The Rise of Candida Auris

Transcript

[Upbeat theme music plays]

Dr. Clancy

Welcome to Rounding@IOWA, a continuing medical education podcast developed by and for healthcare teams. I'm your host, Dr. Gerry Clancy, Senior Associate Dean of External Affairs for the Carver College of Medicine here at the University of Iowa. Today, we'll delve into Candida auris, or C. auris, a growing concern for our community members in long-term care facilities, but also acute care hospitals. Our objectives today include, first, we'd like our participants to have an up-to-date foundation of knowledge around the unique factors of C. auris that make it a growing concern for infection prevention, surveillance, and treatment. Second, we hope our participants can recognize the actions that need to be taken in keeping the at-risk patients in acute and long-term facilities as protected as possible from the spread of Candida auris. Today, we have experts that will help us with this fairly complicated issue. We're delighted to have two University of Iowa physicians, Dr. Karen Brust and Dr. Joseph Tholany. Dr. Tholany is a clinical assistant professor of internal medicine and infectious diseases here at the University of Iowa. He earned his MD at St. George's University School of Medicine. He then completed residency in internal medicine at the University of Pittsburgh Medical Center. He completed a fellowship in infectious diseases at the University of Iowa Hospitals and Clinics, and he completed a fellowship in the VA Quality Scholars Program at the Iowa City Veterans Affairs Medical Center. Dr. Karen Brust is a clinical associate professor of internal medicine in infectious diseases. She is the hospital epidemiologist for University of Iowa Healthcare. She earned her MD from the University of Texas Health Science Center at San Antonio School of Medicine. She completed residency in internal medicine at Scott & White. She was the chief resident for internal medicine at Scott & White. She also completed a fellowship in infectious diseases at Scott & White in Temple, Texas. Karen and Joseph, welcome to Rounding@IOWA.

Dr. Brust

Thanks for having us.

Dr. Tholany

Great to be here.

Dr. Clancy

Thank you so much for coming on. Let's get started with an opening question for both of you. I just provided our listeners a brief official description of your educational background and your titles. Could you first tell us what drew you to this work? And Joe, let's start with you.

Dr. Tholany

Yeah, so I was an EMT back in college, so I knew I always wanted to go into medicine. I initially thought I wanted to be an emergency room doc. I did my med school rotations, realized that I enjoyed ICU level care more than the ED. So most of my fourth year rotations were done in ICUs. And then went into internal medicine residency. I did pulm consults, my first block, and ICU, my third block, and immediately realized that it wasn't what I had expected. What I had enjoyed was working up a patient, trying to find the diagnosis. And I did my ID block, my second block, and realized that was it for me. This is where we actually get to deep dive into patients, figure out what's going on with them, try to make the diagnosis. And at that point, I knew I wanted to do infectious diseases. Kind of at the same time, I had a friend who had a chronic disease and had multiple complications related to it with resistant organisms. So that's where my interest in resistant organisms really arose.

Dr. Clancy

Excellent. So you against the microbial world. Yes.

Dr. Tholany

Pretty much. I think we're all up against the microbial world.

Dr. Clancy

I do too. I do too. Karen, how about you? How did you work your way into this work?

Dr. Brust

Maybe just a usual story of how I got to medicine. My dad was a family practice physician, kind of an old school family practice doctor where he did everything from delivering babies to simple appendectomies. And so I spent a lot of time around him. So I knew I wanted to go into medicine kind of early in life. That was nothing unusual. And then kind of like Joe, I liked everything that I rotated on. And so when I was on pulmonary, I wanted to be a pulmonologist, cardiology, nephrology, everything through internal medicine. And then I think it took some self-reflection to kind of figure out that everything on my reading shelf was related to infectious disease. And the cases within those other subspecialties were really more about infectious disease than, you know, like the endocarditis case rather than

other things in cardiology. So that's how I got to ID. How I got to dealing more with epidemiology and the infection control world, that was a different story. That came up in my second year of fellowship where there was a public service type event where they went to an underserved area in our community. And the medical students kind of helped do some sugar checks and blood pressure checks, et cetera, but realized that the needle hadn't been exchanged between sugar checks. And so it really became an infection control exposure event. And there was a lot of communication that needed to be done with those that were exposed in their native languages to Spanish, and some, making sure that their blood work stayed negative for HIV, Hep B, Hep C. And so I, that was my first experience in this type of work. And I really enjoyed it. I've still enjoyed helping in those types of situations.

