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Released: 04/29/2022
Valid until: 04/29/2023
Time needed to complete: 30 minutes

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Protecting Adults from Pneumococcal Disease through Vaccination

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Dr. Shaffner:
Pneumococcal disease is caused by a common bacteria, that can attack different parts of the body. The disease is serious. It has a notable fatality rate. Updated U.S. vaccination recommendations can help to protect vulnerable adults, including those age 65 and older, as well as adults age 19 to 64 years with certain underlying conditions, from pneumococcal disease. I'm Dr. Bill Schaffner, Medical Director of the National Foundation for Infectious Diseases, the NFID. I'd like to welcome NFID Director, Dr. Monica Farley, who's the Jonas A. Shulman Professor of Medicine and Infectious Diseases at Emory University School of Medicine, who's joining me today to discuss vaccines available to help prevent pneumococcal disease in adults. Hi, Monica.

Dr. Farley:
Hey, Bill. Thanks so much for the invitation. It's a pleasure to be here, in particular to talk about pneumococcal disease prevention.

Dr. Shaffner:
Yes, one of our favorite topics. So to get started, Monica, tell us what the pneumococcus is. And what's pneumococcal disease?

Dr. Farley:
Thanks, Bill. The pneumococcus is a bacteria it’s a gram-positive bacteria and the official name is Streptococcus pneumoniae. And there are over 90 different types of Streptococcus pneumoniae, based on their capsule serotype. And the capsules are the main target or main antigen that is targeted by our currently available vaccines. So, as you can imagine, 90 different serotypes presents a challenge for vaccines and prevention.

The pneumococcus also causes a variety of diseases. Infections that vary from local respiratory tract infections, to very significant and serious invasive disease. And the organism also colonizes the nasopharynx, which is a source for transmission from person to person, often from children to older children and adults. Pneumonia is one of the more common respiratory tract infections. Otitis media and sinusitis are also very common. And then there are serious forms of invasive disease, including bloodstream infections and meningitis. Although those are less common, their morbidity and potential mortality are much more significant.

Because pneumonia is a common manifestation of pneumococcal disease, any vaccine that can also provide some coverage for pneumonia will prevent a larger portion of disease in the population. So we look for vaccines to be able to protect always against invasive disease such as bacteremia meningitis, but if there is a vaccine that can cover pneumonia, even if it's modest coverage, that will be a distinct advantage for that vaccine.

Dr. Shaffner:
I'd like to emphasize something you've said Monica, namely that the pneumococcus has a whole series of pneumococcal capsular

serotypes so that when we create these vaccines, it's really a series of vaccines all put together. And that's why the vaccines have those numbers after them because there is no, or very little, cross protection amongst the serotypes. You have to have a vaccine specific for every serotype. Isn't that correct?

Dr. Farley:
That is correct.

Dr. Shaffner:
So, we both recognize that vaccines are the best way to prevent pneumococcal disease. And there are several pneumococcal vaccines available in the United States. What's the difference between polysaccharide and conjugate vaccines? And what serotypes do they protect against?

Dr. Farley:
So the vaccines that we currently have available differ in components and in the immune response they elicit. So let's start with polysaccharides. The currently available one is a 23-valent polysaccharide vaccine and we often refer to it as PPSV or PPSV23. It's composed of purified capsule polysaccharide, the sugar capsule for 23 different serotypes of the pneumococcus. And it elicits a B-cell response– an immunoglobulin response. And importantly, that B cell dependent response, is not a very immunogenic mechanism in infants. So it's poorly immunogenic in infants.

In contrast, there are protein conjugate vaccines, these are composed of polysaccharides, but they've been individually conjugated or covalently bound to a protein. And the protein now elicits cell help. And that T-cell help, produces a much more robust immune response and one that is very active and effective in infants. We've had a number of different conjugate - protein conjugate or PCV vaccines available in the US. It started with a 7-valent, so 7 capsule serotypes in 2000, was licensed for use in infants. That was followed in the US. by a 13-valent which replaced the 7-valent serotype protein conjugate vaccine that was licensed in 2010 for use in infants, and later licensed for use in adults.

