

Erin Welsh "The patient's age and sex did not permit me to resort to the kind of examination I have just described, ie direct application of the ear to the chest. I recalled a well known acoustic phenomenon. If you place your ear against one end of a wood beam, the scratch of a pin at the other end is distinctly audible. It occurred to me that this physical property might serve a useful purpose in the case I was dealing with. I then tightly rolled a sheet of paper, one end of which I placed over the precordium and my ear to the other. I was surprised and elated to be able to hear the beating of her heart with far greater clearness than I ever had with direct application of my ear. I immediately saw that this might become an indispensable method for studying not only the beating of the heart but all movements able of producing sound in the chest cavity."

TPWKY (This Podcast Will Kill You intro theme)

Erin Allmann Updyke I'm so excited for this episode, Erin.

Erin Welsh Me too. Me too. I have listened to more heart sounds I think than I ever have than lung sounds, we were just listening to them. And it has created a weird sense of anxiety for me.

Erin Allmann Updyke Do you remember that Radiolab episode about the person who could hear their own heartbeat? And then yeah.

Erin Welsh Yeah. I think that might be what's going on and I don't know why that is.

Erin Allmann Updyke I don't have an answer to that.

Erin Welsh Yeah, I don't know. Anyway. But that quote, that paragraph was from of course Laennec, whom you'll hear a lot more about later in the episode, who basically invented the stethoscope.

Erin Allmann Updyke Yeah.

Erin Welsh Spoiler.

Erin Allmann Updyke Sure did.

Erin Welsh Yeah. And hi, I'm Erin Welsh.

Erin Allmann Updyke And I'm Erin Allmann Updyke.

Erin Welsh And this is This Podcast Will Kill You.

Erin Allmann Updyke Today we're talking all about the stethoscope.

Erin Welsh All about it.

Erin Allmann Updyke Yeah.

Erin Welsh We put this down in like our 'let's do this as a topic'.

Erin Allmann Updyke Let's put it on the list.

Erin Welsh And then when it came time to do it we were like wait, what are we-

Erin Allmann Updyke

Yeah.

Erin Welsh

What is the goal here?

Erin Allmann Updyke

I still don't quite know what my goal is. So hopefully we'll get something out of it.

Erin Welsh

I'm really excited because I was like okay, for me, it's clear cut, right?

Erin Allmann Updyke

Yeah.

Erin Welsh

Like who invented the stethoscope? How did it change things? Blah, blah, blah, all that usual stuff.

Erin Allmann Updyke

I feel like that's the story I'm really excited about because like I know very little pieces of it. But what the stethoscope has become I think is so interesting to then think back to when we didn't have them and what it was like then.

Erin Welsh

Yes.

Erin Allmann Updyke

I'm really excited about it.

Erin Welsh

Totally. Well and of course I am excited because I want to hear these sounds even though they give me anxiety or some weird creeping sense of unease. I want to understand how you can tell the difference. Because I feel like when someone listens to your body and they're like... What are they listening to?

Erin Allmann Updyke

Right. That's what I'm going to talk about.

Erin Welsh

Yeah.

Erin Allmann Updyke

I'm really excited about it. It should be fun.

Erin Welsh

I'm thrilled.

Erin Allmann Updyke

I figured that's the question I want to answer is like when you go to your doctor and they stick this metal thing on your chest, like why?

Erin Welsh

Why?

Erin Allmann Updyke

What are they doing and what are they actually hearing?

Erin Welsh

Yeah.

Erin Allmann Updyke

Yeah.

Erin Welsh

I'm really excited about this episode. I feel like I mean we always say this but I like sometimes feeling surprised by the things that we learn.

Erin Allmann Updyke Same.

Erin Welsh Like there are some topics where like we know more or less the outline of the story.

Erin Allmann Updyke What to expect. Yeah.

Erin Welsh Yeah. And this is brand new.

Erin Allmann Updyke But what's not brand new is that we start every episode with quarantini time.

Erin Welsh What are we drinking this week?

Erin Allmann Updyke We're drinking Music To My Ears. It's kind of like there's some musical murmurs in wheezes.

Erin Welsh Yeah, yeah. And Music To My Ears is a tasty little concoction. We're bringing out the Mezcal for this one, it's been a while.

Erin Allmann Updyke Of course we are.

Erin Welsh And maybe some Campari in there, just a little bitterness. Some blood orange juice, a little tart acidic. And then some agave syrup just to help round it out, sweeten it up, make it delicious and tasty.

Erin Allmann Updyke I love it. We'll post the full recipe for that quarantini as well as our non alcoholic placeborita on our website [thispodcastwillkillyou.com](http://thispodcastwillkillyou.com) and on our social media channels. Do you follow us on social media? Because we're there.

Erin Welsh We are there. And we are also on our website, [thispodcastwillkillyou.com](http://thispodcastwillkillyou.com). It's great. It's got some good resources like sources which we put on our website for each and every one of our episodes. We've got links to merch, we've got some cool merch. Check it out.

Erin Allmann Updyke Yeah.

Erin Welsh We've got links to our [bookshop.org](http://bookshop.org) affiliate account, our Goodreads list, links to music by Bloodmobile. A contact us form, a submit your firsthand account form, transcripts.

Erin Allmann Updyke Transcripts.

Erin Welsh Did I mention that?

Erin Allmann Updyke We have those.

Erin Welsh There's probably more things.

Erin Allmann Updyke Check it out.

Erin Welsh Outdated pictures of us that we really need to update.

Erin Allmann Updyke

We will. Maybe by the time this episode comes out they'll be updated. So check it out and see. See how old the pictures are. [Thispodcastwillkillyou.com](http://Thispodcastwillkillyou.com).

Erin Welsh

Wow, okay. Before we go to off the rails, should we get into the content? All right.

Erin Allmann Updyke

I think we should. I think we really should.

Erin Welsh

Let's take a quick break and then begin.

TPWKY

(transition theme)

Erin Allmann Updyke

What the heck is a stethoscope? I feel like everyone knows what a stethoscope looks like but I'm going to describe it anyway just in case. A stethoscope is a metal piece at one end and this metal piece usually has two different sides. One of the sides is more open and curvy and it's called the bell side. It usually has just a rubber ring around it. And then the other side is more funnel-shaped and it's covered with this thin, usually plastic diaphragm. And then this metal piece is connected to tubing that then splits into a Y shape and then is connected to earpieces that we stick in our ears. And at its core, a stethoscope is just a tool to help amplify sound. And we use it to amplify the sounds in your chest for the most part. And Erin, I know you're going to talk about how it came to be and how it's changed because it didn't always used to look like this.

Erin Welsh

Yeah.

Erin Allmann Updyke

And later we'll talk about like does anyone still use the stethoscope? And what are they using instead? And what's going to replace the stethoscope? But for this part, what I wanted to kind of focus on is like what are people listening to and listening for when they're using a stethoscope? It's funny, I feel like I take it a little bit for granted that like we get a decent amount of training in how to use the stethoscope in med school. And so it's like oh of course, you're listening to heart and lungs, everyone knows that. But it's kind of been fun to go back and be like oh what? For someone who has never put their ears to a stethoscope, like what are you hearing and what are you listening for?

Erin Welsh

Right.

Erin Allmann Updyke

So the two main things that we're listening to are your lungs and your heart. To a lesser degree, you can also use a stethoscope to listen to bowel sounds if you stick it on the abdomen. But like I don't. I'm just personally not a huge fan of bowel sounds.

Erin Welsh

Can you say more?

Erin Allmann Updyke

Bowel sounds are present or not present or hyperactive or not hyperactive. So they're just not that interesting when you think about the different pathologies. You can't get that specific with a stethoscope on a belly.

Erin Welsh

Okay.

Erin Allmann Updyke

In any case. We're mostly using a stethoscope to listen to what's going on in the chest cavity. And so I want to focus first on the lungs and then on the heart. And we'll talk about what is a quote unquote "normal" sound and what are the abnormal sounds that we're listening for to try and diagnose if something is amiss? And to do this, we will use some recorded lung sounds and heart sounds. So thank you so much to the open source databases that exist for us to get this and they will all be linked in our sources as well. All right. So the first thing is lung sounds. The sound that you hear when you are listening to a lung is literally the sound of air moving through the lung tubes, right, through your bronchi and through your bronchioles. The name for these lung sounds is vesicular breath sounds, that's the technical term for it.

