Get Connected: The Benefits of Data-Transfer and Computer-Based Audiological Equipment

Presenter: Clayton Fisher, M.Cl.Sc

- Welcome, everybody, and thank you very much for being with us even today. It is a real pleasure for me and for Inventis Academia to have all of you here today for this last appointment with Inventis Academia before the summer break. So, webinar title, get connected, "The Benefits of data transfer and computer-based audiological equipment," webinar speaker Clayton, Clayton Fisher. Clayton is a clinical audiologist, audiology consultant, and owner of Treat Hearing, and in my opinion, a real ear hero. Clayton releases periodic clinical video tutorials on his YouTube channel, which I highly recommend that you watch. Thank you very much, Clayton, for accepting our invitation.

- You're welcome.

- So during this talk, Clayton describes how using computer-based audiological equipment can revolutionize the patient experience as well as your clinical workflow. As usual, I strongly invite all of you to write down any questions in the space provided that you should see on the screen. After the event, you will receive a survey. I kindly ask you to fill out it. The survey will help us to understand your needs, to get your ideas in order to provide the best educational support ever. Clayton, it's your turn now. Enjoy the webinar.

- Thanks, Anna. Okay, so I figured I'd start out by just talking a little bit about myself. First of all, as Anna mentioned, I am a clinical audiologist and I'm in the clinic every day doing assessments, doing treatment. So what qualifies me to do the webinar today on sort of getting gear connected? Well, I've worked in various hearing clinics where I have helped them update their equipment so that clinicians can do their job better and more easily. In particular, I've helped transition one chain of clinics from completely on paper to completely paperless using some existing gear and some new gear, and I also helped another chain of clinics that I worked for before then, go from sort of a manual

entry system of audiometric data to data transfer and using all existing equipment, which was pretty exciting at the time.

So I guess what makes me different is that, well, not from everyone, but, you know, what I find challenging and fun, other clinicians sometimes find annoying or uncomfortable, so I'm happy to share some of my experiences with you today. I have a YouTube channel that is dedicated to audiology best practices, and instruction and education. So far, if you've watched any of this, most of the content has focused on the treatment side, so specifically treatment with hearing aids, specifically best practices in that area, which is real ear measurements. I've said a whole heck of a lot about that, and I think it's because that directly affects patient outcomes, so that was kind of most important to me, but now that I've said most of what I wanna say on that topic, I'm so happy to be talking today about the assessment side and what we can do to make our lives easier and improve the patient experience.

On that note, yesterday I did release a video on PC-based audiometry, specifically using the Inventis Cello, which is the audiometer I'm currently using, so I encourage you to check that out if you're thinking about going that route or updating your equipment. So the reason why I left the assessment side for so long is because, like, we do a pretty good job of getting an accurate hearing test. Most people do, okay? But what I have found is that improvements in workflow can also improve, well, they can greatly improve accuracy, but also improve the patient experience. So they're definitely connected, so it's worth talking about. Okay, so here's an interesting quote that when I was just doing a little bit of research, trying to figure out, okay, like how long has this stuff been around, came across this article in the "Hearing Review," and this quote says, "As intimidating as it might be or seem to transition to PC-based audiometry, the technical benefits are quickly outweighing clinicians' hesitations."

This from was from 2010, and the question is, is that actually true? I'm not sure. I don't really have the data on it, but from my experience, I think clinicians still have quite a few hesitations. So why are we here today? I know a lot of people have embraced like a connected audiology experience, but there are still many that have not, okay? So that talk is sort of mostly for you, but also for everyone. There's a lot of people still doing paper audiograms, perhaps you're one of them. In my opinion, that's a problem, and we'll get into why. Many people don't optimize their gear, and today, I'd like to show you why you should or perhaps why you must do that.

And I know change is often unwelcome, and the same goes for me, but of course, with change comes opportunity, so I'm hoping today that you walk away from this feeling encouraged to get started. All right, our goals for today are specific learning outcomes. The first thing is I would like you to understand the benefits of establishing a connection of your equipment with your computer for clinical workflow and precision. I would also like you to understand the benefits of doing that for the patient experience, okay? And I really do think that those two are sort of equally important. And then, I would like you to understand the methods of achieving this and sort of how we get there, okay?

So just a quick outline for today, part one, we're basically just gonna get into some context and some background. We're gonna talk about some terminology, we're gonna talk about different gear types, we are gonna talk about the benefits, and we're gonna get into a little bit about the history on the topic and maybe why there's some reluctance from clinicians to go there. In part two, we are going to compare and contrast, and look at the two different methods. We're gonna walk through an assessment the old way and we're gonna walk through it the new way, and you can decide which you feel is superior, both for you and for your patient. So my assumption's today is that if you are participating, you fall into one of these three categories.

The first is that maybe you are using traditional testing methods, okay? You're doing a paper audiogram, you have a standalone audiometer. Maybe you have the ability to connect your audiometer, but you're not using it for whatever reason. There could be a variety of reasons for that. Maybe you're not sure if your audiometer can connect or your tympanometer can connect, or maybe you have a connected setup and you're using it, but you're wondering how you could optimize that and use it perhaps even more or even better. All right, part one, let's get into some context and some background. So I'll just quickly describe a typical setup. Most people, I'm assuming here, are, I mean, from either a hearing clinic, hearing aid clinic, you know, private practice or perhaps a hospital or something, so most people in that situation will use Noah as a database, okay?

