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Protecting Immunocompromised Children Through Vaccination

Announcer:
You're listening to *On the Frontlines of Pediatric Vaccines* on ReachMD. Here's your host, Dr. Paul Doghramji.

Dr. Doghramji:
Welcome to *On the Frontlines of Pediatric Vaccines* on ReachMD. I'm Dr. Paul Doghramji, and joining me to discuss the unique challenges of vaccination and infection prevention in immunocompromised children is Dr. Jonathan Albert. Dr. Albert is an Associate Professor of Pediatrics at the University of Pittsburgh School of Medicine. He's also a physician in the Division of Pediatric Infectious Diseases at UPMC Children's Hospital of Pittsburgh. Dr. Albert, thanks so much for being here today.

Dr. Albert:
Well, thanks so much for having me. It's an honor to be here.

Dr. Doghramji:
So to start us off, Dr. Albert, can you help define what we mean when we say a child is immunocompromised and why infection prevention becomes such a critical part of their care?

Dr. Albert:
Yeah. So immunocompromise can take many different forms. As you know, there are many different parts of the immune system. And so for some children, that might mean that they have what we call an inborn error of immunity. A branch of their immune system may not respond to infections typically, and it leaves them more susceptible.

And then there's also acquired immunodeficiencies, say, either for children receiving chemotherapy for cancer or children who are receiving immunosuppressants because they have received a solid organ transplant. Those can all affect the immune system in various ways, and in turn, that can cause children to, one, be more susceptible to acquiring infections, but also, when they do get infectious diseases, they may have more severe manifestations than children who don't have that underlying immunocompromise.

And so when it comes to infection prevention, I think it really is, to those two former points, that these are children who are more vulnerable to acquiring infections, having more clinically apparent disease, and then having more severe outcomes. And so to the extent that you're able to prevent these infections, that saves a lot of issues down the line.

Dr. Doghramji:
So with that context in mind, how does having a weakened immune system affect the child's response to vaccines, and what challenges does that create for clinicians developing vaccination plans?

Dr. Albert:
So vaccines are of many kinds. I would say broadly that immunocompromised children have less robust responses to vaccination, particularly if they are immunocompromised first and then get vaccinated, as opposed to getting vaccinated when they're immunotypical. And I can talk about that in a little bit.

In terms of challenges, certainly there are recommendations for a lot of the protein subunit and inactivated vaccines to be given to immunocompromised children. One challenge is giving live attenuated virus vaccines to children who are immunocompromised. So chiefly MMR and varicella have been big points of discussion within the transplant immunocompromised, infectious diseases world. The old teaching was that if you gave an MMR to a child with any degree of immunocompromise, they'll get vaccine strain disease and get sick and other complications from that. Increasingly, we're finding that there is a subset of immunocompromised children who can

tolerate live attenuated vaccines that we'll talk about in a little bit from now.

But in terms of challenges posed to providers developing vaccination plans for immunocompromised children, I would say, one, the inability broadly to give these live attenuated vaccines, and then also just having less vaccine effectiveness once they're administered.

Dr. Doghramji:
Now, many children who require transplants or cancer treatment have a limited window before therapy begins. So how do you approach vaccination during that period? And also, what opportunities might clinicians miss if they wait too long?

Dr. Albert:
You know, I think this question really is particular to solid organ transplant recipients. For patients who require chemotherapy, it is pretty uncommon to give additional vaccines and await for an immune response before starting chemotherapy. If you need chemo, you just give it. But for transplant recipients, it really is being thoughtful and preemptive when it comes to counseling and when it comes to vaccination.

Particularly for kidney and liver transplants, those are often transplant scenarios in children where you do have the luxury of time to ensure vaccination, and that they have a safe window to convert. And so I really just try to emphasize to families that one, if they get their vaccinations before they get immunocompromised, their immune memory post-transplant will be much better than if they get those same vaccinations after induction of immunosuppression. And then the second part is that, for the live attenuated vaccines like MMR and varicella, the guidance is to avoid transplant if those vaccines are given within four weeks or vice versa. Don't give those vaccines within four weeks beforehand. And so if an organ becomes available, you certainly don't want to miss that piece.

And so that's another value in just being really proactive with those vaccinations, and that's why at our hospital, at, Children's Hospital of Pittsburgh, there's an infectious diseases, pre-transplant consultation for every transplant candidate to discuss these issues.

Dr. Doghramji:
For those just tuning in, you're listening to *On the Frontlines of Pediatric Vaccines* on ReachMD. I'm Dr. Paul Doghramji, and I'm speaking with Dr. Jonathan Albert about vaccines for children with weakened immune systems.

So, Dr. Albert, even when immunocompromised children are vaccinated, some remain vulnerable to infection. What additional strategies do you use to help protect these children and their families?

Dr. Albert:
Broadly, it's a lot of the same boring stuff that we've been taught since we were children. I think it's never too early to introduce hand hygiene as a habit for young children. Obviously, it's easier for some age groups than it is for others. But model that through the family and have really frequent handwashing before eating and after going to the bathroom.