Erin Welsh

Okay.

Erin Allmann Updyke

And you hear these vesicular sounds mostly on inspiration, so when you take a breath in, and then the first part of expiration and then they kind of fade out after that. So I'll play a quick clip for you to be able to listen.

TPWKY

(audio of vesicular sounds)

Erin Allmann Updyke

So that click, click, clicking that you hear is actually the heartbeat.

Erin Welsh

Yeah.

Erin Allmann Updyke

And we'll talk more about the heart in a second and that kind of does predominate in that particular clip. But what you hear in the background is that very gentle, very even whooshing, right.

Erin Welsh

Yeah.

Erin Allmann Updyke

It's like-

Erin Welsh

Rhythmic. Wave sounds.

Erin Allmann Updyke

Wave sounds. That is lung sounds, those are vesicular breath sounds. Nice, healthy inspiration, expiration. The deeper that you breathe in, the longer that you'll hear it. What's always amusing is when you ask people to take a deep breath, they'll usually go (gasp) for a really long time and then (whoosh) for a really long time and half of that expiration, you're not hearing anything.

Erin Welsh

Yeah, yeah.

Erin Allmann Updyke

But that's a bit of an aside.

Erin Welsh

I always feel like stressed because I'm like am I doing this fast enough? Am I breathing deeply enough? Are they going to miss something because I'm like... And then they're like, I'll breathe in and then they're like okay, breathe out, breathe in. And I'm like that's too fast. I can't do that.

Erin Allmann Updyke

Right, right. It's because you only hear that first part of expiration. So the expiration is less important except when there's pathology. So we'll get there. But the first thing that you might notice if you're listening for lung sounds is if you don't hear them at all. Because if you don't hear lung sounds when you put your stethoscope over someone's lungs, then that means that something is going on, right. You should hear air moving in and out. If you don't, it might mean that there's a blockage. So that could mean a mass, it could mean so much fluid that there's just a chunk that you're not moving air. It could mean that a lung has been collapsed.

Erin Welsh

Okay.

Erin Allmann Updyke

So there is literally no lung there for you to hear. Or it could mean that you have such massive obstruction, even from something like asthma, that there's just not air moving in and out enough that you can hear it with a stethoscope.

Erin Welsh

And so this would be like on one side, you would hear breath sounds because someone would have to still be breathing and on the other side, you would hear no breath sounds and that would indicate pathology?

Erin Allmann Updyke

Potentially, yeah.

Erin Welsh

Okay.

Erin Allmann Updyke

Yeah. So that's just breath sounds present, breath sounds absent. Then there are a couple of different abnormal lung sounds that we will focus on. And neither of these are specific in and of themselves to any one particular diagnosis. None of the exam that you get with a stethoscope is an absolute clincher necessarily. They're all part of an overall exam and findings that are going to help you try and figure out what's going on. And the types of lung sounds have a lot of different names in older literature and newer literature and across the globe but I'm going to use the names that the American Thoracic Society tends to use. And so that is wheezes and bronchi, and bronchi are just lower pitched wheezes, and then crackles. And with crackles, you have both fine crackles and coarse crackles. Now this is not all of the things that you would hear but this is the majority of the abnormal or also called adventitious breath sounds that you would hear. So let me play a clip for you of crackles.

TPWKY

(audio of crackles)

Erin Allmann Updyke

Do you hear that? They're kind of, I feel like crackles is a really good word in all honesty because they sound crackly, like you're like you're mixing up a piece of paper or something like that. There's other descriptions that I really love. There's a description for fine crackles specifically that they sound kind of like if you join velcro together and then separate it.

Erin Welsh

Okay.

Erin Allmann Updyke

That's another way to describe the fine crackles. And that clip that I played is a little more coarse crackles than fine crackles. What's causing these crackles? Fine crackles happen when you have inspiration that's opening these really small airways that have been collapsed. And that kind of collapse can happen for a number of different reasons. So you might have crackles, fine crackles or coarse crackles, in something like pneumonia. You might have crackles with something like heart failure because you have fluid in the lungs. Or you might have coarse crackles with something like chronic obstructive pulmonary disease, or COPD, or bronchitis. There's a lot of different types of pathology that can cause crackles. Then there are wheezes. Wheezes are one of my favorite sounds in the lung, even though no one wants to be wheezy, it's not good. But let me play you this clip.

Erin Welsh	Why are they your favorite?
Erin Allmann Updyke	I think that they're my favorite because a lot of the times with wheezing, you can really diagnose something with wheezes and then treat it a little bit more specifically.
Erin Welsh	Okay.
Erin Allmann Updyke	So with wheezes, we're usually thinking about asthma or COPD.
Erin Welsh	Okay.
Erin Allmann Updyke	Are those the only things in the world that can cause wheezes? Definitely not. If you have a foreign body ingestion, you might have a focal wheeze. And the wheeze is happening because there's air that's trying to squeeze through a really small constricted tube. So let me play the clip so you can hear that.
TPWKY	(audio of wheezing)
Erin Welsh	That sounded really horrible.
Erin Allmann Updyke	It's not great.
Erin Welsh	That makes me feel like I can't breathe.
Erin Allmann Updyke	Yeah. So in that clip, there's more inspiratory than expiratory wheezes. You can get both. It's not a good sound. You definitely know that there is something very much wrong going on here. But a lot of times with wheezing, it's something that we can then say oh based on the other things that I know about this person who's coming in here and this lung exam, I know what the next treatment is going to be. Does that make sense?
Erin Welsh	Yeah. Okay.
Erin Allmann Updyke	I think that's why I like wheezes. It's not like they're good.
Erin Welsh	So if there are more inspiratory wheezing than expiratory, then what does that indicate?
Erin Allmann Updyke	There's probably like a very detailed answer to that question that I don't specifically have.
Erin Welsh	Okay.
Erin Allmann Updyke	You can hear both inspiratory and expiratory wheezing. But classically something like asthma is described as expiratory wheezes but you can certainly get both inspiratory and expiratory wheezing in something like asthma, COPD, etc.
Erin Welsh	Okay.
Erin Allmann Updyke	So that's like the main types of lung sounds that you might hear. There's nuances there, there's other types of sounds that you might hear too. But these all just give the listener a bit of an idea about what is going on in the lung and then maybe what to do about it.

Erin Welsh	I have some questions if that's okay.
Erin Allmann Updyke	Okay.
Erin Welsh	Okay. So when you're listening to, first of all, where are you listening to the lungs? What is the best place to put that little end of the stethoscope?
Erin Allmann Updyke	Yeah. It's not about one place, it's about listening in multiple places and comparing them. So people are always going to listen minimum in like four different areas because the two lungs and the top and the bottom. But then there's also places that can stay kind of hidden and so sometimes you have to listen around towards the front side to get the right middle lobe. And really the more places that you listen across the back, the more information that you're going to gather. But it's really about comparing one side to the other and comparing the top to the bottom to listen to the whole lung.
Erin Welsh	Okay.
Erin Allmann Updyke	And it's not just... So it's a really good question of where do you listen because it's not just the sounds that you're hearing, it's also where you're hearing the sounds. Are you hearing crackles everywhere or do you only hear them in one specific spot? Are you hearing wheezing everywhere or just in one particular spot? And so that information is also really important as part of this whole exam.
Erin Welsh	Okay.
TPWKY	(transition theme)
Erin Welsh	When it comes to something like crackles and wheezing and stuff like that, like you said, the location of the origin of that or how pervasive it is or whatever, that's important. But what about the degree? Like if you're hearing fine crackles vs coarse crackles, what does that tell you? Or is it just like a descriptive?
Erin Allmann Updyke	Yeah. So it might give you ideas about what the underlying pathology is if it's more coarse vs more fine, you think of slightly different pathology. And if it's like bronchus, like those low pitched wheezes vs those high pitched wheezes, it's going to clue people into different types of disease that's going on, if that makes sense.
Erin Welsh	Okay.
Erin Allmann Updyke	There's too many different lung diseases to get into like all the specifics.
Erin Welsh	Well and then that kind of brings me to another question which is we use the stethoscope, it's a tool. How often is it the last line? Like how often is it the diagnostic tool rather than like oh I hear some wheezing, oh I hear some crackles, we better get you an X-ray to see just how bad it is or whatever.



