to go ahead and share another polling question before we hand things over to Doctor Gifford. So this polling question is what type of support from AB is more important to your clinic at this time? So two of the things that Doctor Hunter mentioned are patient education and professional development. And potentially including education for non CI hearing care professionals.

So I'll give you just a moment to answer that poll. I'll also let you know that we have an opportunity to take some of your questions in just a moment. So if you have any question you'd like for us to ask before we move into learning from Doctor Gifford, then you can go ahead and type that in the chat as well.

Oh, wow. We have a big split. So 52% of you said patient education, 48% of you said professional development. And I think that speaks to the importance of doing both. And at AB, we do have staff that will help you in both of these areas.

So please reach out to your regional representatives to see how AB can support you in both of these really big tasks. Doctor Hunter, I wanted to ask you a question that came in the chat. You mentioned that for every three patients seen who qualify for a CI, two of them pursued surgery. Of those patients who did qualify, but didn't pursue their CI, what were the primary reasons that they didn't take the step to pursue it? No.

Thank you for the question. We actually published this three or four years ago. I think we presented it at ACI 2020 or 2021. Arguably the biggest reason, and there were a number of reasons. They were worried about their work, they were worried about surgery, but the biggest reason is they weren't confident on the outcome that they were going to get.

They didn't know what they were going to do yet. The unknown. I mean, it's one thing to try hearing aid out, and you know what the benefit is? It's another thing to go under. You put the implant in, and then what's going to happen three months later?

And so it was the unknown. And going back to what I said, a lot of my research motivates me to better improve counselling. And so, in trying to better coach patients to understand what might be the expected outcome, obviously, we can't predict the future, but the biggest issue was they just weren't sure what the outcome was going to be. And would that impact their current status? Mainly, these were patients.

I mean, these were patients of all ages, retirees, and still in the workforce. But would that impact their ability to work or communicate with others? Interestingly enough, like. Like, I think it was like 95% ended up getting a cochlear implant on a later date. It's just.

It's part of the hearing loss journey. And maybe right then and there, for that patient, it wasn't the right time, but, I mean, I got to imagine in the lifetime of a patient and the hearing loss of journey of a patient. I mean, eventually they might come around. I mean, the hearing gets worse. Whatever the barrier that is impeding them, it gets shorter or becomes non existent.

Thank you. All right, Doctor Gifford, I'd like to ask you a question. Sure. I know that there are a number. I mean, there's been a lot of work conducted at Vanderbilt related to clinical efficiency.

So why do you think it's important to talk about clinical efficiency? Yeah, so that's a great question. I think it's important because I've experienced the result of our ability to actually work on our clinical efficiency and improve that. And we got to see that in real time. We were able to double our cochlear implant program numbers within four years.

It's really exciting. So I'm going to give you a little bit of a backstory of how we did it and how we continue to try to maintain that momentum. To keep with the sports analogies, Doctor Hunter teed me up perfectly. So you all were familiar with, of course, the underutilisation of cochlear implants, particularly globally, but especially also in the United States. The data are kind of all over the place.

On the adult side, it ranges anywhere from 2% up to almost 13% utilisation. But really what that means is that we're missing 87% or more of those that are candidates for cochlear implant are not pursuing this technology, and that's just not acceptable. On the pediatric side of things, it's a little bit better, but still not great. So if you look at children born with severe to profound hearing loss, anywhere from 50% to 59% roughly, will get at least one cochlear implant. In the US, in contrast, for example, if you look across the UK, Sweden and Germany, those numbers are much higher, closer to 90% or higher, and in Australia, it's closer to 97%.

And as Doctor Hunter indicated, it's not 100% due to insurance. There are other barriers that we know of and are well documented in the literature, as well as anecdotally from a clinical perspective. So undoubtedly the largest barrier is awareness. And of course, awareness is not just amongst our professionals, it's amongst the public. I always think about years ago, I used to tell people I worked with cochlear implants, and for years people would say, what's a cochlear implant?

It was really shocking to me that it's really the only neuroprosthetic that restores a sense, a human sense, and it's extremely effective, but it's just nothing widespread in terms of its knowledge. So the awareness is an issue and we are working on that, of course, as a field and collectively, of course, the

other issue is that there are varied and overlapping indications. Like Doctor Chang said, you could get one set of indications if you go to one clinic, because they may be working from, say, outdated indications, or they might be using a specific test material that may be easier or perhaps more difficult. And that creates some confusion, not only amongst patients, but it creates confusion amongst providers as well. Another issue, of course, is like, what is the defined care pathway?

