

***Candida auris* outbreaks, Colombia**

[Announcer] This program is presented by the Centers for Disease Control and Prevention.

[Sarah Gregory] Hi everyone, I'm Sarah Gregory, and today I'm talking to Dr. Brendan Jackson, a medical epidemiologist at CDC. We'll be discussing his article about *Candida auris* infections in hospitals in Colombia. Welcome, Dr. Jackson.

[Brendan Jackson] Great, thanks for having me.

[Sarah Gregory] So, talk to us a little bit about what fungi is, in general. How are dangerous ones different from the mushrooms that we eat?

[Brendan Jackson] Well, that's a tall order to talk about fungi in general. There's millions of fungi out there, as many as five million different species—most of which have never been discovered. And they range dramatically, from the mushrooms that you can see, that you eat, to microscopic fungi, like *Candida auris*, that we'll talk about today, that...that are microscopic. And I think that's just remarkable to me that how many fungi there are and how understudied they've been. They once were thought to be, basically, a lower form of plants. You know, in the older texts and everything, there really was very little attention paid to fungi, and we learn more and more about how critical they are to our ecosystems, to crops and trees, and their communication with roots and mycorrhizal fungi.

But when we're talking about the dangerous fungi, the ones that affect...cause human infections, those really fall into three different categories. There's the molds—so you know, you think of bread molds and the like. There's only a few types of molds that actually cause those infections. There's the yeasts—people have heard of yeast infections—that's like *Candida*. *Candida* isn't one of the major types of yeast, but there are others. And then there's the...they're called dimorphs, dimorphic fungi, meaning they exist in a mold at one temperature, and then in a yeast in our body temperature. And a yeast just means it's like a single cell, almost like a bacterium, but just much, much bigger. And so, out of these millions of fungi that are estimated to exist, only about 300 or so cause human infections.

[Sarah Gregory] 300's still a lot.

[Brendan Jackson] It is, and unfortunately that number grows each year.

[Sarah Gregory] As we discover more.

[Brendan Jackson] Right.

[Sarah Gregory] What is the *Candida auris* fungus and where did it come from? You already said it was a microorganism, but elaborate.

[Brendan Jackson] *Candida auris* is similar in many ways to the *Candida* that we know well, that live on our bodies all the time. *Candida albicans* is...lives in and on our bodies all the time. It's the most common cause of oral thrush, oral yeast infections, vaginal yeast infections, and there are lots of other *Candida* species. And so *Candida auris* is one of them—it's a microscopic fungus. But the difference with *Candida auris*, is that it's very different from all the other *Candidas* that we're used to.

There's over 500 different *Candida* species, and that number grows each year as people... scientists discover more and more. *Candida auris* was only described just ten years ago, in 2009.

Now we know, we have isolates, we've seen isolates that go back to the mid-90s, in a couple locations, but really what we've seen is this fungus has been detected all over the world now, just in the last five to 10 years. "Where did it come from?" is a huge question. There was a lot of news coverage this summer about an article suggesting it may be linked to climate change. We've published another article, called, "On the Origins of a Species," speculating on what might lead to the rise of *Candida auris*. And there's still a lot of debate. I mean, really, the amazing thing is it's never been found in the natural environment, it's only been found in association with humans, probably because we haven't been culturing the natural environment. The whole...the world is full of yeasts out there, living on plants and flowers and fish and all these types of creatures, and yet very little of that has been described, particularly in tropical environments. And when you look at closely-related species to *Candida auris*, they tend to have been found in places like mangrove tree roots, plant flowers in South Asia, fish in the Caribbean, just found in a whole smattering of tropical environments. And so it...it doesn't mean that's necessarily where *Candida auris* came from, but it makes you think maybe it came from one of those areas, so anyway this is a...a really important thing that...that we're hoping that more scientists study to try to understand where it came from.

[Sarah Gregory] That's amazing. Is this the same fungus that killed people after the Joplin, Missouri tornado?

[Brendan Jackson] *Candida auris* is a very different fungus than the one that caused those horrific infections after the tornado. Those were caused by *Mucor*, or mucormycetes. They're a type of mold infection, basically, that live out in the environment and they have these awful, like penetrating injuries from, you know, the debris from the tornado that introduced that mold. That's very different from *Candida auris*. *Candida auris* tends to get on our bodies, live on our skin, and then when we become sick for some reason, or we have an invasive procedure, that's when it can get in and cause infection. So they're completely different and unrelated to one another.

[Sarah Gregory] But mold is a fungi.