So within the Noah database, what you would do is use the equipment manufacturer software, which is a module from within Noah, okay? So your data is transferred to that module or it's recorded in that module, the equipment manufacturer's Noah module. So examples of this, you know, would be Maestro, which is from Inventis, GSI-Suite, which is obviously GSI, Otosuite, which is Natus/Otometrics, or Interacoustics Suite, and on and on and on and on. There's many equipment manufacturers out there now. So when you save in Noah or when you save in the manufacturer software, it saves in the Noah database. If you look at my somewhat rudimentary diagram on the side, most of the time, this is a wired connection, USB or a serial cable, to the computer and to Noah and the module working within that.

Just a quick note, okay? It is possible to manually enter data into Noah, okay? So some clinics just have a computer in the test room, and essentially, instead of recording it on paper, what you're doing is you're recording it in the basic audiogram, Noah 4 Audiogram module, rather than writing it out on paper, okay? It's important to note that you can enter your tymp data and your speech data in the same way, right

into Noah, as opposed to entering it on a paper audiogram. And from Noah, you could either print to PDF, or you could print to paper and scan it into your OMS. We're gonna talk more about that later. So let's just talk about some of the terminology, things that I'll be talking about today.

So all audiometers and tympanometers, and we are talking about both, sometimes I focus on the audiometry side, but same as true with tympanometers, fall into one of these categories. So standalone means there's just no connection to the PC. True standalone means it's impossible to connect to the PC, but a lot of people use a PC-enabled audiometer in just standalone mode. PC-enabled refers to an audiometer that you can save on the device, save the thresholds on the device, and then transfer to the computer, transfer into Noah with just the push of a button. PC-based means that you're doing everything on the computer. So you're triggering your stimuli from the computer and you're storing your results right in the computer, right in the equipment manufacturer's software, the Noah module.

A hybrid device can be either-or, okay? And we'll talk more about that. There are few audiometers that are true, true hybrid, and then some devices, like some of the Inventis devices, have a live view, which essentially just turns your PC screen into a monitor, which could be very useful. So looking at this diagram again, so up at the very top, you know, you have a standalone audiometer. and going over to the right side, you know, really these, you're gonna be doing a handwritten paper audiogram or as just discussed, manually entering it into Noah and doing your audiogram that way. PC-enabled is kind of right in the middle, where you're sending that data over to the computer, and then PC-based is right on the computer itself.

And for those last two, you're gonna be printing a PDF audiogram in some form, either generated from the manufacturer's software suite or it's also possible to do it with your office management system, and we'll talk a little bit more about that later. So examples

of just some equipment types, so for a PC-enabled audiometer, if we're talking about Inventis, this would be like their Piano, their clinical audiometer, or their Harp. You know, other popular devices, GSI, that's like the Audiostar and the Pello, where you can save right on the instrument and then dump it into Noah afterwards. PC-based, that would be like the Inventis Cello, the one that I use, or when we're talking tympanometers, this would be something like the Madsen Zodiac, where everything is done and triggered from the PC.

A hybrid audiometer, the only real, true, true hybrid that I've come across and used myself is the Interacoustics AD629, where you can fully either trigger everything from the device itself and still be able to save right in Noah, or you can trigger it from your computer itself, which is kind of cool. Devices with live view, an example of that would be like the Inventis Flute or Clarinet tympanometers, where you can click it into live view, and as you're running the tymp, the patient can see it up on the screen as it runs live, which I think is just a marvelous feature. So just a note on the hybrid options. So there are a handful of PC-based audiometers that offer a control panel accessory, and this is really for people who want a PC-based system, but they like the old classic feel of the device, right?

And the longstanding example of this is the Madsen Astera. Inventis has just recently released a control panel for the Cello, which is very exciting, and I have mine ordered and I understand that it is on the way, so I'm really looking forward to trying that, 'cause I think that having sort of the best of both worlds may allow certain clinicians who are thinking about making the jump to maybe something PC-based, feel a little bit more comfortable, especially if they're coming from a true standalone system. Okay. So now Anna is going to launch a poll, and now that we've talked about the different setups, I'm gonna go through each one of these ones before she does, but I wanna know, we got a lot of people on this talk today, and so we're gonna use this as a data collection opportunity.

I wanna know what you're using, okay? So option A is a paper-based audiogram, true, true paper-based using standalone audiometer. Option B is a digital audiogram, and you can respond to this right now, with a standalone audiometer. So that would be more like with the data entry, the manual entry into Noah, just like what we talked about. Option C is you're using a PC-enabled audiometer and you're dumping your data into Noah. And then option D is you're using a PC-based audiometer and you're doing it all in there. So I will respond to this as well. Digital audiogram with PC-based audiometer. Oh, I can't vote. Well, that's good, I won't skew the data at all.