So if you're a person, you're sitting there, you recognize that you have a pretty severe hearing loss and you know that, you know, you've tried hearing aids, but yet you need to pursue the next step. Who do you see first? Do you need to see your primary care physician? Perhaps sometimes, depending on your insurance. Do you go to an audiologist first?

Do you go to a neurotologist? Like the. It's not clear. Some people might just. You know, you're at Costco, you see the hearing aid section.

Free hearing test. I would be thrilled. Yes, please get a free hearing test, because we are all working together as a field to really get this awareness and really just start to identify that there are multiple entry points. But we probably could do better if we kind of identify, like, the most logical and most efficient entry point. Of course, insurance and finances are an issue, although, interestingly, not necessarily the prone primary issue.

Not even in the United States, where we don't have a national healthcare system, access to CI clinics. Doctor Chang mentioned that, you know, we know that in cities, you're going to have multiple options. But, for example, in the state of Tennessee, we're essentially 400 miles long, over 7 million people, and most of the individuals living in the state live in relatively rural areas. We really only have four major cities here, and Vanderbilt really sees a. The overwhelming majority of the state's patients.

And then, finally, as Doctor Hunter teed me up perfectly, the outcome uncertainty. You know, if you go into an orthopedic and you need a hip replacement, they're going to be able to give you with relative accuracy where you're going to be in terms of mobility at one week, two weeks, and so forth. Unfortunately, we're not quite there. With cochlear implants, we can say with confidence that patients will improve in terms of their hearing detection, their ability to understand speech and noise. It'll help and aid visual cues, because, of course, speech is multisensory.

But we're not at a point where we can say, you're at 20% today, and given your etiology, your age, and all of these things, we expect that you'll be able to reach 80% by three months. We can't do that, but we are, as a field, working collectively toward that. So we have a number of barriers that we need to overcome. I want to give you a little bit of detail about Vanderbilt, where we started from, and how we were able to quickly double our cochlear implant program numbers. I arrived in December of 2010, so I'm only going to be able to present data from 2011 on, because that's all I have access to.

And what we're looking at here is we got the number of cochlear implant surgeries as a function of the calendar year on the x axis. I do want to point out that the average cochlear implant program in the United States is approximately 25 devices per year. So that's the example here. But our program, when I got here, we were close to about 150. We kind of watched and weighed it for a while, and then we got very active and intentional in 2015.

And then over the course of basically a four year period, we were able to double our programs. So if you look at here, if we add a regression line there, you can see that kind of like what we would expect that trajectory would be in terms of our growth going forward. And while we had a nice big jump from 2015 to 2019, the slope of that function is still relatively shallow, despite the fact that we've seen expanded indications. So we know that, for example, even Medicare a couple of years ago expanded the indications from 40%, sentence recognition up to 60%. We also know that there's approximately

60,000 new cases of single sided deafness every year.

And so that's alone a different indication. And there are literally millions of Americans who are presumably eas or hybrid cochlear implant candidates. And, of course, all three of the cochlear implant manufacturers have an EAS hybrid system. And, and additionally, we know from the World Health Organization estimates that the prevalence of hearing loss is increasing. It's not just because hearing loss is becoming more prevalent necessarily, but we're seeing increased age lifespans.

We're seeing an aging of the global population. And, of course, we know the consequence of that is going to be a larger population of individuals with hearing loss. In fact, we're expecting the number of individuals globally with hearing loss to essentially double by 2050. So we've got a lot of work to do. So I want to point out that here we are, and if I look about ten years ago, I'm going to 2013, because we don't have 2024 numbers quite yet.

We were at 180 devices. And then if we look at last year, we were able to reach just over 350. So roughly, we. So we essentially doubled our program from when I got here over about a four year period quickly. But if we look from ten years ago, we definitely have doubled the program kind of again.

So we're going from about 180 to almost 360. Now, let's think about moving forward in time. So we were able to double the program actually pretty rapidly, but for sure over a decade. But now let's think about this for the long term. So now we have a condensed region over here and our calendar year now goes out to 2056.