Dr. Clancy

Great. Well, you both very much have work that is with individual patients and with systems. So yeah, I get it.

Dr. Brust

Correct.

Dr. Clancy

So Karen, let's stick with you. But for both of you, what does a typical work week look like then for you? Because it seems like you have pretty big jobs.

Dr. Brust

So I think the pace of this work kind of waxes and wanes. And so sometimes there is a lot going on. You're putting in a lot of hours. You're dealing what I call, you know, the crisis at hand. And so those tend to be outbreaks and exposure events and kind of some larger type issues that we have to deal with. I think on the day-to-day, I mean, my primary job really is to prevent infections, period. And so we spend a lot of, not so fun times in meetings, looking at the process, looking at the operations of preventing different hospital acquired infections. And then of course, you know, I've got a team of infection preventionists. And so we manage the day-to-day with a lot of communication within our group itself to try to kind of see where the benefits of any improvements might lie. So that's the way I would summarize my job.

Dr. Clancy

Great, great. Joe, how about you? What does a work week look like for you?

Dr. Tholany

I would say it looks pretty similar to what Karen described. A lot of it is meetings and ensuring that we are adhering to whatever regulations are placed on us. There are a lot of metrics that we track within the scope of our work. So ensuring that we are trying our best to meet those metrics. A lot of time is spent reviewing the literature, trying to find gaps in what we are currently doing and how to address it.

Dr. Clancy

Great, great. Yeah, as we joked a little bit, the microbes are always changing and ahead of us a little bit. So keeping up with the microbes. So for our listeners who may not be familiar, let's start into kind of just general definitions and what exactly is Candida auris?

Dr. Tholany

Yeah, I think it makes sense to talk about Candida auris in context with the other Candida species. Generally, we think of fungal infections, we think of them as either being yeast or molds with a couple of fungi that live in both realms. Candida is what we use to describe all these large white yeast that we see underneath the microscope. But there's more whole genome sequencing occurring that tells us that while they are phenotypically very similar, genotypically they're quite different. So a lot of species that we clinically refer to as Candida aren't truly Candida, Candida glabrata and krusei being two of them. But how it pertains to this discussion is Candida auris isn't truly a Candida. It's more accurately termed a Candidozyma auris, which is what you'll often see in the literature. But generally in terms of broader medical discussion, it's still referred to as Candida auris because that is the name that people are most familiar with. And clinically, it has a lot of similarities with these other large white yeast. In general, most of the Candida species live in our GI and GU tracts, and they live on our mucous membranes. They tend to be pretty susceptible to antifungals such as azoles, as well as other antibiotic groups such as the polyenes and the echinocandins. So generally, that's where most Candida live. Candida auris tends to be a little bit different in a lot of regards. Unlike the other Candida species we talked about, it tends to live more on the skin, generally in areas with high hair concentration. So the classic examples are the groin and the axilla. It also has this tendency to develop drug resistance to some of the common classes of antifungals. And unlike a lot of other Candida species, with the exception of Candida parapsilosis, it has a tendency to form biofilms, which makes it extremely hardy, especially in the environment.

Dr. Clancy

Great. Great review. And at least for me, going through medical school back in the ‘80s, I had not heard of Candida auris. So when and where was Candida auris first discovered and how did it get a name like Auris?

Dr. Brust

I'll take this one. I did not learn about it in my medical school either. So it was discovered first in an ear canal in Japan in 2009. There really wasn't a case of Candida auris that we're aware of here in the US until 2013. And so little by little, over the last decade-plus, we've been learning more about this organism and how it has spread across the nation. With respect to Iowa, back to 2022, we had really less than 11 cases. And now by 2023, they had 18 detections total. So we don't have any sort of updated numbers after 2023. But I can tell you that we've done a lot of work and with other systems across the state of Iowa to increase our screening capability to try to put some boundaries on Candida auris and it's spread across the state. We've always worried about spread across the state of Iowa because of our proximity to Chicago. And Chicago for a long time has really been kind of this epicenter or hotspot of Candida auris and spread locally to some post-acute care facilities in the area. And so we were at the advantage of kind of knowing Chicago's experience with respect to that.