So please respond to that and that would be really helpful. It'll be interesting to see what the percentages are on this because really, yeah, I don't know exactly who is on the talk today and what they're hoping to get out of this, so this will be helpful even in tailoring the last portion of the talk. So you guys can take your time with that. By the way, I have worked in all of these, all of these situations. I have worked with all of these different clinical setups, so I have experience in each and I know the pros and the cons of each. How are we doing there, Anna, with the poll? I can't see the results.

- You can't see. Okay, fantastic. Just a moment still, Clayton. 23% paper audiogram with standalone audiometer.

- [Clayton] Okay.

- 20% digital audiogram with standalone audiometer.

- [Clayton] Okay.

- 31 now, it's increasing, 31% digital audiogram with PC-enabled audiometer.

- Nice.

- And 36% digital audiogram with PC-based audiometer.

- Wow, okay, so that's really good to know. So thanks, Anna. So there's a good chunk of people who are still using either, you know, manually writing it by hand or they're manually entering it into Noah. Obviously, option B is much better than option A, but it's really interesting to note that, okay, there I can see it now, that's great, that the majority of people on the talk today are actually transferring data, which is fantastic to hear. Okay. Good, so continuing on. So let's talk about why to connect your equipment if you haven't already. There are many benefits to clinical workflow. The first is efficiency. It is way faster to just press store on your device than it is to, for example, manually enter an audiometric threshold, and it's much, much faster for tymp data when you can just dump it all over instead of rating each one, you know, ear canal volume and static compliance and everything else.

So just based off of that, it's far more accurate to just dump the data in, okay? There's way less opportunity for tester error, and if we go back to the tympanometry, I have worked in situations where you had to manually enter it in, or in this case, I was entering it into a computer, but of course, it's rare that the computer system has the same order that it does on the tympanometer, right? So in terms of, you know, the pressure and everything else, so you'd often have to flip it in your head and have to get in the right box. Anyway, frustrating. And then, of course, it's way more convenient to transfer your data because who wants to waste this mental energy on what I just described, on recording this stuff?

I wanna be thinking about the patient, I wanna be thinking about what's next in the assessment. I wanna think about anything but whether I have, you know, peak pressure in the right spot. Okay. The other thing is, is that when you get your data into

Noah or the manufacturer's software, simple calculations can be done automatically for you, like things like a pure tone average. I would hate to have like calculate a pure tone average in my head. That seems silly. But more importantly, when you do the audiogram, you can get data immediately on the patient's audibility through the Audibility Index, or also known as the Speech Intelligibility Index, and we'll talk about how that ties in importantly later on as you're going over the results.

And then importantly, when you have the data in your system, you can compare it to previous data you have in your system and you can overlay them and you can look at the differences between thresholds, or speed up your next test, or look at the difference between tympanograms or otoscopy, and we'll get into that later. But importantly, there are many benefits to the patient experience. So first of all, the first one is inclusion. When you are doing this, and by the way, you can see my monitor in the background there, I'm talking about having this stuff up on a monitor where the patient can actually see it, and when you do that, the patient feels included in every step of the assessment, and we're gonna do an example at the end, and you'll see what I mean.

It's more transparent. The patient sees what you see. If you're looking into the patient's ear, they see what you see. If you're running a tympanogram, they see what you see. The only time you don't want them to see what you see is when you're doing audiometric thresholds, so turn off your monitor for that. And, of course, it is far more professional, in my opinion, to have a setup like this. It looks modern, it looks impressive, and that builds trust in the patient. And I have patients tell me that every day. Like, wow, things have really come along. You know, especially if you're doing ENT testing, and they're used to, you know, some really old-school set up.

Okay, so this is not a new thing. To be honest, I don't know how long we've been able to transfer data, and, you know, if Gus Mueller was doing this talk, I know he would

have like exact dates, and it probably goes back further than I know of, and he would have, you know, really interesting technological examples, but all I know is that you may be surprised at what older equipment actually has the ability to transfer data, and I'll just use an example of, you know, the Interacoustics AD not 629, but the 229, which was from around 2007. And I was rating a clinic that had a number of these, and I was astounded to find out that you could transfer data as I was, you know, looking through the user manual.

But anyway, you know, with the older systems it was a little bit harder, and I'll show you what I mean by that. Okay, but first, we're not gonna do a poll here, but this is just kind of interesting, like, so if I pose to you a question, can a GSI-61 transfer data to Noah? You know, if you're like me, like most people looking at this initially would probably go, probably not, I don't think so. Well, the answer is yes, at least theoretically. Well, I know that the very earliest ones, they didn't have the port for the serial cable, but the newer ones did, and it needs to be on a certain firmware, but the truth of the matter is is that even the legacy Audiometers can transfer data to Noah, but the problem is that no one uses the feature.

Like I don't think a single person has ever used this. And it's because, at the time, it required knowledge of things like hardware and software handshakes and dip switches and baud rates and parity and number of data bits and stuff, not to mention adapters. It was a little absurd. And that's why no one has ever transferred data, except maybe in the lab, from a GSI-61. In fact, just a funny story, I did like a project when I was in grad school, and in the western audiology program, we had an instrumentation class. And my group, what we were charged with, seeing if we could, you know, network and get connected some of the legacy gear we had in our lab.