So if we were to extend our regression line, which is our proposed trajectory, we're on track to double the program again in over 30 years. So we're not really doing a great job of getting our patients in and keeping that momentum going. How in the world can we expedite this growth? What are we going to do? I can tell you from our experience how we handled this.

And first of all, I want to also point out that we do know from a number of research projects, this one also by Doctor Ashley Nasiri and colleagues, that over 90% of our patients are going to be coming within about a 200 miles radius. And that's across a number of these large medical centers. And cochlear implant programs are in fact increasing in size over time. In fact, the research has shown that these centers increased by on average 43% over a six year period. The issue of course is we're still so behind that we're going to have to accelerate our growth if we're going to even make a dent in those utilisation numbers.

And so to do this, we've got to start thinking about satellite locations. As Doctor Hunter indicated, they have seven locations and now their goal is to get people in within two weeks. We have telehealth and remote programming options, which we'll talk about a little bit more in a moment. And then of course we have to optimize the care delivery process. And that's the section I'm going to be focusing on for the next five or seven minutes.

So first of all, let's talk about stages of change. There's an entire behavioral science field associated with change and behavioral modification toward change. And this is a diagram and model that was originally proposed in 1983. That is still a theory that is active in that field. And they've identified that there are five known stages of change.

The first stage, of course, is just the pre contemplation where you're thinking about it. And so that is where you have your staff, your faculty, your entire team maybe thinking and talking through like, okay, are we in a position where we feel we need to change? And then if so, moving forward to the contemplation stage, what is it going to take to make that change then for preparation? And then of course you need to act on that preparation. But a big part of this is the maintenance and this is the part that we're actively involved in right now and why we're active in this maintenance period is that we were able to get through the first four stages of change rather quickly with our team here.

So I want to point out that here at Vanderbilt in 2011, when I started my clinical practice here, we were seeing adults about six to seven times in the first year, including a two day activation. So they were still doing two day just 14 years ago, 1314 years ago. And our pediatric population, we were seeing them about eight times a year within the first year. Now, I do want to point out that this schedule was not outrageous in any way. In fact, the American Academy of Audiology in 2019 put out a recommendation for the follow up schedule, which was based in the literature.

And so they used the information they had available to them at that time, in addition to clinical consensus and anecdotal information. So this is consistent. The problem, however, with this is that if we are seeing every single one of our patients seven or eight times in a year, we only have so many bodies that we can have. We have so many booths, we only have so many resources. So what we decided in late 2015, early 2016, we had to really do the action phase.

So we were working toward that. The reason we had to is we lost two of our cochlear implant surgeons and three of our cochlear implant audiologists over the course of about four months. Completely unrelated, many people going in different directions, getting promotions, moving back home. But it really was unfortunate from a timing standpoint. So I recall being at ACIA 2016 and our clinical coordinator emailing me saying, our first available for a workup is over nine months away.

And, you know, panic. Right? Like, how in the world are we going to do this? And so our team, I really credit them, we dug into our database, we pulled our scientific information, and we made a. Yeah, data driven decision to start with three to four visits for the first year in adults and four to five in children.

And why did we come up with that particular number? So, at the time, what we did was we have a very comprehensive database that includes every one of our cochlear implant patients here across the lifespan. We started on the adult side, because, of course, adults are usually easier to start, and we

have less concern, of course, because we're nothing, typically acquiring speech and language through the device like we are on the pediatric side. But we pulled all of our adult data, and we pulled everyone who was 18 years or older at the time of implantation. They all had to have a detection in the range of 20 to 30 dbhl.

That's part of our protocol from activation. So every one of our patients is supposed to be there. Also, part of our protocol is that we obtain electrolyte stapedial reflex thresholds, or efforts, by the one month appointment. And that's to shape, of course, the over the upper stimulation level profile. And then, of course, we do.

We're lucky here that we have a CT imaging and three dimensional reconstruction software we call Otopilot, and it gives us information about electrode location for every single one of our patients. It's available to our entire audiology and otology team. And so we have that information. And so all of those, we then wanted to make sure we saw people that we had seen for every visit at activation one, three and six months. And that gave us a sample of 171 adults in 178 years.

Now, if you look at that, we plotted their data. Each individual line is a patient, and then we have the means, n plus minus one standard deviation. What you can see, of course, is we see a significant bump from pre op to one month, of course, that we would expect that we see another boost from one month to three months. But what we did not see is any additional improvement thereafter, at least at the group level. So what we did with this information was we made the decision initially to just cut out the three month appointment.