Dr. Clancy

Great. I kind of remember back with COVID as well, we were able to learn from other parts of the country first and how to respond to that. How much of a global issue is this? Karen, you mentioned, discovered in Japan, but is this something that appears to be worldwide now?

Dr. Brust

Yes, essentially, if they're looking for it, they're finding it. And so I've got some maps pulled up in front of me just to kind of see the red that has kind of gained traction from 2009 all the way through 2018. And it's really kind of found on every continent at this point. I can speak a little bit more to local screening that we've done here at the university. From April 2023 to January 2024, which was not that long ago, we had had 21 patients screened. Now, when we were screening it, that doesn't sound like a large number, but when we were screening at that point, it was for very directed reasons. So this wasn't widespread screening and surveillance purposes. This was that we knew about a patient that was positive at a post-acute care facility, had been in our facility, so then we screened potentially patients that were exposed, and at that point, we found zero positive cases. So you can see that, you know, the numbers have stayed low, but it has gained traction really in the media. And

because I think more people are screening, and so therefore we are finding and detecting Candida auris more readily.

Dr. Clancy

Great. Well, Joe, you touched on this, but let's go a little bit deeper. What makes Candida auris unique? And why should we worry about it more than, you know, plain Candida albicans or that? What makes it its transmission and its persistence so concerning?

Dr. Tholany

I think a lot of it ties back to its recent emergence in the past few decades. So one of the things we know about yeast in general is they don't tend to tolerate very high temperatures, especially our body temperatures. So for a yeast like Candida auris to cause infections is pretty unique. Generally, when we talk about Candida auris compared to the other Candida species, unlike Candida albicans, which it tends to be in the GI and GU tract as well as places like the vaginal and oral mucosa, Candida auris seems to have a preference for cooler areas on the skin. Like I previously mentioned, it tends to congregate around hair follicles. Interestingly enough, there's something about sweat that causes it to form biofilms and go further down into the hair follicles. So we know that we have screening tools to detect Candida auris within these areas, but what we also know from larger retrospective studies, is patients or people colonized by Candida auris can intermittently shed Candida auris. So they can be positive one week, rescreen the next week and be negative, and then the following week be positive again.

Dr. Brust

Yeah, and unfortunately, we don't have any sort of great decolonization measures either. So there's a lot of study and work being done in that arena. But technically, if we know that you have Candida auris, we don't have any good methods to decolonize you. And so therefore, that shedding of skin cells and contamination of the environment continues. The other thing that I would add to what Joe was saying is like in a healthcare setting in particular, we're concerned about the most vulnerable of patients picking up these organisms. And because there are no decolonization efforts and because there are actually kind of poor cleaning methods—a lot of the hospitals across the nation use what we call quaternary ammonium related products, or quats—that is ineffective against Candida auris. And so we've had to look at our disinfectants and target Candida auris more readily to try to pick up some of that environmental contamination to protect the next patient from becoming colonized.

Dr. Tholany

And we'll probably touch on this later, but like Karen alluded to, it tends to cause a lot of issues for healthcare facilities, precisely because it's able to persist in the environment. It is extremely hardy. It is resisted by a lot of our typical cleaning products, such as quaternary ammonium. So there are things that work, such as bleach, but we generally try not to use a lot of bleach in our healthcare facilities. It leads to degradation of our products if we're using reusable medical equipment, and there's often a lingering odor associated with bleach. So a lot of the work has been into looking at alternative cleaning products. So the EPA came out with a list called the List P products that specifically are meant to help with decolonization or disinfection of rooms with Candida auris and incidentally helps with treating C. difficile as well, which is another organism we worry about in healthcare facilities.

Dr. Brust

I would also kind of challenge anybody on the infection prevention world who's listening to go back to their facilities and to, you know, look at the products that they're using for terminal cleans at the end of the patient's stay. That's one kind of realm of disinfection that we need to look at, but we also need to look at the day-to-day disinfection. I believe we mentioned this, but in the healthcare setting, there's movement of machines, different procedures, EKG machines, glucometers, all these other things that kind of move between patients. And so I would challenge the infection preventionist that's listening to go and make sure that those products are also on list P. to make sure that there's effective Candida auris kill on that.

Dr. Clancy

Sure. And are there any particular surfaces or instruments that seem to be more likely to host the Candida, or is it just everywhere?