There was three of us in the group. One was a computer engineer before he went into audiology, the other one was an audio engineer before he went into audiology, and the

other one was me, and you know, I used to be a musician, I used to play in band, I'm pretty good with gear. We were not successful in getting either the GSI-61 nor the Tympstar to transfer data, and it was deeply discouraging. Yeah, so anyway, I can understand why people wouldn't do it or give that a try. But luckily, things have changed immensely, okay? So with the newer devices, it's much easier now because the technology's developed so much and the setup is greatly simplified, and you know, most of the time, it's just a single USB connection to your PC, and there's no drivers that need to be even uploaded in many situations, no advanced computer knowledge needed, which is why it's so encouraging to see that, holy smoke, so there's, you know, vast majority of the people on this talk are actually doing that, or the good majority.

Okay. So next question. Can a GSI-Audiostar send data to Noah? And again, there's no poll here, but I think most people would be like, oh, look at that thing. Yeah. Yeah, sure, it looks pretty new. And, of course, yes, it can, but my question is how often is this feature actually being used? And I think it's less than you might think. And I was just, you know, doing research for this talk, I was looking at, you know, when I grabbed that picture there, I was looking at the GSI website, and I just noticed that the number one frequently asked question was, can the GSI AudioStar Pro, does it require a computer to operate? And, of course, the answer is no, it can be standalone, and that seems to be what people care about.

I don't know if it's because GSI is for more traditional environments, I'm not sure, but it wasn't until way down in the advertising where they say, oh, and guess what? This thing is PC-enabled. Whereas to me, that should be, you know, one of the top features, but. So I'll just give you a real life example. I was recently at a conference and I was speaking to a clinic owner, you know, who, well, I mean, the clinic has been in his family, so it was like an established clinic, but they just talked about, he told me how

he had proudly said that he's got a new GSI Audiostar and he'd just replaced his old audiometer, I didn't remember what it was.

And so just outta curiosity, I asked him, I said, like, so you're sending your data to Noah, you know, you got it connected to Noah, and he told me that, well, he hadn't figured out how to network it yet. And I said, well, what do you mean network it? Like, you know, why don't you just like connect it to your computer in the test room? And then he disclosed that there was no computer in the test room. So if you're in that majority, you know, the 40% today who is doing things on paper, or I guess the 20% who are doing it on paper, first step is just get a computer in your test room. You can get a laptop off Kijiji for like 3, 4, 500 bucks.

Just do it. Okay, so why don't more people do it? If this is so great, why doesn't everyone do it? And I think part of the mentality is that, I mean, if it ain't broke, don't fix it, right? I mean, change is difficult and sometimes maintaining the status quo is honestly a heck of a lot easier, and I fully understand that. The other thing is not all clinicians are equipment-oriented, and it can also be hard to find the time to learn to use your equipment to the fullest because you're seeing patients, right? You either have to do it over lunch hour, if a patient cancels, or God forbid, you know, if you're like me in the evenings, you're curious about something, you look it up online.

And also, like I said, with how hard it was in the past, I don't blame people for being hesitant, okay? So are there any exceptions to wanting to connect your equipment? And I just wanted to mention that arguably, the only time that it could make sense to do a paper audiogram would be in a traditional sort of ENT testing environment, where you just kind of jot it down quickly and then, you know, drop it off to the ENT and take the next person in. However, if you were to do, have a digital PDF report, it would look so much nicer, right? And you can have things like tympanogram curves and not just the tympanogram data, which a picture, you know, says a thousand words, right?

And I do ENT testing and I know the ENT who does lots of surgeries and stuff relies heavily on that curve and not just the data, so he's extremely happy to have that. Similarly, you know, I think video otoscopy is part, should be part, of a modern like connected clinic, and so obviously, having otoscopy over time is extremely important for post-op and that sort of thing. But importantly, there's an enormous lost opportunity for creating a searchable database, especially for ENT testing if everything is being saved in Noah. You know, you can just imagine the possibilities for things like research, and even if it's a traditional hearing aid clinic, for sort of, you know, hearing aid marketing, if you can search your database by things like hearing loss type or degree or configuration or testing date or whatever, date of birth.

Yeah, so. So I would say, even if it takes a little bit longer, this is what we should be doing because it's the best practice. So just another fun fact on that, so I was working in a large sort of hospital organization context where there was an EMR, electronic, you know, medical records, and what we were doing is sort of like a paper version of the audiogram within the EMR. They had a way of like entering the data on the computer, but it was sort of like in this old fashioned like paint screen, and you would just copy and paste that into the report. And the problem with that is, of course, is if you're doing a paper audiogram and scanning it in or doing some sort of digital version of that, as soon as you save that in the patient file, those thresholds, the data is gone, right?