Obviously, we could have chosen the six month. We made a decision that three months was the most likely because more people were no showing their three month appointment as compared to the six month appointment. Now, by doing this, we instituted this in late 2015, but really got aggressive in 2016 because of our backlog. And we saw that we went from 161 devices placed in 2015 to over 300 in

2019. And then we were able to get up to almost 360 last year.

So by doing this, what we're saying is we're going to be following best practices to fit our patients and try to ensure that we have optimized their audibility across the spectrum, important for speech and music perception. And from that point forward, we're going to trust the data and trust the process. And by kind of letting our patients go and kind of do things on their own and allowing them to interact and be more of an advocate for themselves, that frees our time so that we can spend more of our clinical time with the patients who really have complex needs and absolutely are need of our expertise. So moving forward, I just am showing individual data from that paper here. And the bottom line was that even if we didn't see individuals at the three month or, and, or the six month time point, we wouldn't have necessarily missed many or really hardly any patients who would have actually shown a decrement in performance in that time.

So everyone is maintaining performance, or as those who are seeing these blue dots are, they're actually showing individually significant improvement over time. So, as we said, cochlear implants, we know cochlear implants are effective. We're not at a position in 2024 in saying that we need to see people back ten times because we're not 100% sure of, is this even efficacious? We're not there anymore. We know best practices.

We know how to get our patients the auditory access that they need. And by doing that and then empowering our patients, again, that's going to allow us to grow our program as quickly as possible. So let's thinking about the different stages of behavior change. We're active in the maintenance phase now because, again, we're seeing that if we continue to do things like we're doing them today, it's going to take us 30 years to get another doubling of our perform our program. So what we need to do, you have to outline, what are your goals for your program?

Are you in your team? Are you interested in building a destination center, or do you just want to simply grow the practice? Do you want to streamline the onboarding of your patients, so increasing the efficiency of the clinical coordinators and the program managers? Do we want to improve our processes inside, outside the operating room, within our scheduling? Do we want to streamline processes to provide, for example, bundled payments, meaning that you have a single payment for a single episode of care, which would be, for example, the cochlear implant, and, of course, the prevalence of app based programming and telehealth.

And, of course, AV's use of the remote programming has been a game changer. Of course, we have learned that there are some additional barriers associated with it at large medical centers and dealing with protected health information as well as billing. So we are still learning. We're learning and growing every single day as a team. And I think the key is to sit with your team and outline what your goals are.

Laurie, do you want me to turn it over to you right now to ask some questions, or are there any questions out there?

None have come through for you yet, so you can go ahead and keep going. Thank you. All right, I'll keep going. So. So where are we today?

So we. Today, right now, we are. We have a goal, and it's a goal. It's not for everyone. We're trying to see our patients about three times adults in the first year.

We're doing activation and one month, by one month, we should have, we should have a map set with efforts to shape the upper stim profile as well as aid at detection in the range of 20 to 30. And then from there, our goal is we'll see you at twelve months. Provided that everything is going smoothly, how are we going to ensure that we're going to utilize public, you know, remote telehealth at the three and or six month visits? We're going to be utilizing greater communication with our patients through the use of

audiology techs. But the goal is that we don't want to miss anyone.

We want to make sure that if someone really needs our services, additional programming, we'll bring them back. For those three and six months, it's not going to be something where we're going to miss these patients. Then from 2018 on, pediatrics, we of course removed the two day activations long ago, got rid of the one week. We are now considering the three month optional for children as well. And in fact, we're thinking about potentially offering that and the six month in conjunction with a speech language pathologist or ABT, and doing that remotely for those that feel that the child's making month for month progress.

Ultimately, we would love to see us go to two visits in the first year. You know, we love our patients. We want to see them back. But do we need to see them back, or are we basing that on an outdated clinical model? So our goal is to aim toward activation.

One month remote programming thereafter. We might even suggest biennial follow up after that. Do we really actually need to see them yearly if everything's going well? So we're going to be able to utilize the forthcoming tools by advanced bionics, for example, assessing our patient's performance. How are they doing?

We'll get that information from an app. And what that's going to do, it's going to open up hundreds of new evaluation slots for our audiology team. Moving on. And then, of course, our adults, our children were moving to the remote with an SLP and moving on. Weird animation.