[Brendan Jackson] Yep. Mold just means that it's multicellular, more than one cell, it kind of branches out in these hyphae that travel, and...and can...and yeasts...*Candida* is a yeast, they're generally single-cell little creatures.

[Sarah Gregory] Your article says that most *Candida* infections are commensal. Tell us what that means.

[Brendan Jackson] *Candida* infections are thought to be...the classical teaching has been that *Candida* infections are commensal, meaning that *Candida* live on our bodies, and they live in our bodies, in our guts. So we think of the microbiome in our intestines predominantly of bacteria, but there are quite a number of fungi in there, as well, including *Candida* species. And so, what happens, what's thought to happen, mostly, is that people get in the hospital, they have antibiotics which kill off the bacteria, it allows the fungi to grow. They have abdominal surgery, they have other conditions that basically help the bacteria either move from the gut into the internal organs or the bloodstream, or that move from the skin to the bloodstream, type of thing. And so that's why we...we think of *Candida* infections really coming from our own microbes that are living on our bodies, for the most part. That's what makes *Candida auris* different, because we're seeing this spread between patients in...in healthcare facilities. This is not something we usually see with other *Candida* species. There are outbreaks that have been rarely

reported, but this is really something new for *Candida*.

[Sarah Gregory] Yikes. Okay, well, I think you've said a lot of reasons why we should be concerned about this fungus, is there anything you want to add to that?

[Brendan Jackson] Absolutely. I think...I...there's a couple key reasons that we're concerned about this fungus. I think the first I already mentioned is that it spreads within healthcare facilities in a way that we have never seen before. It acts more like a bacterium than a fungus, in some ways. Number two is that it's highly drug-resistant most of the time. There's only three classes of antifungals out there, as opposed to well over a dozen classes of antibiotics to treat bacteria...bacterial infections. And this fungus is often resistant to one, frequently resistant to two, and occasionally resistant to all three of those classes—again, something that we've never seen before in...in a fungal infection like this. I would say the third major concern is that it's often resistant to disinfectants used in healthcare facilities. So the commonly used disinfectants are often quaternary ammonium compounds, or quats, as they're called for short, and many of those don't work against *Candida auris*. And so, for that reason, we recommend higher-level disinfectants to wipe out *Candida auris*. And the fifth, we...we may talk about later is about misidentification. And that happened in this...in this instance in Colombia, where the common yeast identification systems at the time were not able to pick up *Candida auris* and differentiate it from other species.

[Sarah Gregory] Alright, so what are these higher level disinfectants you're talking about?

[Brendan Jackson] Now these are disinfectants that are generally available in many healthcare facilities. There's actually now a specific claim by the EPA—the Environmental Protection Agency—that certain disinfectants can be registered to...to be shown that they work against *Candida auris*. But...until this claim was about, we just recommended that healthcare facilities use disinfectants that work against *C. diff*, *Clostridioides difficile*. And most healthcare facilities will have those; they tend to involve things like bleach, but also hydrogen peroxide. Each product is a little bit different. But those disinfectants are usually just fine at getting...getting rid of *Candida auris*. But that said, environmental cleaning is...is so important when it comes to this, and you know you miss a spot, or there's just all...or someone thinks they're responsible for cleaning one thing, and someone else thinks somebody else is responsible for cleaning a certain piece of equipment, anyway there's a lot of challenges that go for environmental disinfection, and that's an absolutely key way to control its spread in healthcare facilities.

[Sarah Gregory] Yes, I know how difficult it is to even often get doctors to wash their hands, so I can imagine that this is quite the challenge. Okay, so, two and a partial third antifungal medicines don't work. What do people do if they get an infection, what's done for them?

[Brendan Jackson] It's a really good question, and it's one that we've been struggling with. I think the...one important thing to know is that there can be a lot of variability in the resistance, depending on the strain, and so some strains tend to be much more susceptible to...to antifungals than others. And there's some, again, that are resistant to all three. Generally, one class called the echinocandins tends to work for most *Candida auris* infections, thankfully, at this point, and that's why it's recommended for first-line therapy, but if that one is shown to be resistant, sometimes people will try a variety of things. They may try higher doses. They may try a combination therapy in the hopes that there's some synergistic activity, but it's...that's a major concern and that's why we're at least optimistic that there are antifungal drugs, new ones, in the...in the development pipeline, that...that may...that show some promise against *Candida*

auris.

[Sarah Gregory] Oh, okay that's good to know. You touched on this briefly, but in the case of this fungus, what's the difference between an infection in the digestive tract and one in the skin or blood?