Like you can't refer to them later. So I had asked my supervisor, you know, if we could just, you know, most of the computers already had Noah on them, could we just enter it into Noah and copy and paste from there? And the response I got from my supervisor was, "Well, why would we wanna do that? Like, why would you want to have the data in Noah?" And I didn't even know what to respond because I don't know. There's just so many options, the options, the possibilities are endless if you had this huge database, whereas you have zero options if you're doing it on paper or the

digital equivalent of that, right? So. Yeah, anyway, I just think that there's a huge opportunity, both clinically and for research, for just getting that in a database.

So a lot of people are might be wondering, okay, well, like should I be replacing my gear? And if you have older equipment and you really don't wanna buy new gear, first thing you should try and do is determine whether your device can transfer data. So you might wanna look at the user manual, which if you're like most people, is inside a sealed, you know, plastic bag in the bottom drawer in your test room somewhere. But it's definitely like worth looking into even if it's, you know, a legacy device. And as I mentioned before, it might not be feasible, it might not make sense for certain devices, but it would be worth looking into whether you can do it.

But really, it's what I call the in-between devices I think where the real opportunity lies, and these are devices that are PC-enabled, they are newer, they're not from 2007, but that most people just use as a standalone. And an example I'm giving here is GSI 39 Auto Tymp. When I look at that thing, and I've used this before, I just remember looking at it and it just looks so old, and I was like there's no way this thing is gonna transfer data. But sure enough, you can connect it with a standard USB cable right into GSI-Suite and just transfer data with one push, even though it doesn't look, you know, like the newest GSI equipment.

So these are the types of devices that we are looking for. I just wanted to mention as well that it is possible to mix and match. It doesn't have to be all or none, okay? So you might have a tympanometer like the one that I just showed, where you can transfer data, but maybe your audiometer can't, and that's fine. You can use sort of a combined approach, right? Where maybe you just dump the data into the, you know, GSI-Suite with that old, you know, 39, save it, and then you just close out and open up your Noah audiogram module and enter the thresholds in that way, right? You can fully, fully do that. So I'll just give you an example from my clinical experience where, well, you'll see

it was sort of similar situation, but I worked for years using this Madsen Itera II strictly as a standalone device because I was working in sort of a bigger chain of family-run clinics.

This is what we had, this is what we did. At the very least though, we weren't doing paper, which was fantastic. At least we were manually entering it right into Noah on a test room computer, which was, you know, not too bad. You know, as a new student out of school, that's just the way it is, that's the way you do it, but you know, as I started to work there for longer and longer and looked at this audiometer, you know, and looked at the user guide, and on the very first page it outlines how the device really is meant to be used and is best used connected to a PC. So I started to look more and more into it, and I just wanted to mention in that very test room, there was a beautiful Otocam300, which takes magnificent images, you know, of the eardrum, and it was never used unless there was something really weird about the ear and you wanted to get a picture of it.

Anyway, so it was kind of sad, but. So there was 12 locations in this chain, most of them were using the Itera II, and so after experimenting in my own location and figuring out that we could do this, I went around to each clinic, I found the serial cable that it came with that was never connected to the PC, we already had PCs in the test room 'cause we were doing it in Noah, I went on, I loaded the drivers, in some cases, I had to update the firmware on the actual devices themselves, I had to make sure that the version of Otosuite was compatible, but once I had it set up, I showed the clinicians how to use it and I showed them how much better it was, you know?

And then, I mean, again, change is hard and it takes a little bit of time, but people got it, right? And this audiometer was a little bit different, so what it would do is it would sort of, it would turn your computer on Otosuite into like a live view of what was happening on the audiometer, but when you would save on the actual audiometer, it

would save right in Noah Suite. So it was kind of cool, like live view hybrid type thing, but there were some issues with it. Like there were no stored speech lists, so you'd have to use, well, we were using, you know, we transitioned everyone to iPods and just playing speech lists on that.

So you still had to manually enter those lists or those scores into Otosuite, so it wasn't a perfect setup, but it was a heck of a lot better than entering each threshold. Yeah, it felt great to go from that to this. But it was a combined approach. So the tympanometer that we had was this Madsen Zodiac 901, that's what I think all the clinics had. And just so you know, that tympanometer could actually transfer data as well. There is a data transfer button on it, you can see from the user manual down on the bottom right hand screen, but it was funny, when I talked to like the tech who came in, you know, the guy who calibrates everything, and I asked him about it, he just looked at me and he was like, "No, just don't.

Don't do it. Don't try and do it." Apparently it only worked on like Windows 7, and again, it was one of these things where like theoretically it could do it, but you don't go there. So what we ended up doing was a combined approach. You know, we saved everything we could in Otosuite, we printed the audiogram, we jotted down the tymp data based off the printout, signed the audiogram, and scanned it in. It's interesting, that group of clinics was actually purchased, and now they're using, I didn't know this existed at the time, but they have a link between Noah and the office management system so they can actually generate the reports from the office management system so there's.