Erin Allmann Updyke

Yeah. It so depends on the situation that you're in, right? If somebody is in an emergency room and they look super sick, no one's going to end with a stethoscope, right. You're going to be getting imaging, you're going to be doing more things. And you might be treating something even if you think that your lung exam sounded totally normal, right. It all just depends on the situation. There are definitely situations that this stethoscope might be the last part of your diagnosis. For example, a kid who has a known history of asthma who comes in having trouble breathing, you put a stethoscope on their chest and they're wheezing. Then you'd say okay, let's treat this as an asthma exacerbation. And so then you treat it and then see if they get better by listening to their lungs again. So there are situations where it's still something that you very much use and would not then need to do further imaging or even further imaging might not tell you all that much. But as we'll talk more about throughout this episode, there are a lot of things about the stethoscope that are limitations, I guess, of the stethoscope. And so there are a lot of new modalities that are much better for making diagnosis compared to the stethoscope.

Erin Welsh

Right. Because there are presumably a lot of lung pathologies that you wouldn't be able to hear through a stethoscope but you would be able to see in imaging.

Erin Allmann Updyke

Right. Yeah. Lung and heart especially.

Erin Welsh

And heart, yeah. Okay. So then that's sort of another question, and this applies to both, this is just like stethoscope broadly.

Erin Allmann Updyke

Yeah?

Erin Welsh

How subjective is it? Like obviously you can take these classes, like in med school you're trained, okay, this is a wheeze, this is a crackle, this is fine crackle, coarse crackle.

Erin Allmann Updyke

Yeah.

Erin Welsh

A lot of the hard stuff that we haven't touched on yet. And then be tested on that. But how subjective is it?

Erin Allmann Updyke

Yeah. That's I think one of the biggest questions. There's huge inter user variability in stethoscopes. That's one of the biggest downsides of them. What one person hears and what another person hears they might describe totally differently, they might hear things totally differently. And especially when it comes to a lung exam, the lungs change over time. And so what one person hears at one moment, another person might never be able to hear again because that sound might disappear or move or something like that. So there is definitely a lot of variability. There was a paper I read that was lamenting how medical students are just no longer trained in the stethoscope. And I was like come on.

Erin Welsh

I think I read the same one.

Erin Allmann Updyke

It was a little much.

Erin Welsh

Yeah. Well it's like all of these papers seemed so dramatic.

Erin Allmann Updyke

They're so dramatic.

Erin Welsh

They were like already holding a funeral for the stethoscope.

Erin Allmann Updyke

Yeah.

Erin Welsh

And I'm like I've never seen a doctor without one, even if they don't use them. Like come on now.

Erin Allmann Updyke

I think that it's such an interesting... Medicine has this tendency... Sorry, I wasn't going to riff like this until way later in the episode but-

Erin Welsh

Riff away, I love it.

Erin Allmann Updyke

Medicine has this tendency to really dramatize new technologies as being the end of the practice of medicine.

Erin Welsh

Yes.

Erin Allmann Updyke

And I think that the stethoscope has absolutely gotten caught up in that, right? Where it's like well if students can't use the stethoscope, then where has medicine gone? When it's like sorry, ultrasound is great.

Erin Welsh

Right.

Erin Allmann Updyke

But at the same time, I can say, and this is just like me as an individual and of one, I use my stethoscope very frequently, almost every day as a primary care provider, especially one who sees kids. And so I don't think that we are at this day and age in 2024 at the point where anyone's throwing their stethoscope out the window. And I do think that it still has clinical uses and sure, maybe someday it won't and we'll be able to replace it and that's okay.

Erin Welsh

I know.

Erin Allmann Updyke

But for right now it definitely still has its place and it also isn't the only thing and it's not perfect for sure.

Erin Welsh

Yeah. I mean medicine has such a short memory where it's like-

Erin Allmann Updyke

I know!

Erin Welsh

We think that somehow we are here and this is how we've always been here. We forget.

Erin Allmann Updyke

Well that's why I'm so excited, Erin, to hear about when this came because I know there was controversy when the stethoscope came to be. And I love... I'm excited for it.

Erin Welsh

But onto the heart.

Erin Allmann Updyke

Onto the heart!

Erin Welsh

We still have a whole other organ to discuss.

Erin Allmann Updyke

I feel like the heart is what probably people think about and focus on the most when you think of the stethoscope. I don't know, maybe it's a toss up, heart and lungs. But the heart is a big thing that you're also listening to.

Erin Welsh

Yeah.

Erin Allmann Updyke

And probably what gets even more focus in med school training in terms of the specifics of what you're trying to listen for and the diagnosis that you're trying to make when it comes to heart sounds. Because with a stethoscope, with a well trained ear as they say and a stethoscope, you really can make diagnoses of the heart function a little bit better than you can with the lungs. At least that's my interpretation as a not perfect provider. I don't know, whatever. So what is someone listening to when they're sticking a stethoscope on your heart, on the front side of your chest? The first thing of course is the heart sounds that you would expect to hear. And that is Lub dub, lub dub. Let's take a listen to a normal heart, shall we?

TPWKY

(audio of normal heart)

Erin Allmann Updyke

Lub dub, lub dub.

Erin Welsh

Yeah.

Erin Allmann Updyke

Right?

Erin Welsh

Pretty much what I expected.

Erin Allmann Updyke

Right. Do you know what those sounds are?

Erin Welsh

Your heart. Technically right, Erin.

Erin Allmann Updyke

100% right, Erin. Oh that was quite funny. So yes, it is your heart. The first lub, that first sound, also called S1, is the beginning of what's called systole and that is when your heart is contracted. So that sound that you hear, lub, is actually the sound of your valves, specifically the valves that go between the top half and the bottom half of your heart, so your mitral and tricuspid valves, snapping shut. That is the sound. It's a snapping shut of those two valves. That's that first sound that you're hearing. And then the second sound that you hear, dub, is the beginning of diastole and that is when your heart is relaxing, it's filling back up. And the sound that you're hearing is the pulmonic and the aortic valves closing. So the valves that block off your heart from shunting the blood to your lungs and the rest of your body.

Erin Welsh

Right.

Erin Allmann Updyke

So those are the two sounds that we expect to hear. S1, S2. It's the closing of the first two valves and then the closing of the second two valves. And there's a lot. Like that sounds just like blah. There is so much pathology that you can hear inbetween those two sounds. If those two sounds are split in certain ways and if one sound is stronger or quieter, where you're hearing one sound as stronger than the other. So there is quite a lot of pathology that you can actually distinguish within heart sounds. The biggest thing, like the most obvious thing that we're looking for in terms of pathologic heart sounds are murmurs. So if the sounds that you hear, lub dub, are actually just the closing of valves, those are kind of discreet sounds, right? Lub dub, lub dub.

Erin Welsh

Yeah.

Erin Allmann Updyke

Murmurs are when those sounds get blurred a little bit. And they get blurred because of turbulent flow. And so what a murmur sound tells you is that something is going on with the valves, which one depends on the murmur and depends on where on the chest you hear it. But it means that there's something going on with the valves so that the flow of blood across those valves is no longer a nice linear flow like it should be and it's turbulent. And so it causes whooshing type of sounds that you can hear. Let me play a couple of examples of the most classic kind of murmurs because I think it'll give you a really good sense of how different it is from just a lub dub, lub dub.

TPWKY

(audio of heart murmurs)

Erin Welsh

Whoa.

Erin Allmann Updyke

Right? You hear how different that sounds?

Erin Welsh

Yeah, it's not... Yeah.