Dr. Tholany

It's really the entire room. It's as soon as a patient's there, we know from ED studies that the entire room becomes colonized with Candida auris, and that can persist with patients moving to different rooms. So they've done studies looking at environmental colonization, and you see it everywhere from the floors and the ceilings, the bed railings, patient linens and pillows. So pretty much anywhere in the room can become colonized with Candida auris, which is why one of the big things we really harp on is ensuring that anyone who's in the room, if you're using any sort of medical equipment, wiping it down after its use, and really ensuring that there are daily cleans that are occurring as well as the terminal disinfection that Karen mentioned.

Dr. Clancy

Got it. So let's move into a little bit more to clinical presentations of infection itself. Karen, you mentioned vulnerable populations. Who would be on that list of patient populations that when exposed might be more at risk for a pretty significant infection?

Dr. Brust

Sure. So I'll rewind from clinical presentation of infection and rewind it back to kind of risk factors. So in general, and maybe this is almost too generalized, but for the clinician on the call, the type of patient that we think of being at risk for C. diff, I think of being at risk for Candida auris. So it tends to be a patient that's in connectivity with the healthcare setting, lots of procedures, lots of devices, lots of antibiotic use, et cetera, et cetera. Now I'll give you the more specific risk factors that Iowa HHS recommends that we look at and we consider for standard screening. So in general, across the nation, all the public health folks are asking us to screen for any patient that has had an overnight stay within the previous 12 months in an international hospital. In addition to that, you can look at places with high numbers of Candida auris. So for us, we already mentioned the Chicagoland area in Illinois, California, Florida, New Jersey, New York, Texas. the area of the capital, Southern Maryland, Washington, D.C., Northern Virginia, et cetera. The other patient would be history of a patient that's in the ambulatory surgery centers, hemodialysis centers, or directly exposed to a roommate or close contact to Candida auris, which, you know, hopefully that's my team's job to figure that out and then get those patients screened. Joe, anything to add to that list of risk factors?

Dr. Tholany

I think that's a pretty comprehensive list. I would want to add that really it's the patients who are the sickest that are more likely to have complications with Candida auris. We know that looking at studies of healthcare workers, they can have Candida auris colonization, but don't seem to develop a lot of invasive infections related to it. We know looking at ED studies and general medical surgical wards that there aren't a lot of patients who develop invasive infections with Candida auris. It's really our more critically ill patients that are more likely to develop candidemia. So thinking about our patients with ventilators or tracheostomies, where you have tubes going down into their airways, patients with central catheters that allow these fungi on the skin to enter into the bloodstream and cause infections. Those are really the patients that we're most worried about. They are the patients that are more likely to develop candidemia. About a quarter of ICU patients that are colonized with Candida auris develop candidemia. And it's something we really worry about because it does have such a high case fatality, about 30 to 60%. Looking at other resistant organisms, we know that there is a cost to the organism to be able to become

resistant and develop drug resistance. And what we see with Candida auris is it picks up resistance pretty easily and it retains that resistance for a long period of time. So it's really our patients who are not able to fight off these infections and are being exposed to multiple antimicrobials that are at highest risk.

Dr. Brust

There's some co-colonization too between different multidrug-resistant organisms. And so there was a good study out of Maryland that showed that co-colonization with carbapenem-resistant Acinetobacter occurred in about 29% of patients that were screened. And so again, we're kind of, we're describing a sicker population that requires more of the healthcare system that then puts them at risk for these infections with multi-drug resistant organisms.

Dr. Clancy

So, you know, I staff the emergency room a fair amount. I have patients that will be admitted to a community setting, which is psychiatry. So we do every once in a while have a patient that needs to be screened because they're going to enter a patient situation where there'll be a fair amount of circulation. How long does the screening take? You know, if we have somebody that we're concerned about at that emergency room level and they're going to have to come in the hospital, is it a, do we, are we able to turn it around fairly quick or or is it an extensive eval?

Dr. Brust

I think it depends where you're screening from and what the capability of your local facility might be. So I can speak for the University of Iowa that we have roughly 2 handfuls of testing that we can do rapidly within hours, but anything over those two handfuls then have to go to the state for testing, which very luckily is down the street from us. And so our turnaround time is, in my mind, very quick in the 24-hour period. But a lot of folks are not as privileged as we are to have that capability. And some don't even have local state testing available to them. So they end up having to send it off to a different state. And when we began this journey with Candida auris, we also were having to send specimens over to the University of Minnesota for testing. But thankfully, we got it to the state of Iowa and even some low capacity here within the university itself. Joe, I don't know what the VA turnaround time looks like.

