Ep #176: Hypersensitivity Reactions Explained: Type I vs Type II for NP Boards



Full Episode Transcript

With Your Host

Anna Miller

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Anna: Welcome to the *Real Deal Nurse Practitioner Club*, the podcast for nurses who are ready to pass their boards and thrive in their careers as real deal nurse practitioners. I'm Anna, and I'm the Director of Nursing Content at Blueprint Test Prep. Whether you're deep in exam prep or stepping into practice, I've got you. It is time to become the confident, knowledgeable NP that you're meant to be. Let's dive in.

Hey hey everyone. Welcome back. I'm Anna and today, Alex and I are breaking down hypersensitivity reactions, specifically type one and type two. Now, this topic can feel a little overwhelming at first, but once you really understand what's happening, it becomes a lot easier to recognize on your boards and in clinical practice. And don't worry, we are not diving into every single immune pathway. But instead, we're just focusing on high yield concepts that really help these reactions just like click in your brain. So Alex, thanks for joining me.

Alex: I absolutely love this topic because once you understand the underlying mechanism, the hypersensitivity reactions become much easier to recognize. And that's important because these reactions can show up absolutely everywhere. Not just immunology, but in infectious disease, pharmacology, primary care, dermatology, allergy questions, all the things.

Anna: Yeah, absolutely. And I think as always, a really good place to start is with the basics, right? So, when we hear hypersensitivity reaction, we need to know what that means. So Alex, what are we even talking about?

Alex: Yeah, so at its core, a hypersensitivity reaction is an inappropriate or exaggerated immune response that causes tissue damage. So normally, the immune system protects us from harmful pathogens, like bacteria and viruses, but in hypersensitivity reactions, that same immune response becomes harmful. It may overreact to something harmless, like pollen or peanuts, and it may respond abnormally to a medication or even target the body's own cells.

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Anna: Yeah, exactly. And for board questions, really the key is going to be recognizing how the immune system is responding, not just what triggered the reaction. So let's start with type one because I think that's the one most people recognize.

Alex: Yes, type one is that classic allergic reaction. Think IgE, mast cells, histamine, immediate reaction. Those four concepts always go together. So, the first time someone is exposed to an allergen like peanuts or shellfish or bee venom or certain medications like penicillin, the immune system becomes sensitized. It produces IgE antibodies which bind to those mast cells and basophils, and at this stage, that person is usually symptom-free.

However, that reaction occurs with a subsequent exposure. So the allergen cross-links those IgE antibodies on the surface of those mast cells and it triggers them to release histamine and other inflammatory mediators. So, that's what causes those classic allergy symptoms. We're talking hives, itching, angioedema, wheezing, bronchospasms, and in severe cases, anaphylaxis, right? So because symptoms develop rapidly after exposure, type one is also known as an immediate hypersensitivity reaction.

Anna: Yeah, absolutely. I have two kids with this from food allergies and so I very much sadly understand all of those symptoms way too well. But it's really an important point. Sometimes students assume like that first exposure causes the big reaction, right? But the immune system has already been primed by an earlier exposure.

Okay, I want to connect this to something we see constantly in primary care, which is penicillin allergies, right? And this one does show up on boards, but it really shows up in practice.

Alex: Absolutely. One of the most important parts of a medication history is asking, what happened instead of simply, are you allergic to penicillin, right? A reported penicillin allergy can mean very, very different things. A mild rash as a child is very different from throat swelling, trouble breathing,

or a reaction that required epinephrine. That is me, right? Like I have a very severe allergy to penicillin. So many medication rashes that appear days after starting a drug are delayed reactions and not caused by IgE, which is why asking about the timing and severity of symptoms is so important.

Anna: Yeah, that really really matters, right? Because both penicillins and cephalosporins are these beta-lactam antibiotics. And board questions often ask whether it's safe to use one of those, like can they use a cephalosporin if they report a penicillin allergy. And patients with a low-risk reaction, like it was delayed, it's an uncomplicated rash. Those patients can often still receive certain cephalosporins depending on the specific drug and clinical situation.

Alex: Yeah, and on the flip side, so patients with a history of like a true immediate IgE mediated reaction, like me, experience, you know, anaphylaxis or angioedema or even significant respiratory compromise, those patients generally need an alternative antibiotic or very careful evaluation before receiving another beta-lactam.

Anna: Yeah, please commit this to memory if you are taking your boards soon. They love this distinction. Because ultimately, right, that is testing whether you can identify the type and the severity of the allergic reaction. It's not testing whether you've just memorized a list of antibiotics. Okay, let's switch gears now. So Alex, how is type two different?