Erin Allmann Updyke

Yeah. So that one is a murmur called aortic stenosis. So your aorta of course is what connects the left ventricle, the left side of your heart, to the rest of your whole body. And that valve is supposed to close at S2, it's supposed to be open during systole, when your heart is contracted, and blood is supposed to be able to flow to your whole body. But what can happen sometimes is that valve gets stenotic or hard. And so then it doesn't open all the way, so it's more narrow. And when that happens, when the blood tries to go across that valve, it gets forced. Think of forcing, like sticking your finger on your hose or something.

Erin Welsh

Yeah.

Erin Allmann Updyke

And the water that's previously just flowing quietly is like whoosh! Right?

Erin Welsh

Yeah, yeah.

Erin Allmann Updyke

So you hear this very specific kind of murmur that's like whoo, whoo, whoo, where it gets louder and then quieter. It's called a crescendo-decrescendo. I'm telling you, murmurs are like... That's a whole language.

Erin Welsh

A musical, yeah.

Erin Allmann Updyke

Yeah. And so if you hear that, especially at specific places, then that can tell you that murmur, that specific murmur means that someone has aortic stenosis. Without needing any additional imaging, you can say well you have an aortic stenosis.

Erin Welsh

Okay.

Erin Allmann Updyke

If you hear that murmur.

Erin Welsh

Yeah.

Erin Allmann Updyke

There's lots of other kinds of murmurs and depending on where and when you hear them and what they sound like, that can tell you is this murmur because someone's mitral valve isn't working correctly? Is it because someone's tricuspid valve, so on the right side of their heart, is that the one that's not working? Is the murmur in systole, so when the heart is contracted, or is it in diastole when those ventricles are trying to fill back up, right? There's a lot of different things that you can get from when that murmur is and what it sounds like.

Erin Welsh

Interesting.

Erin Allmann Updyke

I know. So there is definitely a lot of pathology that you can't hear with a stethoscope. Even that example that I gave of aortic stenosis. If it's really severe, you actually don't hear it at all because now it's just like such a tiny valve that you can't even hear the flow across that valve.

Erin Welsh

Okay.

Erin Allmann Updyke

And there is varying degrees. For example, let me play a great, this is a great classic med school murmur that happens with what's called mitral regurgitation. So when the valve on the left side of your heart is a little floppy, then sometimes you get backflow of blood-

Erin Welsh

Okay.

Erin Allmann Updyke

During when your blood is supposed to be squeezing out to your aorta. So if you listen to this:

TPWKY

(audio of mitral regurgitation heart murmur)

Erin Welsh

Whoa.

Erin Allmann Updyke

So that one sounded different, right, than the previous murmur?

Erin Welsh

Yes.

Erin Allmann Updyke

So that one also had a fun little, what's called an extra heart sound that you can get when you have other kinds of heart pathology. If your heart is very dilated, then you might get these extra, instead of lub dub, it's like lub da-dub, lub bub-bub kind of a thing.

Erin Welsh

Yeah.

Erin Allmann Updyke

So you might hear that murmur in someone if that pathology is severe. If you maybe have a crappy stethoscope or don't know what you're listening for or if it's just not that severe, you have a little bit of regurgitation, then yeah, you might not hear that with a stethoscope. There are other modalities like ultrasound, going to keep saying it, where you would be able to see the blood flow because you're actually seeing the blood rather than just hearing the blood flow. So that's the main and most obvious kinds of things that you'd be listening for in a heart. And really it all comes down to trying to get a picture of how the valves are working and how the heart is squeezing. A little bit of information about how it's squeezing. And you can get all of that information just by listening for these murmurs and listening at different places on your chest. So you asked when we were talking about the lungs where you listen, there's four main places that people listen to listen to the heart. And those are named after the four valves. So aortic, pulmonic, tricuspid, and mitral. All Physicians Take Money. That's how we remember it.

Erin Welsh

It took me a second. I was like whoa. Okay.

Erin Allmann Updyke

Sorry, that's how we remembered it in med school. But so depending on what type of murmur you hear and where you hear it, it can give you clues as to what that pathology might be.

Erin Welsh

Okay.

Erin Allmann Updyke

And then there are degrees of like is it a really loud one or is it a really soft one? Does it start out loud and then get softer? There's so much that people who are really, really good at murmurs would be like... The joke is like if a cardiologist can just touch their stethoscope to someone's chest, they'll hear a murmur that a med student would have to listen really closely with the best possible stethoscope to hear it. There's all these jokes about it.

Erin Welsh

That's a really good joke.

Erin Allmann Updyke

Isn't it? I'm just hilarious. I told it really well. But that's like how you rate the degree. Like is it a 1/6, a 3/6, blah, blah, blah.

Erin Welsh

Oh there is like a scale.

Erin Allmann Updyke

Yeah, there's a scale of 6 on how loud the murmur is.

Erin Welsh

Okay. Interesting. And then presumably, I mean this is getting into other things, not stethoscope but presumably then that is do we do surgery? What are the steps that you take?

Erin Allmann Updyke

Totally, totally. What are the next steps? It all depends on what that murmur is. How long has it been there? Because there are lots of totally benign murmurs especially in childhood. These tend to be often described as musical murmurs. The ones that we listened to were all very pathologic murmurs. But there are lots of different flavors of murmur and some of them, if someone hears, would definitely require follow up and some of them probably wouldn't.

Erin Welsh

Okay.

Erin Allmann Updyke

It all just depends on how old is the person? Is it the first time you're ever hearing it? Etc, etc.

Erin Welsh

Right.

Erin Allmann Updyke

So that's what we do with the stethoscope. We'll talk a lot more about how far we've come. But that's like when someone sticks a stethoscope on your chest, that's what they're trying to figure out is does it just sound like lub dub and like (whooshing) or does it sound weird?

Erin Welsh

Yeah.

Erin Allmann Updyke

There you go. Erin? How'd this guy come up with it? How did we do anything before it?

Erin Welsh

Oh those are great questions. And I can't wait to tell you what I can of the answers to them right after this break.

TPWKY

(transition theme)

Erin Welsh: We've kind of talked about this already, Erin. But truly is there anything that symbolizes 'doctor' more than the stethoscope?

Erin Allmann Updyke: I mean the little, what do you call it? The snake thing.

Erin Welsh: Caduceus or whatever?

Erin Allmann Updyke: Yeah, no. No, it's the stethoscope.

Erin Welsh: I mean okay, I thought maybe the white coat could also count itself as a contender.

Erin Allmann Updyke: Sure, sure. Okay.

Erin Welsh: But then you could see a picture of someone in a white coat and think oh maybe they're a scientist who works in a lab.

Erin Allmann Updyke: Right. Yeah. It's a little more generalized.

Erin Welsh: Yeah. But the stethoscope, that's the thing that acts as the visual cue for a doctor.

Erin Allmann Updyke: Yeah.

Erin Welsh: It's included in every single doctor Halloween costume.

Erin Allmann Updyke: Yeah.

Erin Welsh: Any kids doctor play set, any toy figurine of a doctor. If you Google Image search just the word doctor, which I did-

Erin Allmann Updyke: Of course.

Erin Welsh: Nearly every single picture features a person in a white coat with a stethoscope. I will note that the first picture that did not include a physician with a stethoscope was McDreamy from Grey's Anatomy, I can't remember the character's real name. Was it Jared?

Erin Allmann Updyke: It does start with a G I think? Nope. McDreamy.

Erin Welsh: Anyway. McDreamy.

Erin Allmann Updyke: McDreamy is the gray hair guy, right?

Erin Welsh: I don't think, I don't know if it started out gray. I never finished the show, I stopped when one of the characters turned into a ghost. And yeah.

Erin Allmann Updyke: I remember that.

Erin Welsh: Yeah.

Erin Allmann Updyke: He had an LVAD too, right? Anyways.

Erin Welsh

Erin, it was like 15 years ago.

Erin Allmann Updyke

Erin, it doesn't matter.

Erin Welsh

But studies have shown that doctors with stethoscopes are perceived as more trustworthy than those without, which I think is fascinating. The stethoscope is such an establishment. It is such an integral part of practicing medicine even if it's not used that it seems impossible to imagine a time when it didn't exist or a future without them in it. Although as we'll discuss, that does seem to be the future that some people are envisioning. It's more controversial than I bargained for.