Dr. Tholany

It's pretty similar. Currently, we have a commercial laboratory that we're able to send it to, or we're able to send it to the state hygienic lab, which like Karen mentioned is just down

the street. So we're definitely very blessed to be able to send those tests out. It's a composite groin axillary swab. So 4 swabs, one for each armpit and two for the groin. It's a PCR-based test, so it does have a pretty rapid turnaround time. Again, we are fortunate to be in an academic institution and have these tests available to us. In more resource-limited places outside of the US, they are reliant on culture-based methods, which we can talk about is fraught with a bunch of difficulties. There's also been the development of a Candida auris-specific chromagar, which has better sensitivity, but a very high false positive rate. So definitely very fortunate to have a PCR-based test.

Dr. Clancy

So delving into once an infection starts, what types of presentations do we see as far as localized presentations? And then, Joe, you did mention about candidemia as well, and obviously those patients are very ill.

Dr. Tholany

Yeah, so colonizes the skin. So generally that's where we expect most of these infections to start. It isn't the primary cause of wound infections, but oftentimes can become associated with wound infections that have started from other organisms. I think one of the most well-described type of wound infections are sternal wound infections. So we can often see Candida auris cause those type of infections. And then once it's able to enter into our body, it's able to cause a host of other infections. We see pericarditis, pleuritis, endophthalmitis, osteomyelitis, and in very difficult situations, meningoencephalitis, all associated with Candida auris.

Dr. Brust

I think the difficult part for a clinician is coming to a case and trying to decide, is this a true infection or is this just a colonized state? especially when you're just picking it up in the skin. And so that's when there has to be just kind of relying on your clinician skills to know if there's a localized infection there that warrants therapy. We can talk a little bit about the different treatments and the type of Candida auris that we're seeing here in Iowa. Thankfully, the one that we're seeing the most here in Iowa is not as multi-drug resistant as the others that maybe other folks in the northeastern states are seeing. And so we still have the capacity to treat with the group of drugs that we call echinocandens.

Dr. Clancy

And you, from preparing for this, you categorize these different versions as clades. Is that right? Yeah. And so the clade that is here in the Midwest so far has been not as difficult to work with compared to others. Is that what you're saying?

Dr. Brust

Correct. We call it the South American clade. So it came from South America and matches the clade that we were seeing in Chicago and then over to Iowa.

Dr. Tholany

Yeah, to put that into context, we are now up to six clades of Candida auris. Previous studies probably showed 5, but there is a newest one from Singapore called the Indo-Malayan. Interestingly enough, the first case report of Candida auris from a Japanese patient, that is considered clade II, and it tends to not have as many invasive infections associated with it. So what we see mostly here in the US are clades I, III, and IV, which are the South Asian, African, and South American ones respectively. And like Karen mentioned, what we're seeing here in the Midwest and Chicagoland specifically is mostly clade IV, which is the South American clade. Clades I, III, and IV are a little bit more difficult because they are more likely to cause invasive infection and have a higher predisposition to develop resistance. But fortunately, we're not seeing a whole lot of resistance here currently.

Dr. Brust

And fortunately, I don't think we're seeing a lot of invasive candidemic states where the Candida has had the opportunity to jump into the bloodstream. Personally, I'm very interested in Candida auris-related colonization and infection in a burn population, specifically because they are a patient population that for the most part has just lived their life out in the community. They're not typically in and out of hospitals until the moment that they have their burns. And then that loss of skin integrity coupled with time on the ventilator, time on the different devices, all the antimicrobial therapies that need to be used to protect those patients, then put them at risk of Candida auris. And so I am not alone in that interest. And so we've gotten together with a few people across the nation to start looking at information within that very specific patient population. And we're watching the literature to see what sort of decolonization efforts are out there for them and how to kind of best clean their environments. So if it does enter into a burn unit, how are the other burn patients protected from becoming colonized and then infected from it?

Dr. Clancy

Great. So you've both touched on this, but let's talk about treatment and what treatment options do we have. And let's also include the worries about antifungal resistance that Candida auris presents.