We recently have had two new tools added to the toolkit and that is a 15-valent protein conjugate, PC15 and a 20-valent, PCV20 conjugate vaccine that provides some advantages.

So all of these conjugate vaccines, as I said, are more immunogenic in young infants, and there is plenty of disease in young infants. They also provide a bonus of reducing nasopharyngeal carriage. So it can interrupt transmission from one person to another, and we get the benefits of indirect protection of those who are not actually immunized. And it also can provide moderate protection against non-bacteremic pneumonia. Because there's such a high burden of disease, that's an important feature of the protein conjugate, or PCV, vaccines.

Dr. Shaffner:
So these vaccines sound great, especially these newer conjugate vaccines because they include protection against additional serotypes than previous options. So perhaps you can give us a sense of the impact of pneumococcal vaccines on public health in the United States. If we look at the country overall, are there some metrics we can look at to see how well these vaccines have worked so far?

Dr. Farley:
Yes, I think the protein conjugate vaccines are success stories. The introduction of the protein conjugate pneumococcal vaccine has had a major impact on the incidence and number of cases of invasive pneumococcal disease in particular, which is the easiest for us to measure. After introduction of PCV7, a 7-valent for infant use only, there were 280,000 cases and 19,000 deaths prevented,– and it occurred with a precipitous decline in invasive disease in the first few years after introduction back in the year 2000. After it was replaced with PCV13 in 2010, there were an additional 20,000 cases and 2,000 deaths prevented. The interesting part of this is that most of the deaths prevented were in adults who were not receiving the vaccine. And this was due to that indirect protection, or some referred to it as herd immunity. So the benefit of interrupting transmission from those immunized to those who are unimmunized.

Dr. Shaffner:
Monica, these are stunning numbers, and I'm impressed with that indirect protection of adults. And clearly, pneumococcal vaccination among children has been effective in reducing morbidity and mortality. Now, do we rely completely on the pediatricians and the family doctors vaccinating children? Or should we be vaccinating adults directly also?

Dr. Farley:
Pneumococcal conjugate vaccines, specifically PCV13, were first recommended for immunocompromised adults in 2012, and for adults age 65 years and older in 2014.

Recommendations for adults have continued to evolve since then, based on changing epidemiology. And this changing epidemiology

was due in large part due to indirect benefits, sometimes referred to as herd immunity, provided to adults by the use in infants in the immunization program. This prompted a change in the recommendation in older adults in 2019, because of the observation that more of the disease had been prevented through indirect benefits than through direct use in adults. And at that time, in 2019, the recommendation was changed from a routine use in adults 65 years of age and older to that of shared clinical decision making, where the individual provider and patient could make the decision together on whether to give the conjugate vaccine to that individual.

But recently with the availability as I mentioned, of the PCV15 and PCV20 recommendations have changed. And there are new recommendations for adults. It has gone from the shared clinical decision making now to a routine recommendation again.

Now, how are these vaccines different? The new vaccines are PCV15 and PCV20. They each provide coverage for all of the serotypes that are present in PCV13. PCV15 provides coverage for two additional serotypes. PCV20 provides coverage for 7 additional serotypes. And the polysaccharide 23-valent vaccine covers an additional 4 serotypes not present in either of these two new vaccines.

Dr. Shaffner:
Well thank you. That's really quite clear.

So, Monica, you mentioned vaccination recommendations for adults have changed in the US. with the introduction of 2 newly licensed pneumococcal conjugate vaccines. So let's talk about current considerations for adults. And let's use some case studies.

Let's consider a patient. We'll call her Lauren, who is 42 years old and has recently been diagnosed with diabetes. She has no history of pneumococcal vaccination. What are the immunization considerations for Lauren, and patients like her?