Erin Allmann Updyke

I know.

Erin Welsh

I did not expect to see articles with headlines like Bring Back the Stethoscope! Save This Relic of Medicine! And I'm like really?

Erin Allmann Updyke

It's hilarious to me how much drama there can be in medicine sometimes about things like that.

Erin Welsh

Right. I was like we just mentioned Grey's Anatomy, of course there's drama in medicine. But as it turns out, the stethoscope is actually a lot younger than I expected it to be. And its development marked the beginning of a huge transition in medicine and in the relationship between patient and doctor. So let me take you back to the second half of the 1700s. Medicine during this period of time was still very much under the spell of Hippocrates and the humoral theory of disease where illnesses of course were thought to be caused by an imbalance in the body's humors, blah, blah, blah. Human anatomy was still in its early stages since dissections had long been seen as sacrilegious and only recently were people beginning to develop like an atlas of the entire human body. And as a result, this belief persisted that most illnesses were not localized but systemic, owing to this humoral imbalance. And I'm talking the origin was systemic, not the effects were systemic.

Erin Allmann Updyke

Right, right.

Erin Welsh

And so things like heart disease, liver disease, illnesses associated with the lungs, they weren't really conceptualized the way that we think of them today. Diseases of the heart were known but symptoms indicative of heart disease weren't really considered, if that makes sense. So like someone has a symptom of something and you think oh, that symptom is in their heart. But it's a systemic disease.

Erin Allmann Updyke

I see.

Erin Welsh

It's their entire body's humors that are imbalanced-

Erin Allmann Updyke

Right.

Erin Welsh

Not the anatomy of their heart is actually not functioning the way that it should.

Erin Allmann Updyke

Right. It's like their heart isn't working because the rest of their body is off balance.

Erin Welsh

Yes.



Erin Allmann Updyke

Okay.

Erin Welsh

Yeah. And part of what perpetuated this was that in the late 18th and into the 19th centuries, physicians were limited in what they could observe in a patient beyond what the patient themselves could tell them. Which is important as we know and it sort of I think has over time, now the pendulum has swung in the other direction to some degree. But it doesn't always capture all of the elements, right? Like someone can feel completely not sick whatsoever and there could be something that shows up on whatever imaging or shows up even like with a stethoscope. And if you remember from our fever episode, watches with second hands weren't developed until the 1690s which only then allowed physicians to accurately measure pulse rate. And the mercury thermometer invented, in 1714, wasn't regularly employed by physicians until the early to mid 1800s. And the incorporation of these tools into medicine, especially for diagnostic purposes, was part of this larger trend in the scientific search for Truth with a capital T. Like objective truths that could be measured and standardized so that their meanings remained constant across individuals, across space, and across time. In medicine, it seemed to be driven in part by a mistrust by the physician of the patient's account of things.

Erin Allmann Updyke

Yeah.

Erin Welsh

The physician's like well I can't trust what you're telling me, I gotta see it for myself. I gotta hear it for myself. I gotta smell it for myself, whatever it is.

Erin Allmann Updyke

Right.

Erin Welsh

Not necessarily malicious but a recognition that people's accounts can vary, sensations can feel differently to different people, and that there could be a disconnect between the way someone feels and what they're experiencing. Like fever, for instance, where you might feel freezing cold but actually your temperature is burning up. Low grade fever. One of these tools or methods to make objective measures in medicine was developed in 1761 by a physician from Vienna named Leopold Auenbrugger. Essentially, percussion entailed tapping a person's body with their fingers and then listening to the sounds produced, which were supposed to tell you the quote "vitality of the internal organs", especially the heart and lungs. So you would like bunk, yeah. And he wasn't the first to listen to the internal goings on of the organs but he was among the first to write about it systematically and apply it to specific diagnoses. So like maybe a dull thump meant that the lungs were full of fluid or a hollow echo meant the spleen was doing just fine. I don't really know the guidelines, I made all of that up. But neither did the physicians who came across his treatise which apparently included only the vaguest of descriptions.

Erin Allmann Updyke

Gotta love that.

Erin Welsh

Yeah, right? He's like let me tell you about this method, it's really great. And you just tap your fingers on that person's body and then listen.

Erin Allmann Updyke

Do it. Yeah.

Erin Welsh

And then what you hear will tell you everything about what the person has.

Erin Allmann Updyke

The end.

Erin Welsh

The end. And so this sort of lack of description probably had something to do with his method of percussion not catching on the way that he had hoped. But it was also because what he was proposing was very much outside of the norm for medicine at the time. Because for one thing this method of percussion required physicians to think of the body and disease in anatomical terms, which was still very much a new concept. Anatomy took a backseat in most explanations of the day of how disease began and how it developed. And secondly, to successfully employ the percussion technique, physicians really had to get in there, like up close and personal, they had to touch their patients and then they would have to bring their head close to their chest or whatever part of their body to get a good listen. And this was something that called into question the physician's dignity since manual labor was considered beneath the physician at the time. They were intellectuals, not common laborers, they use their minds, not their hands.

Erin Allmann Updyke

I find that so interesting and not at all a part that you learn about medicine.

Erin Welsh

Yeah, yeah. Well and it's also... Okay, let me read you a quote that I think even brings a little bit more color into this picture. Quote: "In particular, the physical intimacy required by percussion threatened to undermine the professional standing of the physician. Even to place him in a class with the surgeon, over whom he affirmed both medical and social superiority." End quote.

Erin Allmann Updyke

Wow. Surgery vs medicine.

Erin Welsh

So it's like are you talking about a surgeon?

Erin Allmann Updyke

They run deep!

Erin Welsh

Yeah, they do.

Erin Allmann Updyke

Wow.

Erin Welsh

So I think it was really interesting, like the divide was so stark and the hierarchy was so well established.

Erin Allmann Updyke

Wow.

Erin Welsh

Where a physician was a thinking man. And I say 'man' because-

Erin Allmann Updyke

Man' on purpose.

Erin Welsh

Pretty much, yep, what I mean.

Erin Allmann Updyke

Yep.

Erin Welsh

And yeah. So it was like no, they make diagnoses with their books, with their minds, with the way that they take in all of the data. They don't cut, they don't touch. That's just fascinating to me.

Erin Allmann Updyke

Oh Erin, this profession.

Erin Welsh

Yeah. I know, I know. And so Auenbrugger's percussion had a lot working against it and it largely faded into obscurity. But it did catch on in a handful of doctors who passed it down to their trainees. One of these trainees went by the name of René-Théophile-Hyacinthe Laennec. I'm just going to say Laennec from this point forward. Laennec was born in France on February 17th, 1781. When he was just five, his mother died from tuberculosis and his father sent him to live with a great uncle. His childhood and youth was filled with playing the flute, reciting and composing poetry, learning Latin and Greek, and going to the countryside for fresh air when his asthma acted up. And I just need to... Okay, I found this paper from the 1920s that was celebrating the life of Laennec. Like no one was higher in this person's esteem than Laennec was. It was the most praise. Okay, let me just get to it.

Erin Allmann Updyke

Okay.

Erin Welsh

Quote: "From this land of salt sea breeze, gray rocks and downs, and druidical forests of misery, came the calm and prodigious intellect of one comparable only to Hippocrates in his vast store of medical lore and almost superhuman accomplishments." End quote. Okay, I mean Laennec did-

Erin Allmann Updyke

He put a tube on someone's chest. I mean he did a lot but like...

Erin Welsh

I know. I mean he also was the first to, besides the stethoscope, he did other things too. I think he did Laennec's cirrhosis, he described that for the first time. I think he was first.

Erin Allmann Updyke

Yeah, there's a lot. There's rules named after him and stuff.

Erin Welsh

Yeah.

Erin Allmann Updyke

Yeah.

Erin Welsh

And he identified melanoma as being a cancer and separate from... Like a lot of people thought at the time that it was tuberculosis, like the black granules that came to the surface. And he's like no, this is not that. Anyway. But when Laennec was 14 and a half, he started as a student in the School of Medicine of the Hôtel-Dieu at Nantes. And quote "soon after he was appointed military surgeon of the third class at a salary of something like nothing a year." End quote. Which first of all, a few things to unpack. I love the description of something like nothing. And then soon after, he was 14 when he enrolled-

Erin Allmann Updyke

Yeah. What is soon?