Dr. Tholany

I'll jump in here. I love antimicrobials. So when we talk about invasive fungal infections, since the early 2000s, we've really only had three classes. We have our polyenes, which is amphotericin, our azoles, which includes fluconazole, which is the main anticandidal that I think most people are familiar with, and then the echinocandins that Karen had talked about earlier, which is caspofungin at the university and micafungin at the VA. And essentially since 2002, these have really been the only three classes of antifungals that we have. What we typically see with Candida infections in a non-Auris population is we give a lot of fluconazole. Generally, fluconazole is our first line drug for things like Candida albicans, parapsilosis, tropicalis. We see Candida species that are a little bit more resistant. Candida glabrata tends to have what we call a susceptible dose-dependent relationship, where you'll often require high doses of fluconazole. And then Candida krusei is intrinsically resistant to fluconazole. And then from an ID board's perspective, Candida lusitaniae is intrinsically resistant to amphotericin B. But in general, Candida doesn't tend to be very resistant to the three classes of antifungals that we have. Candida auris essentially turns everything that I just talked about on its head. We see in what we have collected so far, about 90% of Candida auris isolates are resistant to fluconazole, which is generally our first line drug. We see about a third of isolates are resistant to amphotericin B, which if you think back to med school is generally what we talk about as being our go-to heavy hitter in terms of treating fungal infections. Fortunately, what we see is echinocandins tend to have a lot of retained susceptibility currently. Only about 5% of isolates are echinocandin resistant. But what we do know is echinocandin resistance is increasing. We are slowly seeing more cases of echinocandin resistance as time goes on. And like I mentioned earlier, unique to Candida auris is it seems like removing the selection pressure of the broader spectrum antifungals doesn't seem to lead to removal of the resistance mechanisms, which is interesting compared to other resistant organisms.

Dr. Clancy

Well done. So with, you know, this kind of race with antifungals, do you see new treatments on the horizon that might be helpful? Is there compounds in development that look like the magic bullet for Candida auris.

Dr. Tholany

So there have been a couple of antifungals in the pipeline. Rezafungin is a long-acting echinocandin. It retains susceptibility in patients who have echinocandin-susceptible Candida auris, which makes sense, but isn't effective for echinocandin-resistant Candida auris. There are other novel agents that are currently in the pipeline. One of them was olorofim. It doesn't seem to have a lot of activity against Candida auris. But the two that

seem the most promising are ibrexafungerp and Fosmanogepix. Ibrexafungerp is pretty similar to the echinocandins in that it affects 1,3-Beta-D-glucan synthase, which is required for the fungal cell wall, but it acts in a different mechanism compared to the echinocandins. And then very interesting for Fosmanogepix, it affects a totally different part of the fungal life cycle. So we're slowly starting to see more novel antifungals, but a lot of them are still in the pipeline and are years away from broader clinical adoption.

Dr. Clancy

Great answer. Let's change gears again. Let's talk about surveillance. You are both epidemiologists, and so obviously health policy and guidance is changing all the time in this area. Is there kind of a consensus right now at the national and state level on the best way to go about surveillance?

Dr. Brust

Yeah, I'll take that. Yes. So, and really kind of reflecting on what Joe was just saying, right, limited treatment options. So for Joe and I, the most important thing here is is early detection. Why? So then we can appropriately use isolation precautions, be excellent with our hand hygiene, and excellent with our environmental cleaning. And so currently, as I stated before, the international hospitalization in the last year was kind of a bare minimum of what public health is asking us to do. In general, they're asking us to look at our more local epidemiological risk factors and then make a decision about what type of patient to screen. And so, like I said, we've been on this journey for a few years now. And so our original screening criteria included connectivity with Illinois, actually. So we were kind of sensing that things were coming out of the Chicagoland area into Western Illinois and Eastern Iowa. And so we started including that as risk factors for screening. Obviously, the co-colonization with other MDROs, so the MDRO status gets you a single patient room in screening. And then any stay in a ventilator capable skilled nursing facility or long-term acute care hospital is also in our current screening criteria. We've been screening now for over a year, so we have a year's worth of data to determine whether or not this was enough. And the answer was it is not enough to capture the at-risk patient for Candida auris colonization. What we're missing here is hospitalization in Iowa. Just hospitalization period is really what we should be saying. It doesn't matter if it's Iowa, Florida, Texas or anything. And so now we are working towards, we haven't gotten there yet, but we're working towards adding that screening criteria. So if a patient has been hospitalized in the last three months, we would like to pick up their screening. And again, by the way, you sort of mentioned this, the rapid turnaround of screening. That's really important, right, to figure out patient placement within the hospital and then protecting other roommates if they do land in a double room. And so this is all a very thoughtful process, right? So the nurse, the