[Brendan Jackson] Yeah most...most common *Candida* infections involve the skin, so places like...or...or the mucous membranes, like the mouth or the vagina, or those types of areas. *Candida* does live in our digestive tract; it very rarely causes infections of the...of the GI tract. But what we worry about is when it actually gets in and gets into the bloodstream or it gets into those internal organs, like the kidney or the liver or the spleen or those types of areas. And so you know, the...the *Candida* infections that affect, like our mouth and vaginas, those are...those are just very common in just...just about anybody, but these invasive infections, these ones that get into the bloodstream, tend to affect people with either weakened immune systems or are having a bunch of medical procedures.

[Sarah Gregory] Okay, so those are the ones that you really need the antifungals to work on.

[Brendan Jackson] You may need the antifungals for the other ones, too, but you really, really need...it's true, it's life-threatening to have an invasive infection, so you absolutely need it for those.

[Sarah Gregory] Who's most vulnerable to this type of infection?

[Brendan Jackson] Well the classic teaching for *Candida* is that it's people who have a weakened immune system, for instance from cancer or a transplant, people who've had abdominal surgery, people who've got sometimes diabetes or central venous catheters—basically a large IV that goes into one of the very large veins in our body. What's...what's interesting about *Candida auris* is its...it does tend to...it does affect those people, but it seems to affect sort of a wider group and...and people, the...the...those invasive devices really seem to be a key factor in predisposing people to getting these infections.

[Sarah Gregory] So are there specific disinfectants for those apparatus—different than cleaning the floor, or...?

[Brendan Jackson] That's a great question. It's...it's always a...a difficult thing when it comes to cleaning equipment, because a... you know, some of our strongest disinfectants, like those that include bleach, can be pretty corrosive and you really can't use that...those on sensitive medical equipment. And so, yeah, there's a whole lot of different strategies people have to use to be able to clean those more specialized devices.

[Sarah Gregory] Because there's been some outbreaks—I don't know if they're of *Candida auris*—but of other molds or fungus in...a couple years ago in spinal blocks in...in...and...

[Brendan Jackson] Oh, the contaminated steroids.

[Sarah Gregory] ...endoscopies and stuff, yeah.

[Brendan Jackson] Right, there was a big outbreak back in 2012 related to contaminated steroid injections that were going into people's spines for...for pain relief. And the issue in that case was actually that that facility that was compounding the steroid medication that was injected was...just had really poor handling practices and so they...that allowed their steroids to get contaminated from there.

[Sarah Gregory] Okay, that's frightening. Your article is about a *Candida auris* outbreak in four Colombian hospitals in 2016. Tell us about those outbreaks.

[Brendan Jackson] Sure, and I want to emphasize that...that we did this as a joint investigation with the Colombian National Institute of Health, the Instituto Nacional de Salud, or INS, and they really invited us to come down there and work with them to try and figure out what was going on.

But I want to just take a second and set the stage about *Candida auris* in 2016. It was really still a pretty much unknown pathogen at that time. There had been a few publications out there, sort of describing cases, and a few small outbreaks in...in areas, and...and we really got concerned when we started hearing in 2016 about multiple hospitals around the world seeing these very concerning outbreaks, with this spread between patients and characteristics that we'd not seen before. And so, we put out a...a call for letting...an alert, to clinicians in the U.S. to let them know to be on the lookout for it and we also started talking with our international partners about...about this issue. And that's when Colombia reached out to us and said, "Hey, we've got these cases of *Candida haemulonii*." And you may be asking, "What in the world is *Candida haemulonii*?" and so did we. The issue is, it's a...another rare species of *Candida*, but when I talked about that misidentification issue, a lot of the yeast identification systems will misidentify *Candida auris* as *Candida haemulonii*. And so when, all of a sudden, a couple hospitals started to have a bunch of *Candida haemulonii* infections, they sent those isolates, those specimens, to us at CDC, and the lab here tested them and found out actually, lo and behold, they were *Candida auris*. And so, once that was found out, we worked together with the Colombian National Institute of Health to really investigate what was going on with these hospitals here. So that's where things stood in 2016, when we were first learning about these *Candida auris* confirmed cases in Colombia.

[Sarah Gregory] Would the treatment have been different? I mean, what...did it matter that it wasn't *haemulonii*?