Erin Welsh

So just imagine like a 15 year old.

Erin Allmann Updyke

How soon are we talking? Couple years? Five years? One year?

Erin Welsh

I would think he was probably within a few years.

Erin Allmann Updyke

Oh my god.

Erin Welsh

Yeah. So in this stint, he did a bit of surgeoning with the troops. And then when that was over he continued his medical education in Paris, which of course is where he invented the incredible device for which he still receives just untold praise from like the author of that article. The story goes that as he was on his way to the hospital one morning in September 1816, he saw some children playing with a wooden beam and a pin. One kid held the end of the piece of wood to his ear while his friends scratched the other end with a pin, sending little signals. Okay, did this actually happen? Probably not. I doubt it. I highly doubt it. I don't think he ever wrote about it personally, I think it only shows up in people who wrote about Laennec.

Erin Allmann Updyke

How fun.

Erin Welsh

Yeah.

Erin Allmann Updyke

That fateful day he remembered seeing those children. Like come on.

Erin Welsh

But maybe it did happen.

Erin Allmann Updyke

Maybe.

Erin Welsh

And I think if it did happen, the incident would have probably been soon forgotten. If not, he had a particular patient. And like you heard about in the firsthand account, he couldn't use his usual method of percussion or direct auscultation where he put his ear directly on this person's chest because his patient was a young woman with suspected heart failure. Which we didn't mention this at the top but we included audio of a clip of someone who has heart failure.

Erin Allmann Updyke

Yeah.

Erin Welsh

In that firsthand account.

Erin Allmann Updyke

Hear those crackles.

Erin Welsh

The crackles, yeah.

Erin Allmann Updyke

Those heart sounds.

Erin Welsh

And so yeah, he was like I don't want to get up close and personal, this is really uncomfortable. And so then in the firsthand account he rolled up that piece of paper and was like whoa, this is amazing.

Erin Allmann Updyke

Wow.

Erin Welsh

This has potential not only for this particular patient in this particular situation but so many things. Like he immediately saw potential. And over the next few years, Laennec put this new tool to work and he called it the stethoscope, meaning I look into the chest. He played around with different designs and materials, starting with a piece of paper tightly rolled like he described. And then he would like glue the ends to try to create more of a, I don't know, capture the sound because it would come out. And I don't know how anything about like audio engineering works.

Erin Allmann Updyke

Yeah, that was the thing I thought about looking into and then I was like physics and me don't get along.

Erin Welsh: Yep.

Erin Allmann Updyke: So I didn't.

Erin Welsh: And then he tried different materials. He tried ivory, he tried goldbeater's skin, which I looked it up, it's made from an animal's intestine. So like yeah.

Erin Allmann Updyke: Okay. Gross.

Erin Welsh: Then he tried various woods. And ultimately he landed on soft woods with an opening at the end. So Erin, you described this modern stethoscope.

Erin Allmann Updyke: Yeah.

Erin Welsh: If you saw, if you just saw in a random museum or antique store or something one of Laennec's early stethoscopes, you would not recognize it as a stethoscope.

Erin Allmann Updyke: Yeah.

Erin Welsh: You'd be like what is this like long pin? It's like a wooden cylinder.

Erin Allmann Updyke: I would because I've seen pictures of them. But if you haven't seen pictures of them, you would not. You would think it was just a stick thing.

Erin Welsh: Yeah.

Erin Allmann Updyke: Yeah.

Erin Welsh: It looks like a stick. Maybe there's like a flaring out at the end.

Erin Allmann Updyke: Maybe, yeah.

Erin Welsh: Maybe. Which is funny because I think that like now our image of the stethoscope is of the modern stethoscope, which is not that old. And so it's just funny. It's like anyway.

Erin Allmann Updyke: Yeah.

Erin Welsh: But so in 1819, Laennec presented his stethoscope to the world with the publication of his two volume 'On Mediate Auscultation' available for the low price of 13 francs or 16 if you wanted a stethoscope included with it. He made a bunch of them which is a complete stroke of genius, right?

Erin Allmann Updyke: That is really funny.

Erin Welsh: I love that so much.

Erin Allmann Updyke: He's like here's the book and here's the thing!

Erin Welsh: Yeah. He's like you don't have to wonder what this is like, you don't have to wonder what these noises I'm describing, see for yourself, hear for yourself.

Erin Allmann Updyke: Love it.

Erin Welsh: Yeah. His book and the stethoscope took off in popularity, probably in part because the device was included with it or you could buy it. But also because his descriptions of various chest sounds in association with certain diseases were so detailed and precise.

Erin Allmann Updyke: Yeah.

Erin Welsh: Like let me read you a quote.

Erin Allmann Updyke: Oh I love it.

Erin Welsh: Quote: "When the patient coughed or spoke and still more during respiration, there was heard a tinkling like that of a small bell which has just stopped ringing or of a gnat buzzing within a porcelain vase." End quote.

Erin Allmann Updyke: Right. You really understand what you're hearing or what you're supposed to be hearing or what he was hearing.

Erin Welsh: Yes. What a way with words.

Erin Allmann Updyke: Yeah, that's cool.

Erin Welsh: Like I don't think I would be as creative or articulate at all.

Erin Allmann Updyke: You heard me, Erin. I was like it's like whoosh and then it goes woo-whoosh.

Erin Welsh: Now put that in writing and there you go. And so in these volumes, he created new terminology entirely, like stethoscope, but also rails, fremitus, cracked pot sound, metallic tinkling, egophony, bronchophony, cavernous breathing, puerile breathing, veiled puff, and brute. Yeah.

Erin Allmann Updyke: Yeah. Some of those words we still use.

Erin Welsh: It's kind of amazing. I mean okay, maybe I am back to thinking that he's Hippocrates level. But with this tool and his book, Laennec revolutionized medicine. The stethoscope has been called the first major diagnostic tool of modern medicine. Before the stethoscope, there was virtually no way to observe what was going on inside the body. Except for autopsy which of course happened after death or surgery which at the time almost always led to death. With this device, Laennec was able to say these sounds are linked to this disease or this illness and then he could confirm the location and pathology in autopsy later on. Something that again was in its early stages, like the concept of localized disorders. His book flew off the shelves as the stethoscope picked up speed, leading to more refined descriptions, applications outside of lung and heart sounds like in obstetrics and orthopedics. And then people started to make variations in the design of the device that allowed for better listening.

So Laennec, who was only 35 years old when he invented the stethoscope, would only live to see some of this excitement. Because of course having a diagnostic tool doesn't necessarily help prevent or treat or cure disease. Laennec had never been the image of perfect health even as a kid. But as the 1820s rolled around, his asthma, his insomnia, and his chest pain got worse. In 1826, he had a sense that things were coming to an end. He had a fever, productive cough, shortness of breath. And he'd been a doctor long enough to know the signs of tuberculosis when he saw them. But he had for years denied that he had the disease. A lot of people in his family had gotten sick and died of tuberculosis. And so maybe it was sort of a matter of just like this can't happen to me. How can this happen to me? And so finally in the summer of 1826, while in the countryside, he had his physician nephew listen to his chest using the tool of his own invention, what he called quote unquote "the best part of my legacy". And the diagnosis... I don't know why I feel so sad.

Erin Allmann Updyke

I know. This is more emotional than I expected.

Erin Welsh

I know. I can feel tears. The diagnosis was... I'm laughing but I really do feel sad.

Erin Allmann Updyke

Yeah.

Erin Welsh

The diagnosis was tuberculosis. And he died later that summer at the age of 45.

Erin Allmann Updyke

Wow.