physician, they all have to think about these screening criteria on top of so many other things that they have to think about when they're doing the admission process. And so we're trying to figure out how to leverage artificial intelligence to do this for us. So we know that there is AI available to read a patient's chart, but you have to, again, do that manually. And so, I don't know, it's really kind of opening up some possibilities for us to better contain, better mitigate, better increase that turnaround process for screening and then containment of the organism.

Dr. Tholany

To piggyback off of that, I think Karen hit on a lot of the important points, but the biggest thing is this is not just an issue from foreign countries or healthcare facilities in the epicenters that Karen had outlined earlier. Candida auris is probably in a lot of our healthcare facilities and is currently being spread undetected. So really identifying the patients who are at highest risk. So really those hospitalized patients, the patients who've had previous surgeries, patients who were undergoing hemodialysis in healthcare facilities and worrying less about where they came from geographically. Looking back to the initial cases back in 2016, we know all of our cases from the U.S. were imported from other countries, but as the recent SARS-CoV-2 pandemic has shown us, people travel very frequently and people are intermingling with each other and we're not exactly sure how much transmission is occurring between folks in the community. We don't know, say a person has been in a healthcare facility to visit a loved one or a friend. They're picking up Candida auris and then subsequently becoming sick or passing it on to other household members or close co-workers. So there's likely a lot of transmission occurring that we are not currently detecting. And a lot of work is being done to try to better identify which patients we should be screening.

Dr. Brust

I want to just say one more thing here. I had a very interesting conversation with a physician at HHS and really signed up to do this podcast because although this is an emerging pathogen where we're still learning quite a few things, it does sound scary, the transmission through the hospitals, the resistance patterns, all these things. But when it comes down to it, we actually want to remove some of that enigma from this pathogen. We want to educate the public, the clinicians, nurses, infection preventionists, everybody about it, because some of our mitigation efforts are pretty simple things. And we've mentioned those. Single rooms, hand hygiene, contact precautions, gowns and gloves in the hospital, and enhanced barrier precautions outside the hospitals in nursing homes and skilled nursing centers, where you use the gowns and gloves if you're helping toilet a patient, if you're cleaning a wound, if you're emptying a urinal, these types of things. And so the

containment process, it should not be overwhelming to any facility. We have the capacity to do that, even in low resource settings. And so I hope that some of this discussion has brought to light maybe why it is kind of capturing public media attention, but also kind of balancing that with the capability of trying to contain it as we learn more about it.

Dr. Tholany

Going back to the 2023 CDC report that really stirred up interest in Candida auris, we've received a lot of questions about who is at risk for Candida auris. Again, to reiterate, it's our critically ill patients. We know that lay people with normal immune systems and even healthcare workers who are in and out of healthcare facilities don't seem to pick up Candida auris, don't seem to develop invasive infections related to it. We know that even in places that are at higher risk for transmission, we don't see a lot of Candida auris transmission occurring. There is a MMWR from July 2025 that talked about how standard cleaning precautions in a hemodialysis center seemed to help mitigate the transmission of Candida auris when they weren't aware that there were patients at the hemodialysis center with Candida auris. So a lot of our standard hygiene practices, a lot of our standard disinfection and sterilization techniques do work. It's just a matter of being cognizant that this pathogen is out there. And for our most vulnerable patients, that there is a little bit more effort that goes into protecting them and ensuring that they don't have poor outcomes related to it.

Dr. Clancy

Great answers from both of you. Well said. Well said. So as epidemiologists, you guys are looking at trends and predictions all the time. As we look to the future, what do you see as the biggest challenges in managing, controlling, limiting Candida auris? And how do you see things playing out as time goes on?