[Brendan Jackson] I think the key difference is that *Candida haemulonii* generally does not cause invasive infections, it doesn't grow at our body temperatures. And I think what the major thing was that was different from all the other *Candida* species that had come before, it was something new in that area. And the reason we were trying to jump on this, is we'd already seen in some other places, including places like India, where it started out as a small thing and pretty soon grew to be the dominant infection in those hospitals. And unfortunately, we've now seen that in a number of places around the world, including in South Africa, where it's now become one of the leading causes of these invasive *Candida* infections. And so the problem is, not only does it just push out some of the other *Candida* species, it's actually additive on top of that and you then have resistant infections in place of what you had...in place of the susceptible ones that you had before.

[Sarah Gregory] Okay. So is this only found in hospitals and care facilities and why are these places more susceptible? Is it because of the difficulty in cleaning that you were talking about, or more than that?

[Brendan Jackson] I think there's still a lot of unanswered questions, but when we look at the known cases that have all been diagnosed, essentially all of them come from healthcare facilities and people who've had, again, sort of intensive medical procedures or the like. I think it's possible that it's out there circulating in the community to some extent, but we think that's

probably much likely, because most of the transmission pathways that we've seen tend to involve either hospitals or long-term care facilities, sort of high-level long-term care facilities. And there... I think there seems to be something different about patients' skin once they've sort of been sick and in the hospital for that long that really allows *Candida auris* to kind of set up shop and thrive in a way that doesn't happen if you're sort of out and about and able to bathe and do your normal activities kind of thing.

[Sarah Gregory] This is sort of a weird question, but do you think sweating helps get rid of these things?

[Brendan Jackson] I think it's an unanswered question, it's hard... I... I couldn't tell you.

[Sarah Gregory] Cause I don't imagine when you're in a hospital bed you perspire much.

[Brendan Jackson] I... there... you know there may be something for being out in the sunshine, in the UV light, that might help.

[Sarah Gregory] Interesting.

[Brendan Jackson] I think there's a whole microbiome to our skin that we're just only beginning to understand.

[Sarah Gregory] Okay, so go on, tell us about your study, specifically. What... what did you go into it looking for?

[Brendan Jackson] So, we went down with a couple different ideas in mind, but the main thing was just to figure out what is going on. So, you know, in the steps of an outbreak investigation, one of the first things is perform the descriptive epidemiology, and that just means characterize the cases, what... what... who are they, what were their conditions, what was going on with them. Because there's a lot that you can learn once you have that initial information about what the transmission might be like and what the control measures are like.

So these joint teams went down to these four different hospitals, two in the northern part of Colombia and two in Bogota, and basically just did intensive chart reviews on each patient, and just looked at what were the procedures that they had, what were the medications, what were their characteristics, what were their age, all of those types of... did they survive, did they die, all of those types of things. And what we found was that patients were generally quite ill. A hundred percent had a central venous catheter, a central line, basically a large IV that goes into either the neck or the groin. You know, many had been intubated, which means they had a breathing tube put down and you know, a large proportion had had surgery, so anyway, there was a... there was a very sick population. One of the things that came up though was that a surprising proportion were in children—around a third or so—and even a sizable number were in infants, as well. Generally, these were children that already had many other medical issues to begin with. But I will say, this is different than what we've seen in the United States, where essentially, nearly all the cases have been in adults. And I think what that reflects is really where *Candida auris* has been circulating. And this is why it's so important that we continue to try to contain it and keep it out of other facilities, because once it can... gets into a facility and starts spreading, it can affect whichever patient is there that has sort of the right risk factors, no matter their age.

[Sarah Gregory] Mmm. Okay, so how was your study different from a few others that have been published on this... on this particular fungus, and even in EID journal?

[Brendan Jackson] Yeah, I think this is just one more piece of the puzzle to try to understand

what's going on with *Candida auris*. It's...it's similar to what's been done in other places, as well, but I think it's important to understand that there's different strains, so there's actually four different strains now, maybe five different strains, as recently published in...in EID, of *Candida auris*. This is sort of known as the South American strain, although we don't really know that it originated there, but it was first detected in Venezuela, up in the northern city of Maracaibo. What's interesting is that these cases in Colombia were first identified in a north coast city, not all that far from Maracaibo, as well. So whether there's a relationship or not, we don't know. There's also...it's also important that there's major differences in healthcare and patient populations around the world, and understanding how *Candida auris* was behaving with this strain, in this population, is important for its control. And the other is, this was one of the first sort of field studies that we did with *Candida auris* and I think this actually helped shape both the response in Colombia and the response in the U.S.; it informed a lot of what we knew about what to expect with *Candida auris*.

