Hospital-Associated Infections and Chain of Infection

Wwelcome to this video on hospital-associated infections and the chain of infection. A couple things to start out with… Hospital-associated infections are sometimes called acquired. I've noticed that hospitals have moved away from this language because saying hospital acquired infections is basically like admitting guilt, which probably opens them up for a lot more lawsuits. So, usually you'll see infections that someone gets in a hospital called hospital-associated infections. And then in this video we'll also briefly go through the chain of infection about how diseases can be passed from one person to another, but we're mostly focusing on this situation in a medical setting.

So, for a hospital associated infection, you have to have three ingredients. Ingredient number one is immune-compromised patients. For some reason, of all of these patients will have less ability to fight back while they are hospitalized. So this first example right here—and let's do these ones in green. So, immunocompromised patients—this is the first ingredient.

And why might they be immunocompromised? Well, I'll use a green pen for these. So first, this first person says what I've messed up my flora! They have dysbiosis. This word is somewhat new on the medical scene, but it basically means bad biology or not having healthy amounts of normal flora or they don't have enough of them or they are out of whack or out of balance. Something like that. Okay, this person saying I'm already so sick. So maybe this person already has an infection, what we would call a primary infection, that could then lead them to get a secondary infection in the hospital. Or maybe they have a pre-existing condition like an autoimmune disease.

Okay, this person says my body is ensuring I don't reject my baby. So there's a little baby in there. This lady is pregnant. Pregnancy is a state of immunocompromise, and the balance has to be found by the body. The immune system has to ratchet down its immune response just enough so that the mother's white blood cells don't attack this new person inside of her, but at the same time keep her immune system strong enough so that she doesn't die of an illness while she is pregnant. So, we do sometimes see complications that go awry with this situation, but that would be a topic for another very fun video.

Okay, in this situation here's a little kiddo saying I'm so young my white blood cells are still learning lots, or yours might say they still have a lot to learn in this video. I wrote out the page twice. And for the one that you have I like the way I phrase things better. So this would be the very young.

And you're probably not surprised that this one is the very old. My body is wearing out.

Okay, so, that's ingredient number one.

Ingredient number two that sets the stage for more common hospital-associated infections are antibiotic resistant organisms. Antibiotic resistant. I'm just gonna say microbes because fungus not just bacteria can be kind of known for this. So antibiotic resistant microbes.

In the news, these are called the superbugs. And super bugs can be gram positive, gram-negative, they can be spheres, they can be rods. But let's just put a few different scenarios on here. They can be endospore formers like Clostridium. So, I just color some of those purple and some pink, and I like to put a couple green endospores in there.

Okay, so what are these guys saying? These microbes have mutations and traits that allow them to thrive when normal bacteria are kept away. That's what happens in a hospital. They like to share their antibiotic resistant properties with each other. So if one of them has a gene for antibiotic resistance, they will give it to the others that live around them, and then they're all immune from our antibiotics. And then this one's saying anybody want my plasmid; they're happy to share.

And the reason they're so happy to share is because by living in a little ecosystem called a biofilm then they're able to pool together their resources that allow them to be resistant to cleaning efforts like bleach or something and antibiotics if they're given to a patient. So, both in the person's body and on the surfaces in the hospital.

So these kind of situations are especially going to be particularly common after a patient receives antibiotics. So c-diff is a classic example. A person is given antibiotics, and then they develop a very bad case of diarrhea that is caused by classic diarrheal post or even during antibiotic infection and then that has to be treated with a different kind of antibiotic. So it's all like this vicious cycle.

Okay, so then let's go on.

Oh, I should also say that a lot of these microbes apparently can't thrive very well when there are plenty of normal flora around, so some naturopaths will actually recommend that a person that has an antibiotic resistant infection that they're having trouble beating spends more time in the woods in the dirt outside and tries to repopulate, supposedly, their normal and healthy flora. This sort of thing hasn't been clinically tested very well, but I wouldn't be surprised if you hear more and more about that sort of effort in the years to come so instead of treating infections with antibiotics some more alternative therapies might be to try and re-establish the normal flora and once they are real established they kick out these purebred over here that are only able to thrive when out without the normal ones around.

Okay the third ingredient in hospital-associated infections is overworked hospitals. So, I'm gonna do orange for this. And it doesn't necessarily need to be a hospital. It could also be, you know, a doctor's office, more of a private clinic. But overworked hospitals, and this could be the medical staff themselves. I've seen 20 patients today—I've heard it can sometimes even be 40, I don't know. And this bed in the ER may be saying I've had 10 patients lay here already today.

So when we talk about that we could say that the staff are overworked. And the staff could be the doctors, the nurses, certainly the nursing assistants and how about the cleaning staff themselves. All these people are overworked. The facilities are overworked. What that means is it takes that maybe they're having trouble getting the bedding cleaned, the beds, the sheets, the surfaces, the curtains. All of these things then can become harbingers of superbugs.

So let's, last, look at what's called the chain of infection. Now, the chain of infection—I'll highlight this in yellow—the chain of infection could refer to any infection, not just hospital-associated infections. But I am going to just use that on this page. So, in this first circle—so see all these things are connected. And if you can break any of these connections, potentially you can stop the disease from being passed on.

So, first of all you have, like, an infectious agent that could be the bacteria or the virus or the fungus—whatever the causative agent is. And then you have to think about the reservoir—where does it normally live? Normal living place. That could be inside of people, it could be on surfaces, it could be in water, it could be in a different animal—all of these things—or the soil—all of those would be considered a part of a reservoir. Then, there has to be what's called a portal, and portal just means doorway of exit. So, how does the microbe get from the water, let's say out of the water? And then the next would be the mode of transmission. Would it be like a bite? Mode of transmission. Is it through needles? All of these kinds of things. Then, we have a portal of entry, and that's how is it going to get into its next victim. And that could be like an open wound, it could actually be ingested, it could be on the skin—all of these could be examples of how it gets in. It could be a needle puncture, actually. And then the last is the susceptible host, so that means that even if the organism gets into someone that doesn't mean they get sick.

So, if any of these things can be interrupted, then you could actually stop the passing of this disease. So, again, is it a bacteria, is it a virus? Here would be the name of the organism. Where is it found normally in nature? That's its reservoir. How does it get out of its reservoir at all so that it's able to potentially be passed and then able to get inside of someone that actually gets sick by it? So, this is called the chain of infection.

Okay, that's it for this video. See you in the next one!