And then other things like masking can be a valuable resource. I always tell families that, to an extent, you have to live a little, and some children are really averse to wearing masks. But if you are in a crowded indoor space or if it's flu season or there are other circulating respiratory viruses, a mask can be a really useful tool for preventing acquisition of those viruses that can make this population of patients more sick.

Beyond that, outside of vaccinations, handwashing, and masking, to the extent possible—again, I think it's a tall ask to ask these children to live within a bubble—but if you know of, say, an outbreak of measles in a certain community, I'd probably avoid going to that part of the country during that outbreak.

You know, with things like Disneyland, just be really mindful of reports, and always talk to your friendly neighborhood infectious diseases provider because they can always help kind of give guidance on best strategies.

Beyond that, there are different post-exposure prophylaxis options depending on the nature of the exposure. For example, for children exposed to measles who are immunocompromised and can't receive a post-exposure MMR vaccination, we do give these children IVIG, because there are measles antibodies within the donor antibody pool. And there's specific guidance for other exposures such as varicella that I won't get into the weeds with here. But again, feel free to reach out to your friendly neighborhood ID provider.

Dr. Doghramji:
Okay, so when you're discussing vaccines with families of immunocompromised children, what questions or concerns come up most often, and how do you navigate those conversations?

Dr. Albert:
Yeah, that's a perennial challenge, at least these days. I would say that vaccine hesitancy is of many forms. And one of the most important things is to not make assumptions about the family's beliefs or stances, and that the vaccine-hesitant parents are not a

monolith.

I think the first piece is getting a thorough understanding of where they're coming from, what their concerns are, and how you can alleviate them. What kinds of information are they interested in? Do they want clinical trials or do they want just a broad description of your experience?

In terms of the most common concerns, I'd say one is broadly the concept of inflammation. I think there is a lot of disinformation out there that the inflammatory response produced by vaccines can be associated with things such as autoimmune conditions, or other chronic health maladies that we have a substantial amount of data to say that's not the case.

And then there are other theoretical toxicities from vaccine additives. Aluminum-based salts used as adjuvants in vaccines, again, are very commonly used. The dose that you'd get from an intramuscular vaccination is a tiny fraction of a percentage of what you get of aluminum through your diet, even if you make a really conservative estimate of one percent bioavailability of dietary aluminum.

So there are various things. I guess to answer your question more directly, concerns about inflammation and concerns about aluminum and other vaccine additives. I will give a plug, not for our hospital, but for Children's Hospital of Philadelphia. They have a wonderful vaccine education center that actually talks about the primary literature and the safety behind each of these concerns that you can help direct your counseling to each family's individual concerns.

But the most important thing is just sitting down with the family, not making assumptions, and getting a good understanding of what their concerns are and trying to build up rapport, because I think trust really is the most important piece of the puzzle.

Dr. Doghramji:
So, Dr. Albert, what about access to these vaccines and also maybe even coverage? Do patients ever have a challenge there or question that issue?

Dr. Albert:
You know, that's a really excellent question. There are health inequities that pertain to vaccine access, and you might imagine that it's easier for some families to get to their drugstore or have their pediatrician's office have vaccines available, versus families who may not have the same access to transportation or may not have the same resources available at their local pediatrician.

I do think that is a really important consideration when you're counseling these patients to what do they have access and doing the best you can to advocate for their ability to access these vaccines that you're recommending. It's one thing to say, "Okay, go find a place to get an MMR vaccine, before we list you for a kidney transplant." But it's another to task a family to find a drugstore, because a lot of clinics, or at least, our transplant clinic here at Immune Hospital, we don't have that stocked. So they need to go to their pediatrician or they need to go to another pharmacy. So that is a potential consideration, and that's part of the value of working on a multidisciplinary team—that our transplant coordinators do a really good job of helping ensure that we have the right resources available to the family, if that answers your question.

Dr. Doghramji:
Yeah, that can be challenging, but we have to meet the challenge to make sure that these children get what they need. So finally, Dr. Albert, as you look ahead, what developments in vaccines, immunology, or infectious disease prevention are most exciting for improving outcomes in immunocompromised children?

Dr. Albert:
One of them that I alluded to earlier is the ability to give live attenuated vaccines like MMR to children who've received transplants, and that there are certain cutoffs that you can find within the ASD guidelines or again, talk to your friendly neighborhood ID provider. But for children who are on minimal immunosuppression, they can receive these vaccines and still receive pretty durable lasting immunity. That helps out a lot.

In terms of other more technological innovations, I think just further advancement within vaccinology. I hope to live to see the day that we have a universal influenza vaccine that you don't need to get updates every year for the most likely strain of influenza that you'll encounter. If we can find a vaccine that universally provides good coverage against likely flu strains, that would be amazing. And then other mRNA-platformed vaccines I think do have a lot of promise, although that also comes under the challenge of getting support for these vaccine platforms.

Dr. Doghramji:
Dr. Albert, it seems we definitely have a lot to look forward to. And with those final thoughts in mind, I want to thank my guest, Dr. Jonathan Albert, for sharing his insights on protecting vulnerable pediatric patients through vaccination. Dr. Albert, it was great having

you on the program.

Dr. Albert:
It was great being here. Thank you again for the thoughtful questions. I appreciate the conversation.

Announcer:
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