[Sarah Gregory] You said that a lot of the patients in Colombia were small children and even infants. In your study you say 30 percent of the patients were less than a year old. Do you have any more to say about that?

[Brendan Jackson] I think it's a concern for...for in the United States as well, that we just really want to keep this...this yeast out of pediatric intensive care units and neonatal nurseries. I think that was the issue in Colombia is that it had just gotten into one of these units, and it sort of set up shop and was causing infections in infants. So, I don't know that there's any major biological difference, I think it's just a matter of where this fungus ended up.

[Sarah Gregory] The spots that didn't get cleaned. What were the outcomes for these patients? Were they okay in the end?

[Brendan Jackson] You know, unfortunately, over half ended up dying while in the hospital, and about...I think it was about 40 or 43 percent died within 30 days. So I think the big caveat to that is, we don't know if they died from *Candida auris* or from one of their many other medical conditions. Probably—this is true with any form of invasive *Candida* infection—there's probably some percentage for *Candida* in general, it's thought maybe 10 or 15 percent of the over...of people die from their *Candida* infection. But you know, I think, just one other thing I want to point out about that is the median time from culture to death in these patients was about a week. So it suggests that, you know, given that there was 22 days on average, about when patients came into the hospital to when they were first diagnosed with *Candida auris*, and then there was only a week from *Candida auris* to death, suggests that *Candida auris* may have been playing a role in some of those deaths.

[Sarah Gregory] Okay, looking at all the data that you collected, what ultimately did you find? Was there anything that surprised you?

[Brendan Jackson] Given how early we were in our understanding of *Candida auris* at this point, I think I was surprised, at least personally, about how sick these patients were, about how many comorbidities they had, about how many had a central line, how many were on a ventilator, and...and all...all of those types of things. So, I think that it did help underscore that *Candida auris* was infecting the sickest of the sick, our most vulnerable patients, and sort...and just showing why it's so important, given the mortality rate, that we try and contain it.

[Sarah Gregory] Okay, so your article says the armpit and groin were the most commonly

colonized sites. Why do you think this was?

[Brendan Jackson] Again, this is another mystery of *Candida auris*: why does it seem to colonize the skin more than other yeast species, or *Candida* species, at least? We're not sure but this is a finding that's been consistent across different areas in the world; the axil... the armpit and groin just seem to be places that this fungus likes to hang out; it probably also likes to hang out in the nose and a few other places, as well. I should say that in this... in this investigation, there were only, I think, five patients in which we cultured *Candida auris* from various body sites; four of them had it in either the armpit or groin, but that helped, this plus other information, helped guide our response in the United States, where now, when we're looking for colonization within a healthcare facility, we actually do... some people call it a Zorro-swab, where you kind of go like a Z, both armpits and then both sides of the groin, to look for colonization. And the idea is that single-swab is sort of a cost-effective and more rapid way to look for colonization than trying to culture a whole bunch of different body sites with different swabs and lots of testing.

[Sarah Gregory] Oh I see, so instead of four swabs you have just one that's collecting from four sites.

[Brendan Jackson] Right.

[Sarah Gregory] Okay, so going forward what can hospitals do to help prevent or control this infection?

[Brendan Jackson] Great question. So there are several key things that are... are needed. And the good news is most of these interventions are the same as just classic infection control that work for most germs. So hand hygiene, hand hygiene, you mentioned how difficult that is, in general, but it's just critical for the control of *Candida auris*. Those alcohol-based hand rubs work just fine for *Candida auris*, people use them far more often than they do soap and water; soap and water's hard to use all the time, so that's... that's a key thing to making sure your hand hygiene rates are really good. Number two, the environmental disinfection that we talked about, using a product that's effective against *Candida auris*, and we need more research on what other disinfectants are effective against *Candida auris*. Number three are sort of your classic infection control procedures, so trying to put patients in a single room if you can, using gowns and gloves, cohorting staff or patients if they've got it, meaning putting them together so that they don't... are less likely to spread it to others. And then another is working with your health department since they are really key in sort of helping control the spread of these sort of multi-drug resistant organisms. And then the last is communicating when you're transferring a facil... patient from one facility to another, so that receiving facility knows, "Hey, this patient has... is colonized with *Candida auris*," and they can take the right precautions to protect the rest of their patients as well.

[Sarah Gregory] Okay, I was thinking about gloves just yesterday, and you just mentioned them. So if doctors or janitorial staff or whoever use gloves, does that take the place of hand hygiene in other ways?