Yeah, so it's just a much better system. There's no printing involved. I just showed a couple Inventis things down here as well though. The Timpani is what I use, and so you basically run it, and it's like data transfer into the Maestro Suite, but again, I mentioned the Flute and the Clarinet. They have this live view, which I think is sort of the best

thing where the patient can see the traces as they're happening up on your monitor. Alright, so it's time to compare and contrast these two methods, okay? Let's say that clinic A uses a standalone audiometer and paper audiogram. How many times do they need to actually enter that audiogram throughout the kind of patient journey let's say in a traditional hearing aid clinic?

Number one, the first time is on paper when they write it down. Number two, if they're gonna do a hearing aid fitting or a hearing aid demo, they then need to enter it into Noah through the audiogram module, okay? Number three may be if they want to get it in their office management system for their digital patient file so that they can do things like marketing or just have it there. And then number four, if they are using a standalone verification system and they don't have it networked, then they're gonna enter that audiogram in for a fourth time. So clearly, that's not efficient. But clinic B uses a PC-based audiometer or a PC-enabled audiometer with data transfer.

How many times do they need to enter the audiogram? Once. One time. On the audiometer. You save on the audiometer, it's either right in the system with PC-based or you transfer it over to the system, and then that's it. Because if you have something that syncs with your OMS like Blueprint's BPLink, soon as you save to Noah, that data is also right in your office management system, and if you're using a computer-based verification system, for example, like the Inventis Trumpet, then, of course, that data is right in the Trumpet software as well, okay? So one time, four versus one. So let's again compare and contrast the clinical workflow perspective with these two methods, okay?

So with the traditional approach, the old way, you look in a patient's ear and you say, yeah, it looks pretty good. They don't see anything, you don't document anything, okay? What do we then do? We do, you know, tympanometry, maybe run some acoustic reflexes, again, they don't see anything, but there's a large opportunity, if

you're jotting things down, for clinical error, having it in the wrong spot, and of course, we don't get the curves with that, right? We don't get those nice beautiful curves. For pure tone audiometry, you have to ask yourself, you're constantly looking, am I testing the right ear? Am I writing it down on the right frequency, the right intensity? And the same thing with manual entry.

So you're always checking, checking that you have everything right. When we do speech testing with, you know, like let's say a standalone audiometer, this is often done with live voice because the lists aren't on the device or you're using a CD player or an MP3 player, or that's what you would have to use to use recorded speech, and a lot of people don't like using it, especially with the CD, I get that, although it's not a big issue with the iPads and iPods. And then, of course, for data comparison, it's cumbersome. It's annoying to compare data over time. So just from our perspective as a clinician, there's a lot of stuff that could be improved there.

So from a clinical perspective, so this says the old way, sorry, up here, but this is actually the new way. When we do otoscopy, we get documentation in Noah with video otoscopy, 'cause that should be part of your whole process, okay? When we run tympanometry and acoustic reflexes, there's no data entry required. We just transfer the data over, we get these beautiful curves, okay? For pure tone audiometry, there's far less chance for error because you just save the frequency intensity that you are on, on your screen, and as long as you have the inserts right in the booth, you can't go wrong. Speech testing is almost always done recorded because the speech lists are embedded or preloaded right on the device or in the software, and we know from best practices that is definitely the way to go.

And, of course, data comparison with the new way is far easier to compare things over time, whether it's audiometric thresholds, tympanograms, or otoscopy. So let's talk about a patient experience the old way, okay? So traditional, we'll say old-school

audiology clinic. Again, you look in someone's ear, the patient is completely blind to this, and as a result, you say, yeah, it's okay. Or there's little conversation around this. Oh, there's a little bit of wax. They see nothing, okay? Tympanometry, same thing. The patient is completely blind to it. It occurs on this tiny little screen the old way, maybe you print a little something out. They're just not part of the process, okay? Audiometry is then often explained on a piece of paper, often handwritten, which is not ideal.

And then, of course, for the consultation, if they need treatment, there's often no demonstration of hearing aids. And why is that? Because the audiogram's not in Noah and then you have to do this extra step and it's extra annoying of getting the audiogram in Noah, and for a lot of people, a lot of clinicians, that barrier, just forget about it. You'll just tell them how good the hearing aids would be instead of demonstrating it. Okay. Now, let's look at what a typical patient experience can look like the new way. Here's what happens in a modern hearing clinic, okay? We do video otoscopy and the patient sees what you see on the monitor in real time, and obviously, this spurs discussion.

Oh, weird. What's that, you know? Oh, there's the hole in your ear that your doctor told you about, whatever it is. Then, we do live tympanometry, and the patient sees their tympanograms mapped in front of them or displayed afterwards, after the curve is run when you dump the data in, okay? And obviously, we can talk about that, we can talk about how the middle ear is moving perfectly, so if you have any hearing loss, it's likely related to the inner ear, and so on and so on, or vice versa, obviously, if there's middle ear issues. But we have data-driven audiometry, so we can explain on the big monitor right in front of them in full color with overlays and counseling tools, and discuss their audibility, or lack thereof, using actual stats and percentages, and I'm talking about the Audibility Index, the Speech Intelligibility Index.