Alex: Yeah, so type two hypersensitivity works through a completely different mechanism, right? Instead of IgE, think IgG and IgM. So these antibodies bind antigens on the surfaces of cells or tissues and trigger that immune system to destroy those cells or alter how they function, right? So because of that, the symptoms really depend on what's being targeted.

So, for example, if red blood cells are attacked, that's going to produce autoimmune hemolytic anemia, right? If platelets are targeted, you can develop immune thrombocytopenia. So let's say these antibodies stimulate the thyroid stimulating hormone receptor, you know, that can lead to

Graves' disease. Or if they block acetylcholine receptors at the neuromuscular junction, you get myasthenia gravis.

Anna: Yeah, so unlike type one, which we think those classic allergic symptoms, we've got the hives and the wheezing, type two produces organ or cell specific disease based on the cells or the receptors that are being affected, like Alex said.

So before we move into like a little case scenario that I want to do on this episode, I know a lot of people listening are probably thinking, okay, how am I actually supposed to remember all of this on exam day, which is a fair question. So, one thing about SMNP is that we love our memory tricks. So, do you have any memory tricks to make these easier to keep straight?

Alex: I do, and honestly, in this scenario, the simpler the better. So my quick mental checklist is type one, think immediate. So with that one, think of an I, immediate. IgE, mast cells, histamine, that whole, you know, group of concepts that are all related. Type two, think we are looking at two different antibodies. So IgG and IgM, which target cells or receptors leading to that cell destruction or altered function.

Anna: I love it. I always love a good memory trick. Okay, now let's try to apply this information. Because that is what you're going to be asked to do on the exam. That is what you have to do in clinical practice.

So let's say we have a 19-year-old college student. They present with fever, sore throat, tender anterior cervical lymph nodes, and a positive rapid strep test. Antibiotics are indicated, but the patient reports a penicillin allergy. So your next question for all of you listening should be what?

What happened when you took a penicillin? We asked that and they tell us at age seven they took amoxicillin and they developed an itchy rash a few days later, but no swelling, no difficulty breathing, no emergency treatment was needed. So Alex, how do you interpret that history?

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Alex: So this is exactly how the boards test this concept, right? We've already diagnosed strep pharyngitis. Now the question is how to interpret the allergy history. The key isn't that they reported a penicillin allergy, it's what kind of reaction they had so we can pick a good treatment.

So an itchy rash that developed a few days after starting amoxicillin without hives, breathing difficulty, or angioedema, that suggests what? That's going to be a low-risk delayed reaction, not an immediate IgE mediated allergy. So in this scenario, a first generation cephalosporin like cephalexin is generally an appropriate option. However, I'd still educate the patient on what to watch for, document, you know, any reaction clearly, and proceed with treatment.

Anna: Yeah, absolutely. All right, let's change it up. What if the patient instead said, you know, my throat swelled a little, it got a little hard to breathe, and I used, you know, my EpiPen or some epinephrine from the hospital. Well, now we have a completely different scenario, right? That type of history is highly concerning for an immediate IgE mediated reaction. So in that case, I would avoid cephalexin and carefully select an alternative antibiotic or consider allergy evaluation if there's a scenario where a beta-lactam is absolutely preferred.

Alex: For sure. And remember, about 90% of patients who report a penicillin allergy are not truly allergic when formally evaluated, right? So take a careful history because this can really help expand safe treatment options.

Anna: Look at you being in the 10%.

Alex: Always. Always an anomaly.

Anna: All right, everyone. That is it for today. I hope this episode helps simplify hypersensitivity reactions for you. And remember, this is kind of our vibe and our style of how we teach inside of our courses. We really want to focus on understanding those basics first and then use those to apply to

real clinical scenarios, because really that's what helps you answer board questions confidently. We are not about memorizing endless lists or going through all the nitty gritty content here.

Alex: For sure, and if you're looking for even more practice, check out our Q-banks or even our live study groups. We really dive in and simplify topics like this one today.

Anna: And of course, we share our little quick exam tips, practice questions, content, all of the things on our Instagram pretty regularly @SMNPreviews official. And we'd love to have you join our free Facebook community of future NPs who are studying just like you. But thank you, everyone, for listening, and until next time, keep up the great work. We're rooting for you.

Thanks for listening to another episode of the *Real Deal Nurse Practitioner Club*. If you want more information about the different types of support that we offer to students and new nurse practitioners, you can visit npreviews, with an S, dot com. We'll see you next week.