Dr. Farley:
Well, this is part of some new recommendations that have just been published in the MMWR in January of 2022. And it's based on the fact that chronic medical conditions, including diabetes, increase the risk of invasive pneumococcal disease. So the new recommendation is that adults age 19 to 64 years with certain underlying medical conditions, chronic medical conditions, or other factors who have not previously received a conjugate vaccine or whose previous vaccination history is unknown, should receive 1 dose of PCV or conjugate vaccine. This can be either PCV20 or PCV15.

When PCV15 is used, it should be followed by a dose of PPSV23, the polysaccharide vaccine, at least 1 year later. If PCV20 is selected, it can be used alone.

So the use of a conjugate vaccine in individuals who have chronic medical conditions is a new recommendation. Previously, this had been reserved for just those with immunocompromising conditions and those with cochlear implants and CSF leaks.

Dr. Shaffner:
So, Monica, I'm so pleased that you have mentioned chronic medical conditions, such as Lauren who has diabetes, because, you know, it's my experience that physicians who care for those patients are very concerned about the diabetes but don't often think of vaccinations part of their important care of such people with chronic conditions. So I would like doctors to think about vaccination, pneumococcal vaccine for sure, influenza vaccine, other vaccines as part of the comprehensive care of all their patients with chronic medical conditions. Would you agree with that?

Dr. Farley:
I agree. And I think it's important to remember this includes people with chronic heart disease, chronic lung disease, chronic liver disease, even chronic smokers. So when you think about it, it is a large fraction of our patients who are in this 19 to 64-year category. So we need to be cognizant of the recommendations, and we need to get vaccines into the arms of these patients.

Dr. Shaffner:
Yes, as one of our friends loves to say, 'Vaccines don't prevent disease. Vaccination prevents disease.'

For those just joining us, this is ReachMD im Dr. Bill Schaffner and joining me to talk about pneumoccal vaccines is Dr. Monica Farley.

So that said, let's consider another patient, Bradley who recently turned 65. He's healthy with no chronic health conditions. So what are the pneumococcal immunization considerations for Bradley, and patients like him? Just 65. Otherwise, really quite healthy.

Dr. Farley:
Yeah, so with Bradley we need to consider his age. So even though he doesn't have chronic medical conditions, we know that the rates of pneumococcal disease increase with age. And so the risk increases with age. And it's been shown that those 65 years of age and older are at particular risk for serious disease and even death from pneumococcal infections. So immunization recommendations for adults age 65 and older changed in 2019, as we said, to the shared clinical decision making, but again changed in 2022 due to availability of these new PCV15 and 20. So it's important to be aware of the latest recommendations.

So the 2022 current recommendation is that adults age 65 years and older who have not previously received the conjugate vaccine, or whose history is unknown they should receive 1 dose of protein conjugate vaccine. And that can be either PCV20 or PCV15. And again, when PCV15 is used, it should be followed by a dose of the polysaccharide PPSV23, at least 1 year later. If PCV20 is selected, it can be used alone.

Dr. Shaffner:
You know, one of the things I'm so glad you mentioned is patients whose vaccination history is unknown. That's so common. They don't walk in with a vaccination history. So when in doubt, you're saying, immunize. I love the message.

Now, Bradley actually mentions that his wife, Sue, who's also 65, previously received a pneumococcal vaccine. It was actually PCV13. She received it several years ago. Now, does Sue still need to receive additional vaccines to be protected against pneumococcal disease.

Dr. Farley:
Yeah, so, I'm presuming that Sue received the conjugate vaccine because of some underlying condition that was an indication for PCV13 before she turned 65. That recommendation would have been to follow that with a dose of the polysaccharide vaccine to have expanded coverage for additional serotypes, so the PPSV23. In this case, in the new recommendations for adults who are 65 years of age or older, and who have only received PCV13 but have not completed their recommended pneumococcal vaccine series with the PPSV23, the recommendation from CDC is to go ahead and finish that series with a dose of PPSV23. Or, and this is an important new addition, you can use PCV20 if the PPSV23 is not available. And at that point, you would be finished with the vaccine regimen for this patient.