And, of course, as you move on to the consultation, if they require help with their hearing, you program the hearing aids and you demonstrate them in like a minute or two because the audiogram's already in there and it's really easy to program hearing aids nowadays, so. Let's just walk through really quickly what I do in my clinic every single day, and we'll just walk through an assessment. For this purpose, I'm not gonna include the sort of case history intake form, but it should just be mentioned that, you know, that process has changed a lot as well. You know, in my clinic, you know, we send this to people beforehand, they fill it out, they submit it online, we get it beforehand, and if they can't do that, then I'll do it on an iPad with them right there so it goes right into our office management system.

So step one, we do otoscopy, and of course, that means video otoscopy. People love to see their own eardrum. There's a few people who don't, and that's fine, they can close their eyes, but you know, 95% of people do, and this is a great way to objectively show people for real that there's no just wax blocking their ears and that's why they can't hear, right? And for everyday practice, and as I mentioned for ENT practice, it makes a lot of sense to document the state of the eardrum, especially for example, if you're doing things like wax removal. Take a picture of the wax, take it out, take a picture without the wax, they can see the improvement, and then you've documented, you know, for your colleagues and everything that you haven't perforated an eardrum.

You can even get the audiogram as I do for my ENT testing reports. Sorry, you can get the otoscopy right on the audiogram, which is a fabulous thing to have as well. Next, we do tympanometry acoustic reflexes, and again, people love to see this. They say, oh, wow. You know, what's that measuring? And ideally, you're doing that in real time using a PC-based tymp or using live view, but you can also show them statically afterwards. You just dump it in, there's your nice beautiful curves, and this is what it means. We're peaking at it in normal pressure and all this stuff. And we're not just showing them on some grainy screen or, you know, crappy printout.

Of course, we never, we just wouldn't even, we'd just say yeah, everything looks okay. The audiogram. So using a PC-based or a PC-enabled audiometer, you store your thresholds on the computer or on the device, depending on which one you're using. As I mentioned before, this is the one time you do wanna turn off your monitor. I didn't do it in this picture, it was 'cause it was for like a photo shoot, but you turn off your monitor so the patient can't see it out of the corner of their eye or you know, the family members shouldn't even really be able to see it when you're doing the hearing test. And, of course, when we're doing speech, you store the speech data, you're using embedded word lists, and you're telling the computer which one you're running, word recognition versus SRT, and and so on and so forth.

When we are explaining the results, we're doing so on the big colorful monitor right in front of them and we're talking in terms of severity using overlays. We're discussing the person's hearing loss in terms of the impact that it has on audibility, okay? And I don't care what manufacturer you're using, what software you're using, what Noah module, it's gonna have the SII or the Audibility Index, and so you tell them, you hear 64% of sounds in your right ear for an average speech signal and you hear 42% of sounds in your left ear. And you know, patients always love to know about things in terms of percentages, and when you have the Audibility Index calculated for you, you can do that, you don't have to count any dots, okay?

And that makes a whole, that really, really resonates with people. So. And then, of course, the next step is you explain how hearing aids can help to get those numbers higher, okay? Ask if they have any questions, and then the next logical step if you dispense hearing aids, is to demonstrate the treatment options when appropriate. This is extremely easy 'cause the audiogram is already there, and now with everyone just using, you know, Noahlink Wireless 2.4 gigahertz, there's nothing stopping you from demonstrating technology. You can do it in, you know, under a minute you can get it

set up for them. And, of course, that really helps a lot of people to move ahead and treat their hearing loss when they can, oh, they can hear that.

Wow, that really does make a difference. Okay, so just as we wrap up here and before we take some questions, you just posed a question, right? Like, so I have noticed that newer clinics tend to have more connected gear, let's say starting in the past five years or so, and that's likely because they had to purchase their equipment from scratch, and you know, the newer equipment tends to be more likely to be connected and it can often be slightly less expensive than, you know, the traditional setups if you're buying those brand new. And, of course, it has a smaller footprint, and if you're like me where you have the little micro office, that could be very important.

It also has a cleaner, more modern look. It's not all new clinics 'cause I've definitely seen clinics where they buy their stuff used off, you know, Facebook Marketplaces or wherever, and they're getting maybe older gear that isn't connected, but a lot of new clinics have this setup, and you have to ask yourself, okay, does that give them an advantage over the more established clinics? Because the older clinics that have been around for longer tend to have older gear that is less likely to be networked and connected, and this means that these clinics are gonna spend more time on data input, and that means that they have less time with the patient, they have a less modern process, it's less efficient, and perhaps as we discussed before, that impacts the patient experience negatively.

So in summary, connected audiometric equipment improves clinical workflow efficiency, accuracy, and convenience. There's no doubt about it. If you don't know what I mean by that, try it out and you'll see what I mean. It also, however, and perhaps more importantly, improves the patient experience by making it more inclusive for them, and more transparent and collaborative for them. And there are many different equipment options and possibilities and combinations that you can do to facilitate this

connected experience, both for you and for the patient. Purchasing new equipment may not be necessary to achieve some version of this connected experience. So I encourage you if you're not doing it already, to go out there and try it, and if you are amongst the group of people who are already doing it, hopefully, you got some new ideas from this talk today.