[Brendan Jackson] You know, I think that's a common misconception, that hand... the gloves are no substitute at all for hand hygiene. It's really important that people are washing their hands or doing hand hygiene before they put on gloves, and then after they've removed their gloves as well, because there's a lot of ways to contaminate your hands before or after that, so they're... they're definitely no substitute.

[Sarah Gregory] Okay, that's disconcerting, thinking of all the doctors that just come in and put on gloves and take them off and go.

[Brendan Jackson] Well they may be, they may be doing that hand hygiene right out in the hall right as you leave so...

[Sarah Gregory] Maybe.

[Brendan Jackson]...so let's hope that's the case.

[Sarah Gregory] What do you personally think is the most important aspect of this study?

[Brendan Jackson] I think the most important aspect of this study was, really...this investigation was really getting in there and understanding who was being affected at this early stage of the epidemic, finding out where the colonization was taking place on people's bodies, the fact that it was often in their axilla and groins, finding out the populations, and really from there working, I think, working closely, with the National Institute of Health in Colombia to put in place infection control recommendations. Because I think this investigation is more than just the data, but it's actually representative of this whole collaboration of improving infection control in these healthcare facilities and many others.

[Sarah Gregory] You work as a medical epidemiologist at CDC. Tell us what that means, what your job is, and also what you enjoy most about it.

[Brendan Jackson] So I work in the Mycotic Diseases Branch, which is another word to say "fungal." And I'm a...a team lead for epidemiology.

[Sarah Gregory] Are you a physician?

[Brendan Jackson] Yeah, and I'm an internal...an internally...an internal medicine-trained physician, and preventive medicine, as well. And so, I...I actually use that medical training all the time in our outbreak investigations, in our studies to understand the burden of disease, and other research that we do about...it's epidemiology, which basically means how are diseases affecting people and why—what are those risk factors? And what I love about my specific position is...is that you know, there's just so much to do. I mean, I think that's the challenge, is that fungi are so understudied, but it means that there's...there's never a shortage of interesting questions to look at and...and important topics to deal with.

I think the challenge with fungal diseases, is when I tell people I work on fungal disease, I know they're immediately thinking about their toes. But...and...and...and that's important, I don't mean to... you know, because, foot fungus is...is certainly a problem for people that deal with it. But I don't think...people don't understand...the public often doesn't understand...there's a lot of invasive infections, severe infections that come from fungi. And I think that translates to a sort of a lack of attention in the research community to some extent as well. And so I think we're trying to do whatever we can to try and raise the profile of fungal diseases, to make people understand this is a challenge. We've got new pathogens coming out. We're suppressing people's immune systems more and more, because they're living longer with other conditions, and there's just a lot to be learned in this area. I think...I think the thing I love best about working where I do is the people. It's...it's such a mission-driven culture, where we're really focused on improving health for people, it's not about trying to accomplish this or that, it's really about what can we do to prevent illness and death.

[Sarah Gregory] How long have you been at CDC and where were you before you came here?

[Brendan Jackson] I've been at CDC almost ten years. I started out as an EIS officer, an Epidemic Intelligence Service officer, in the, the foodborne and waterborne disease group where I worked on Guillain-Barre from *Campylobacter* infections and cholera and salmonella outbreaks and *E. coli* outbreaks and the like. And then, I spent a couple years working at a local health department, and...and I spent some time working on listeria outbreaks, where I worked on outbreaks involving Bluebell ice cream and a couple other food-producing companies.

[Sarah Gregory] I think that that's one of the things that I find most fascinating, when I talk to people, interview people at CDC. There's such a varied background of so many interesting things that you've done along the way before you came to where you are at this point, which is fascinating, too.

[Brendan Jackson] Well, you know, it's interesting because people often say, "How can you just jump from thing to thing like that?," and I...I don't like to think of myself as...as jumping but I...you can really get into a subject matter, but the...the epidemiology, the outbreak investigation skills, the partner relationship skills, all of that is sort of transferrable to some extent. And I think we bring something by moving between place-to-place at times.

[Sarah Gregory] Definitely. Okay, well thank you so much for taking the time out of your obviously very busy day to talk to me, Dr. Jackson.

[Brendan Jackson] Hey, it was my pleasure. Thanks.

[Sarah Gregory] And thanks for joining us out there. You can read the July 2019 article, "Hospital-Associated Multicenter Outbreak of Emerging Fungus *Candida auris*—Colombia, 2016," online at [cdc.gov/eid](https://www.cdc.gov/eid).

I'm Sarah Gregory for *Emerging Infectious Diseases*.

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