Dr. Shaffner:
Sounds good. But let's consider one final patient, Jim, who's only 25 years old, I say only, is 25 years old and is a solid organ transplant recipient. Now, in reviewing his immunization record, you note that he received a dose of polysaccharide vaccine last year, but he does not have a record of receiving pneumococcal conjugate vaccine. How should we proceed in protecting Jim?

Dr. Farley:
Adults who've only received the polysaccharide vaccine should go on and receive a conjugate vaccine. And this can either be PCV20 or PCV15. And the interval if you receive the polysaccharide first, it really should be a year or more between the doses after the last PPSV23. In this case, if you used PCV15 in contrast to the previous recommendations we've been discussing, in this case, if you're using it in someone who already has received the PPSV23, it does not require another dose of the PPSV23.

Now one thing I'll mention, since this is a true immunocompromised host if we were vaccinating him for the first time, we would start with the conjugate vaccine, and again, either PCV20 or 15. But if we selected 15 to be used, we might narrow the time window before we gave the second dose, which would be PPSV23. And while we normally would wait a year in an immunocompromised host, we might give him that vaccine that polysaccharide with a minimal interval of 8 weeks just to cover him as quickly as we could.

Dr. Shaffner:
Sounds good. Now, given these new recommendations what are some strategies to implement pneumococcal vaccination in practice?

Dr. Farley:
I think we really need to focus on assessing each patient who comes in. We need to look at each patient and assess whether they have chronic medical conditions or an immunocompromising condition, or of course, if they're 65 years of age or older, to determine if they're eligible for pneumococcal vaccination, and vaccinate them if that's the case.

The other important corollary, which we've been talking about, is we need to really be better at recording the immunization, including which kind of vaccine they received. So because we have one vaccine that's a conjugate vaccine that can be given alone, but the other one requires a follow-up dose with the polysaccharide vaccine, we need to know what the patient received for their first dose. So when PCV15 is used, the recommended interval between the administration, as I've said, is an optimal 1 year or more. But again, in an immunocompromised host, remember that you can narrow the window to a minimum of 8 weeks for those who are immunocompromised and a couple of their other conditions to minimize the risk of invasive disease caused by those serotypes only provided coverage for in the polysaccharide vaccine because they are particularly vulnerable. And then remember, in adults, you can administer a pneumococcal vaccine, either the PCV15, 20 or PPSV23 during the same visit with influenza. You can coadminister with influenza vaccine.

Dr. Shaffner:
Excellent. So with all that information, and it's great information, Monica, are there any key take-home messages you would like to share with our audience?

Dr. Farley:
I think that we want to focus on the fact that we now have again a routine recommendation for adults who are 65 years of age and older, and we have more harmonized recommendations for 19 to 64 years of age individuals who have chronic medical conditions or immunocompromising conditions. They all are now eligible for a protein conjugate vaccine. And eligible adults who receive the PCV15, should receive it in series with the polysaccharide. But those who received the PCV20 can receive it alone. So one and done.

I can't overemphasize how important it is for health professionals to be assessing each patient as they come in and looking for indications for the vaccine. There are a longer list of indications for those with chronic medical conditions as well as immunocompromising conditions who are eligible for the conjugate vaccines. And it's even more important than ever to record the information, preferably in a vaccine registry in your state if it's available, and include the PCV vaccine type that was used.

Dr. Shaffner:
Monica, that's a great way to round out our discussion on pneumococcal vaccines. I'd like to thank my colleague, Dr. Monica Farley for helping us better understand the updated recommendations for adult pneumococcal vaccination in the United States. Monica, it was great speaking with you today.

Dr. Farley:
Thanks, Bill. I really appreciate the opportunity to talk about prevention of pneumococcal disease in adults.

Dr. Shaffner:
As a reminder, everyone, please visit the NFID website at www.nfid.org/pneumococcal for additional tools and resources.

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