Erin Welsh

Yeah. But as we all know, the stethoscope didn't die with him at all. There was some resistance. Erin, you kind of alluded to that earlier. Like some patients were afraid of this new instrument, some physicians felt like the physical labor aspect of it gave off too much of a surgeon vibe. But most of the energy was focused on better incorporating the tool into medicine. Like how can we use this? How can we maximize the use of this tool? And so the rest of the 19th century was filled with improvements on Laennec's simple design. In the 1850s, Dr. George Philip Cammann developed the first two ear stethoscope. Smaller stethoscopes were introduced so you could carry them more easily. People worked on flexible stethoscopes. And in the early 1900s, physicians realized that they could pick up sounds better if they stretched a diaphragm over the mouth of that little open cup at the end of the stethoscope. As the century came to a close, it seemed like the stethoscope was here to stay, a permanent fixture in medicine. But is there such a thing?

Erin Allmann Updyke

Fun question.

Erin Welsh

Yeah. I mean if there is, the stethoscope is probably the closest thing to it. But its future seems uncertain. At least that's what we've been talking about based on some of these papers titled things like 'Throw the Stethoscope Away: A Historical Essay' and 'In Defense of the Stethoscope and the Bedside'.

Erin Allmann Updyke

I have some good ones too.

Erin Welsh

And although these papers are from the last couple of decades, the sentiment behind this is a lot older, as is the downward trend in the stethoscope's use. Why is that? we've talked about this. Like other diagnostic, more precise tools have come onto the scene that provide better and more accurate pictures of what might be going on. Like the X-ray machine, which is quite old and when it was introduced and started to become widely used, it replaced the stethoscope as a major diagnostic tool of lung conditions. Or CT scans, MRIs, chest radiographs, ultrasounds, and so on. With these instruments, we move closer and closer to objectivity in medicine. In terms of measuring tools, not in terms of bias. Medicine is not objective by any means.

Erin Allmann Updyke

Right.

Erin Welsh

Percussion was developed and the stethoscope invented so that physicians could better observe for themselves what was going on inside their patient, to not have to rely on their patients testimony entirely to make a diagnosis and decide on a course of treatment. But like we've talked about, the noises that people hear, the sounds that you hear in a stethoscope, they are open to interpretation; to misdiagnosis; to simply not hearing them at all. And several studies have confirmed that stethoscopes harbor lots of germs like MRSA, although I don't know if they are significant vectors for transmission or if that's been measured.

Erin Allmann Updyke

Oh there is a paper that measures that. It doesn't carry C. diff which is nice. In most of the papers.

Erin Welsh

That's great, yeah.

Erin Allmann Updyke

Yeah.

Erin Welsh

But teaching these sounds can be difficult in that regard. It's like in the ear of the beholder, I guess. A squawk to one physician might sound like a bell clang or crackle to another. The ideal diagnostic test in medicine is one that produces results that look the same to every physician, right. Like wouldn't we want them to be universally yes/no binary almost?

Erin Allmann Updyke

We would.

Erin Welsh

We would, I mean that's the ideal.

Erin Allmann Updyke

Yeah. Is any diagnostic test capable of that at this point?

Erin Welsh

No, I doubt it. But I mean maybe. But I think we can get closer.

Erin Allmann Updyke

Yeah.

Erin Welsh

And I think that's the whole thing behind it.

Erin Allmann Updyke

Yes.

Erin Welsh

And this isn't to say of course that noting that squawk or bell clang or whatever isn't important because that might be what gets you to order additional tests to find out what's going on. And the stethoscope itself is I think an opportunity to keep medicine present in the room, like grounded in humanity and physical diagnosis and dependent in part on bedside skills. And I want to hear your thoughts on all this. But first let me leave you with-

Erin Allmann Updyke

I have a lot.



Erin Welsh

Yeah. Let me leave you with this quote from a 1979 article that I really liked. Quote: "Today the stethoscope is the old warrior of medicine. Although it cannot compete with the array of elaborate and expensive technologies for which it paved the way, it clings tenaciously, resisting retirement. Its staying power in modern times is based in part on its giving both physicians and patients a sense of continuity with the past, identified with dependable diagnosis, the familiar object evokes confidence. Most important, it provides those physicians who still know how to use it with good, immediate, and low cost information that can eliminate the need for complicated diagnostic tests." End quote. So Erin, what do you think? Is the art of auscultation something we should preserve or is that sentiment just a reflection of the natural resistance to change and fear of the new?

Erin Allmann Updyke

Ooh, I cannot wait to tell you Erin's opinion corner about this right after a quick break.

TPWKY

(transition theme)

Erin Allmann Updyke

Erin, it's funny that you ended that section with a quote from a paper from 1979 because I actually, I'm guessing it's the same paper. Let me see.

Erin Welsh

The one by Reiser from Scientific American?

Erin Allmann Updyke

Yes!

Erin Welsh

I loved that paper.

Erin Allmann Updyke

The Medical Influence of the Stethoscope'?

Erin Welsh

Yes.

Erin Allmann Updyke

I also have a quote from that paper but it's a totally different quote and it's like the opposite end of the coin. And I think what it highlights is what you mentioned which is like why does the stethoscope represent what it has come to represent in this push and pull of new technology and physical exam and all these things? So let me read you my quote from that same paper.

Erin Welsh

Yay, okay.

Erin Allmann Updyke

Quote: "When the 19th century physician chose to make diagnosis less on patients' verbal accounts of their symptoms and more on the physical signs of illness that in many cases he alone detected, he was obliged to make up his own mind about illness. As a medical era, the 20th century must be characterized as a time when physicians have come to rely less on themselves and more on specialists, technicians, and machines to collect and evaluate the evidence of disease." End quote.

Erin Welsh

Erin, I almost included that quote.

Erin Allmann Updyke

It's such a good one because that really is what it feels like it comes down to. Where there are people who say that the stethoscope is a mark... Like the ability to use a stethoscope to make a diagnosis, to have that good ear, that's the mark of a good physician. And the fact that we are kind of doing away with it or there are people who say we need to do away with it, like that is the problem with medicine and blah, blah, blah, right. These new technologies are going to replace us as physicians, that is something that you hear. And not just about the stethoscope, that's like a fear of medicine.

Erin Welsh

Right.

Erin Allmann Updyke

What is the future of the physician in the face of all of these new technologies? I think that the stethoscope and the problems with the stethoscope and the new technologies that exist really get at the heart of that fear that exists in the practice of medicine. Okay, now for my opinion corner?

Erin Welsh

Yeah, yeah, I want to hear your opinion corner.

Erin Allmann Updyke

So like I said, I use a stethoscope pretty frequently. Do I use it every day? Definitely not. Do I use it on every patient? Definitely not. Do I always feel like I'm really confident in what I'm hearing? Nope, definitely not. I think that in terms of the future of medicine question, the stethoscope is such a minor thing in that.

Erin Welsh

It's a symbol Erin.

Erin Allmann Updyke

Yeah. It's \$100 or \$150 which when I was in med school was super expensive and for a lot of people is very cost prohibitive. But compared to an ultrasound, compared to an X-ray-

Erin Welsh

Right.

Erin Allmann Updyke

It's really a drop in the bucket. Is it useful? Sure, it's still useful today. Is it the end all be all? No. Should it be a substitute for these incredible technologies that are coming out? Absolutely not. And what I think is so interesting is that there doesn't have to be a reality where these new technologies threaten medicine as a practice, right? If we use the stethoscope as an example, yes, there is wide user variability in the stethoscope and it's an imperfect tool and there's areas for improvement. But it has its place and so many other tools that we also use have inter user variability, right. Think about an X-ray, not every radiologist interprets an X-ray the same way. And so I think that what this lets us get at is one of the ways that the stethoscope itself and the practice of auscultation can actually and has begun to be improved upon in the same way that X-rays and radiology and things are being improved upon. And that is data.

So with the advent of digital stethoscopes, you are able to not only augment the sounds that you're hearing by doing things like noise canceling, like reducing ambient noise and then amplifying the sounds that you hear, which makes it easier for the user to hear the sounds. It also allows for us to record sounds. Recording tons and tons of sounds of normal and abnormal hearts and lungs allows for things like machine learning algorithms to compile all of this data. And what's really cool is that you said, Erin, what is a crackle to one person might sound like a squawk to another. And that is true in that someone might say one word or a different word or interpret something. But if you look at waveforms, there are very distinct waveforms associated with these things that we call crackle, fine crackle, coarse crackle. Like if you can look at this on a computer screen instead of only relying on your ear to hear the differences, then you can actually pick up on things in a much more specific way by combining the digital stethoscope with imaging of that sound in terms of waveform. Which is awesome.