So before we finish up, let me just peek at the questions here. Okay. I have a comment here that says paper audiograms. "Paper audiogram is very much appreciated by patients." So I'm not sure what that means. I guess the idea perhaps that, you know, let's say that you've got someone right in front of you, sometimes having that thing right there makes you more connected. I think there could potentially be an argument for that, but I would argue that showing it to them on a big beautiful screen and emailing them, you know, a nice color copy where things aren't scribbled out and they can see it, and same thing with their health practitioner, I think that is far superior, but I think I get what you're talking about there.

It's about making a connection and letting them feel involved in the process. I have a question from someone asking "What video otoscope is good to buy initially?" You gotta do your research on that, it really depends. It depends on what system you're using, if you already have existing gear for example, so just do your research on that, like, you know, for the scope that I use, the Horus Scope that works with the Inventis software is really good. If you want to go out, and it's nice 'cause you can use it connected to the computer, but you don't have to have it connected to the computer. It works as a standalone video otoscope where you can see it here and show it to the patient, depending on what environment you're in, so you gotta do your research on that.

Next question, "Where is your micro office?" I am in a shared health professional facility in Ottawa, Ontario, Canada. Next comment, "I was using AD-229 until two years

ago, then I changed into the Inventis Harp Plus, and it's the best thing I could have done." Totally agree. That's a great comment. Next, "Do you have a resource that you can share that explains how to transfer data using a GSI-61, or any tips you can share?" Well, the first thing with the GSI-61 if you wanna go down that route, and I'm not sure that you do, but if you do, you gotta look on the right side and make sure that it shows the serial cables that are connected.

But what I would do if I were you is look at the user guide and then if you contact customer service, they can send you those images that I sent that I had in there that shows you the adapters that you need to use. They'll tell you what firmware you need to have. You need to make sure that your device can actually do it before going down that rabbit hole. But, and ideally too, you might want to talk to your distributor, but they might not even have any sort of idea. They'll probably tell you to replace your audiometer, right? "Can we connect a different manufacturer's device to one software?" So this is a really interesting question.

So you have to use the manufacturer's software to get the data from that device that is for that manufacturer, but you can fully use, and I sometimes do this, you can use different devices sending data to different, you know, manufacturers' suites in Noah, and because once the data is in Noah, it doesn't matter how you got it there. So you can get your audiogram printed out. In fact, by the way, you can also use different manufacturers' software for printing options as well. So different manufacturers have better report builders, and I would encourage you to download some different manufacturer's options for that because sometimes you can get a better PDF report from one manufacturer as opposed to the other, and again, once the data's in there, it should work across all equipment manufacturers' modules with a couple exceptions.

"Are you able to be reimbursed for video otoscopy?" I just include that as part of the entire assessment fee. So whoever pays for your assessment, whether it's the patient

or some third party, that should just be part of it. When you're looking in someone's ears nowadays, you should be able to visualize it on a screen and show your patient, even if that means getting one of those, I don't know if you guys have ever heard of the little teslong ones. I think you get them on Amazon under a different name, but those things have disposable tips and they're like 40 bucks. There's no excuse not for having video otoscopy nowadays. Okay. "If one is starting from scratch, can you suggest the most affordable and comprehensive setup?"

You suggest, so considering longevity, yeah, I mean, again, you definitely need to do your research, but, you know, we're doing this with Inventis, and I would honestly suggest starting there, they've got some great options and it tends to be at a really good price point. So you're trying to figure out, okay, what is the best thing for your need and what are these different price points like, but you do need to do some research for yourself. "What office management software do you use? Does it communicate with your EMR? Do you mind sharing that EMR that you use in cases?" So I don't, I guess my office management system is sort of like my EMR, and I'm using for my private practice blueprint, and I do use that same software BPLink, which connects Noah to the office management system so that when you've saved in Noah, you're saving in your office management system as well, which allows you to generate reports from there as well.

So, okay, last question because I know we're outta time. "Is it only Noah software that has the ability to use," the ability to, I assume it says store data. No, there's other databases you can use, depending on what manufacturer you're using. Like I know some manufacturers, equipment manufacturers have their own databases, like I think Otobase is one with Otometrics that works with EMRs. And I think it's pretty expensive, I haven't looked into it, but there are options there. Okay, thank you all for coming. This has been a lot of fun. Hopefully, everyone has got a little bit from this presentation, and

if you have questions, you can also feel free to shoot me an email, addressed at the email there.

- [Anna] Fantastic. Thank you so much, Clayton, and I truly hope our attendees enjoyed this fantastic learning opportunity. Keep in mind that we will see Clayton again more or less next fall for sure. Right, Clayton? With a new fantastic webinar.

- Yeah, sure. Yeah, we will.

- Okay. For sure. As Clayton said, we have recently released the Maestro control panel which is a physical keyboard intended to navigate and control Maestro software, especially, but not only, when performing audiometric exams. So if you're curious to know more about our PC-based audiometers and Maestro control panel, I strongly invite all of you to take a look at our website, and in case of question, please send an email to support@inventis.it. Thank you, Clayton, once again and thank you all. Bye for now.

- [Clayton] Bye.