It's a little bit slow. Okay, so the future of clinical care delivery, we know we have to evolve. We also know, and I raised my hand here, as an audiologist, we are the primary bottleneck right now. It's not the surgeons. So how are we going to make these changes as part of the behavior change and then continue to maintain?

We have to start considering things a lot more remote programming, a lot more of those remote telehealth options. We do have to consider, however, are you at a hospital system or are you in a professional billing situation? There are differences with respect to the billing and the reimbursement. And of course, there's state differences as well. License.

Like for example, if you're in New York City, there's a very strong likelihood that a lot of your patients are living in New Jersey, Connecticut and elsewhere. So you do need to be licensed in the state where the patient happens to be. Of course, you have to select your patients. You might have an 88 year old who doesn't even have a smartphone. Probably not the best person to start with your remote programming.

So we really do have to look at these things on an individual basis. And then living in Tennessee, honestly, outside of the large metropolitan areas, our cell phone service is not the greatest. And so does the patient have Wi Fi? Because this is something that is a big deal and we have to consider these things. So we're actively working toward that.

We want to bring our clinical care model into the 21st century. And with that, I will turn things over to Laurie.

Great. Thank you. Before we continue on with this webinar, I have a final question for our presenters. But I also want to mention that if you enjoyed learning from Doctor Gifford on the topic of clinical efficiencies, we will be hosting a 1 hour webinar with her on Thursday, November 7 at 09:00 a.m. Pacific.

And you can be one of the first to register for this event. So we'll put the link in the chat that you can access. You can go on in and register for that webinar. To learn more from Doctor Gifford, I do want to

mention before we wrap up today that AB has a number of resources and we are here to help you by working with hearing care providers to educate them about cochlear implants and their candidacy criteria, which should help them get the right patients into your clinics. We also have a b staff that will work with CI candidates and they are happy to help answer your candidates questions and also provide them with support.

So be sure to connect with your regional team to discuss how they can best support you and the specific needs you have in your clinic. Now for the final question from me. Will each of you share? We're at the top of the hour, so let's keep it to one action that clinics can take to be more efficient and to better serve their patients. Doctor Hunter, I think it's a heavy investment, at least on the time.

But it was a eye opening experience for the entire team to map out our process to get patients in it was shocking. And I recognize that took build in for a couple weeks and maybe 3 hours over a day, but I'll never forget it. And I think most of our team would never forget it. It was just eye opening to really understand you. Look, you're looking under the hood and realizing what's working and what's not working, but.

Gifford. Yeah. So I think that the best thing that each team can do, and I'm going to speak from the audiology perspective, is to look at your current protocol for postoperative care and then compare what your patient's performance looks like for your clinic. Look at your clinic norms and don't take my word for it. Look at the data.

Use the data to inform your processes. And I highly recommend to start trimming those appointments down. And that's going to dramatically expand your ability to bring in more people to start. But we have to continuously reevaluate.

Thank you.

Thank you. To everyone who attended today's session. Please use the QR code or the link you see here on the screen to complete a short survey about today's webinar. It's only two required questions, so I would guess that you can complete it in 1 minute or less. So if you can either use the QR code with your cell phone or use the link that was just placed in the chat, it's the one that is forms and so on, and that will take you to the survey.

I also want to mention that during this presentation, it made a lot of sense that we received quite a few questions about the candidacy and evaluation process. So I will encourage you to join us for our next webinar, which is next Thursday, September 12. The topic will be candidacy and evaluation, and I will have more of your peers here as guest presenters. We have Heather Strader, Molly Smeal, and Katie sheets. I'll also go ahead and put the registration page in the chat.

So if you haven't registered for next week's webinar or any of the others, we do have five total. Feel free to go ahead and go in and register to learn more then. Finally, Doctor Hunter mentioned this early in today's webinar, the Institute for Cochlear Implant Training has a lot of training opportunities for individuals who are working with cochlear implant recipients. You can see here there are a number of courses that are also available internationally, and Doctor Hunter mentioned the learnings that he obtained from the CI clinic efficiency course, and there are a number of other courses available as well. We will put the link in the chat to the ICT program so that you can learn more.

And then I'd like to wrap up today by once again saying thank you for attending today's webinar. We know your clinic schedules are so very busy. We appreciate your time. Have a great rest of the day, and I look forward to seeing you next week. Thank you.

And thank you so much, Doctor Gifford and Doctor Hunter.