Dr. Brust

I'd like to see decolonization figured out. Joe is nodding his head. Yeah, I feel for the patient that is found to be colonized with Candida auris that maybe is younger, maybe is receiving dialysis. You know, it's no fault of theirs. And I would just love for decolonization to get figured out. So we do not have to use contact isolation precautions for that type of patient every time they go to any sort of healthcare facility. I've had a couple patients see me in clinic and I say, today, I have nothing for you. Call me in a year. So I always say, call me in a year, call me in a year, and we'll let you know what sort of decolonization efforts are available.

Dr. Clancy

Joe, how about you?

Dr. Tholany

When I think about infection prevention and control, there are three things that I always think about: detection, treatment, and prevention. So I think we are getting better in terms of our detection methods. I mentioned the composite axillary and groin swab. I think as that becomes more readily available and more widely adopted, we'll be able to find more cases. Really the areas that I'm most concerned about are the treatment. Like I mentioned, we really only have three classes of antifungals and we see there are Candida auris isolates that are resistant to all three classes. So really the development of the novel antifungals. I wholeheartedly agree with Karen. It would be wonderful to have a decolonization protocol for Candida auris. And then I think in terms of developing better cleaning products that are able to, that are effective in both daily cleans and terminal cleans of patients with Candida auris. A lot of work is going into no touch technologies to assist with decolonization efforts. There's a lot of work looking at UVC radiation in particular for Candida auris. So I think there's a lot of interesting work coming from those fields as well. And I'd be interested to see what we have a year from now, like Karen had mentioned.

Dr. Brust

We didn't talk about this and but the UV technology for Candida auris, that's a burgeoning field, but that only takes care of surfaces that are hit by the light itself. And so how do we tackle the crevices where some of these skin cells might fall into? And so we do need to study hydrogen peroxide, ionized hydrogen peroxide-type products that can mist the entire room and penetrate some of those crevices to try to get a better clean. So there is work being done in all these spaces, but as we know, it kind of takes time to do the research and link that research back to positive clinical outcomes. And so we're probably in that 10 to 20 year period right now trying to figure some of these things out. So we'll see where we land in 20 years.

Dr. Tholany

And ultimately, these no-touch technologies are all adjuncts. Nothing beats just manually wiping down a surface, proper hand hygiene with soap and water or alcohol-based solutions that are greater than 60% alcohol. Nothing will beat those. There's no amount of UVC or aerosolized hydrogen peroxide that is going to get into a clump of that tissue that is remaining there. So it's really contingent upon our environmental services staff, as well as

our providers and our nurses who are going in to ensure that devices are being wiped down appropriately.

Dr. Clancy

Great answers. You guys know your stuff so well. So as we close, what are some of the take-home points you'd like to leave with our listeners? And Karen, let's start with you.

Dr. Brust

I think for the folks that are listening that live in the infection prevention world, I want them to do two things at their local institutions. One is to ask about screening. What are they doing for it? How are they doing it? And if they're not doing it, how to ramp it up? Because I do think if we screen it, we will find it. And then the second thing for them to do when they go back to their home institutions is to figure out what they're using to clean with and to make sure that there is list P product available. There are some alternatives if they need to go there, but for the most part, they want to make sure that the disinfectants have kill against Candida aura. So those would be the two things for me.

Dr. Clancy

Great. Joe, how about you? Some take-home points?

Dr. Tholany

Yeah, just tying it back clinically and just knowing that unlike other Candida species, it tends to colonize the skin. It's interesting in regards to the fact that it's able to form biofilms. It's able to persist in the environment for long periods of time. I don't think we talked about this specifically, but a lot of our hospital surfaces are plastic or plastic-based. And we know that Candida auris is able to survive as a growing, dividing, functional colony for a period of three to four weeks. So knowing that it's able to survive in healthcare facilities, it's able to survive on people's skins and able to be intermittently shed and that patients are at risk for developing it, but it's really our most critically ill patients that have the worst outcomes related to it. And just being aware of the importance of the infection control measures that we had talked about during the course of the podcast. As we're learning more about it, we know that we still need to do things like wearing gowns and gloves, ensuring that we have regular cleans of these rooms and very targeted terminal cleans towards the end of the hospital stay, trying to ensure that there isn't a lot of transmission of patients in and out of the room, and trying to reduce the amount of transmission of other folks coming into the room that don't need to be there.

Dr. Clancy

Thank you both so much for joining us today and for your great work on infectious disease surveillance, early identification and interventions, as well as treatment. And overall, just thanks for protecting us.

[Upbeate theme music]

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