Erin Welsh

It's so cool.

Erin Allmann Updyke

But there's so much more than just digital stethoscopes. And if there is one single tool that may spell the downfall of the stethoscope, it's another pretty old one that has gotten upgrades in recent decades. And that is the ultrasound. So specifically what is called point-of-care ultrasound. And I'm not going to get into details of ultrasounds because again, physics and me are not friends. But everyone can probably picture an ultrasound machine if you've ever seen either in real life or in a movie someone getting an ultrasound of their baby, right, of their fetus. So ultrasound uses sound waves that bounce off of tissue and then are reflected back into a transducer and then interpreted as these magical black and white images. And while we all might think of an ultrasound machine as this giant bulky thing that they wheel into the room and they squirt all this gel and it's a huge screen with all of these buttons, because of advances in technology, there are now ultrasounds that plug into your smartphone, that are literally just the size of a transducer or even ones that are an entire ultrasound that's the size of a tablet or a small laptop.

Erin Welsh

I love that.

Erin Allmann Updyke

They're really portable, they're much less expensive. And while a lot of these at least today in 2024 don't have the resolution of the really big fancy ultrasounds, they do a really amazing job even in relatively inexperienced hands, say first year medical students who are learning how to use ultrasound, at picking up pathology equal to or better than a stethoscope in very experienced hands. And that includes in the heart and lungs but also a lot of other places in the body too. So I think that point-of-care ultrasound is one of the things that comes up time and time again as being the thing that's going to outseat or replace the stethoscope. And it's true that this is kind of the big thing right now in medical schools that people are really being trained in. And that's kind of like it's the new stethoscope. Is that a thing? It's like ooh, this is the thing we all need to get trained in. And as we've talked about on this podcast before, one of the issues with incorporating anything new in medicine is the kind of time lag and turnover.

Erin Welsh

Yeah.

Erin Allmann Updyke

And when it comes to ultrasound, one of the challenges is that while a lot of medical schools have really accelerated this training, not all of the attendings have. Which means that maybe it's your new trainees who know what they're doing and the people who are supposed to be training them who have no idea how to do it. There's also issues with any new diagnostic tool and especially the better diagnostic tools that we get, if in inexperienced hands especially, can have things like false positives, right. So you have this risk where you're going to see things that maybe you're not interpreting the correct way or you're over calling things as being abnormal when really it's not a big deal, if that makes sense.

Erin Welsh

Yeah.

Erin Allmann Updyke

So there's downsides to every new piece of technology. There's ups and downs to every diagnostic and screening tool that we use in medicine. But they're all just a part of the story. And I think that that's what's missed in all of these very heated emotional papers about defending the stethoscope or saying stop listening and look, that's the ones that are defending the ultrasound as being the end all be all.

Erin Welsh

Like why is it so binary?

Erin Allmann Updyke

Yeah, it's not.

Erin Welsh

Like why can't it be that the stethoscope... Right. And it just seems like you're creating this, it's like an invented argument in some ways.

Erin Allmann Updyke: Totally.

Erin Welsh: Like who are you debating against? Just a ghost who's like throw away the stethoscope entirely and get rid of all of them! Let's burn them all in a giant pile!

Erin Allmann Updyke: Right. But then if we do that and then we're relying on computers, now computers have replaced the physician.

Erin Welsh: Right.

Erin Allmann Updyke: But if we do that then... And part of it is like there is a lot to learn. So part of I think, if I give them some grace, part of the drive in some of these arguments is like what should we be focusing on when we're teaching in medical school?

Erin Welsh: Sure.

Erin Allmann Updyke: Because there is so much. So how much do we need to focus on the stethoscope vs the ultrasound vs the whatever else? And that's a valid question. How much do you focus? But it also just like, I don't know, it feels like it misses the point.

Erin Welsh: It feels like it misses the point. It is sort of this like existential fear of, yeah-

Erin Allmann Updyke: Yeah.

Erin Welsh: Are we going to no longer be needed?

Erin Allmann Updyke: Right.

Erin Welsh: I think it does call into question what makes a good physician.

Erin Allmann Updyke: Yeah.

Erin Welsh: Which is like a whole separate episode that we could talk about.

Erin Allmann Updyke: It is. That I also have a lot of opinions on. Yeah.

Erin Welsh: I think what seems really important to me about the stethoscope, someone who's not in medicine, who's completely outside, is that it's low cost relative to like an ultrasound.

Erin Allmann Updyke: Very low cost. Yep.

Erin Welsh: And it seems like that would be helpful in terms of a decision tree. If someone doesn't have insurance or if they don't have good insurance, things like an ultrasound can be really expensive. And so it's like if you don't know that you need to get an ultrasound, is that part of the decision tree?

Erin Allmann Updyke: Yeah.

Erin Welsh: I don't know. You know what I mean?

Erin Allmann Updyke: Yeah. Well and it gets so complicated too because then that is in all honesty an argument for point-of-care ultrasound over things because you're able to diagnose better-

Erin Welsh: Right.

Erin Allmann Updyke: In the clinic setting without having to send someone and bill for a separate... But billing, oh my god, don't get me started.

Erin Welsh: Yeah.

Erin Allmann Updyke: So this is America specific because that's what I know. But yeah, it's all really interesting. And I think that at this point in 2024, the stethoscope still exists, it still has a place, it's still being taught. Will it go away someday? Maybe. It doesn't mean the demise of physicians.

Erin Welsh: Yeah but AI is, Erin.

Erin Allmann Updyke: AI.

Erin Welsh: Soon it'll be AI robots.

Erin Allmann Updyke: AI might be. Just kidding, it's also not, Erin. Hot take. I've got opinions. Not worried about it. Bring it on. Anyways, wanna know more? We got sources.

Erin Welsh: We got so many sources. So there's that paper that we both loved by Reiser from 1979 in Scientific American titled 'The Medical Influence of the Stethoscope'. I loved it. And there's a bunch more but honestly that one was like really, really great.

Erin Allmann Updyke: I have a lot of sources unsurprisingly. So the sounds that you heard, all of those recordings, the lung sounds came primarily from a database that came from a paper titled 'A Respiratory Sound Database for the Development of Automated Classification'. And I wrote down specifically which clips we ended up using, so if anyone wants to find those clips, they also have literally thousands more. It's phenomenal. There's another really great heart sound database that was an open access database for the evaluation of heart sound algorithms. But the ones that we primarily used for this so that they could be specific to types of murmurs was the incredible database from University of Michigan School of Medicine. We'll link to all of those. And then I had a bunch of really fun papers, some of them were old like the 'Clinical Methods: The History, Physical and Laboratory Examinations' from way back in 1990. And not a lot of those drama papers that we talked about, like a paper from 2021 titled 'The Future is More Than a Digital Stethoscope'. Anyways, we'll post the full list of our sources from this episode and every single one of our episodes on our website [thispodcastwillkillyou.com](http://thispodcastwillkillyou.com).

Erin Welsh: Thank you to Bloodmobile for providing the music for this episode and all of our episodes.

Erin Allmann Updyke: Thank you to Tom Breyfogle and Lianna Squillace for the incredible audio mixing.

Erin Welsh: Thank you to Exactly Right.

Erin Allmann Updyke: And thank you to you, listeners. We hope that you had fun with this episode. I sure did.

Erin Welsh: Yeah, I did too. And what are your thoughts on the stethoscope?

Erin Allmann Updyke

Yeah.

Erin Welsh

Yay/nay?

Erin Allmann Updyke

Yay/nay?

Erin Welsh

Don't care?

Erin Allmann Updyke

Do you like it? Wash it better? What do you think?

Erin Welsh

Yeah. And a special thank you of course as always to our wonderful, generous patrons. We appreciate your support so very much.

Erin Allmann Updyke

So much. Thank you, thank you, thank you.

Erin Welsh

Well until next time, wash your hands.

Erin Allmann Updyke

You filthy animals.