Episode 28 – Vaccines & Disease Severity

With Dr. Susan Hassig

Diane (00:00):

So what makes a disease severe? And how effective are vaccines against severe diseases? We'll find out today on Vax Matters. Vaccines protect us against many diseases, but what changes with a severe disease? Dr. Susan Hassig, the Associate Professor of Epidemiology at Tulane University, joins us to help us understand. Dr. Hassig, thank you for coming on our podcast today.

Dr. Hassig (00:36):

I'm happy to be here.

Diane (00:37):

Well, again, thank you so much. And I guess the big question that we're going to start with is what is disease severity, Doctor?

Dr. Hassig (00:46):

This is a- a term that we use or a phrase that we use to try and convey just how badly, uh, the consequences of a disease might be for individuals that interact with it. Uh, there are degrees of severity and- and we've seen that with our recent, uh, coronavirus experience, where some people have a mild cough and that's it. Other people get sick enough that they need to be hospitalized, and then other individuals may ultimately die from their disease. So those are all gradations of severity, and it's, uh, one of the really driving reasons why we develop most of our vaccines, are to try and avoid the most severe consequences of some diseases.

Diane (01:37):

So there are medical classifications of diseases, I believe, what, minor, uh, moderate, major, extreme? Is that close to being correct, Doctor?

Dr. Hassig (01:49):

That's-

Diane (01:49):

I hope-

Dr. Hassig (01:49):

That's one of the scales that-

Diane (01:51):

Okay.

Dr. Hassig (01:51):

... is used-

Diane (01:52):

Mm-hmm.

Dr. Hassig (01:53):

... because... Uh, and sometimes who is using those terms makes a difference. Um, you may have recognized, when we were dealing with SARS-CoV-2 and COVID, that, um, when clinicians talk about mild disease, it could still be enough to keep you in bed for a week, but their definition of mild to major would move from non-hospitalized to hospitalized, needing more extreme support and, particularly in the case of COVID, for example, oxygenation. So in terms of how the general population might think about it, how the average person might think about it, I think the way we might think about degree of, um, spiciness in a crawfish boil-

Diane (02:44):

Ah.

Dr. Hassig (02:44):

... is- is not a bad way to think about it-

Diane (02:46):

Well said. (laughs)

Dr. Hassig (02:47):

... uh, mild, moderate, (laughs)-

Diane (02:49):

(laughs)

Dr. Hassig (02:49):

... s- substantial, or extreme.

Diane (02:53):

Uh-huh.

Dr. Hassig (02:53):

And I, personally, am perfectly happy in the moderate to maybe a little bit extreme, but- but not the truly extensive [inaudible 00:03:03]-

Diane (03:02):

(laughs)

Dr. Hassig (03:02):

... into that, but- but everyone's boundary may be slightly different, um, in- in how people may characterize it.

Diane (03:12):

It's all in your perspective, I would imagine, as you said that it might be classified as a- a minor situation, but if you're in bed for a week, that doesn't seem minor to the person having to deal with this.

Dr. Hassig (03:26):

That is correct. And so... But when we're thinking about disease severity from an epidemiologic perspective, especially one that would drive for, uh, the development of a vaccine to protect against it, severity is really important because vaccine development and production is a very extensive activity, very costly in terms of time and resources, and often requires a lot of pre-investigative research. And so you're not going to invest in a vaccine if it's not a disease target that is, you know, trivial. So we don't have a lot of vaccines... We don't have any vaccines for mild diseases. We have vaccines for diseases that have serious and potentially severe consequences.

Diane (04:18):

A- and the complications therein and the number of people that it can impact or affect, and that's what we were talking about before, that a lot of folks hadn't even heard the word "pandemic" until the past couple of years. And that was one of the, again, you know, the COVID-19 and what have you, but what is the international classification of diseases, the ICD?

Dr. Hassig (04:43):

That's correct. The... It's an international classification of disease and death, and it's, uh... It's actually a- a numerical code system that was initiated back in the late 1800s by a French mathematician, who was trying to find a way to help, uh, individuals involved in various aspects of health and disease to be able to, uh, have consistent definitions for the diseases that they were interacting with or observing or identifying. And so it's a way for us to systematize clarity, in terms of, "What is cardiovascular disease? What is autism? What is COVID-19?" And so it's a way to translate from words and particular defined characteristics to something much more easy to manage a- which is a numeric code.

Diane (05:46):

So as you said, easier to manage, and hence the purpose? That's the purpose of the classifications?

Dr. Hassig (05:52):

The purpose of the classification is to allow for comparison-

Diane (05:55):

Mm. Okay.

Dr. Hassig (05:56):

... so that if a individual, a clinician is working in one country or one region of the world, for example, and the international piece is really important, they may have different levels of diagnostic capacity, but through the ICD system, one set of classification tools or techniques can point to that same ICD code that someone with far more technologically advanced classifications would also point to that same ICD code. So it's a way for there to be coherence across multiple levels of information, technology, and definition of disease processes to ha- be able to communicate effectively about the same health problem.

Diane (06:46):
So that would be what we would call common language then, worldwide.

Dr. Hassig (06:51):
Effectively.

Diane (06:52):
Uh-huh.

Dr. Hassig (06:52):
Yes, because numbers aren't really the... Mathematics and numbers are really the universal language. Um, and so, linguistically, you know, what... The term that might be used in Arabic might have a slightly different context than the term that's used in French versus English versus Spanish versus Chinese. And so word linguistic language can be really challenging. And so bringing it down to a point of utilizing numbers, which are far less, uh, contextual, uh, is- is a- a tool that has been in... been in place now for, you know, almost two centuries.

Diane (07:35):
Very critical then, obviously, for over two centuries, for everybody to basically-

Dr. Hassig (07:39):
(laughs) Not quite two centuries.

Diane (07:40):
... be on the same page. So is the ICD... Is that only, Doctor, for infectious diseases or does it include other things, such as, maybe, injuries? How- how does that all work together, or does it?

Dr. Hassig (07:56):
It- it include... It does all work together. It- it is applied to everything. Um, and so when we look at, uh, for example, autism, which has- has been a problem that we've been wrestling with recently, back before 1991 or '2, I think, was when the definition of autism changed. There was only a very extreme and severe presentation of autism that was called autism, individuals who were completely noncommunicative, who often had very extreme repetitive movements, and, uh, were really unable to interact in an... in anything that would've been considered usual, um, with the surrounding world.

Dr. Hassig (08:43):
And now, we have a spectrum of condition and, uh, ways to define a- a spectrum of variation and gradation of those kinds of parameters of communication styles, and verbal skills, and a variety of other parameters that define different levels of autism. And in the ICD codes, that most extreme form of autism has a specific code, and then the more recently defined, less severe or slightly different presenting autism forms have that same base code, but they have different decimal points associated with it. So the numerical nature of the ICD codes really help to combine or unite but also allow for differentiation in terms of disease presentation.

Diane (09:37):

And that helps pinpoint exactly what you're looking for and what you're striving for as you look at the overall impact of that said disease?

Dr. Hassig (09:46):

Yes, it has your- your... It allows you to define more clearly and more, uh, specifically, and it also helps you to focus, for example, investigations into what might be causing those different presentations, because it may be a different set of risk factors or triggers or, uh, determinants of each of those different decisions. It's very possible what causes that most severe presentation may be different than what causes some of the- the less severe presentations. And so, by identifying them as distinct and discreet phases of a... of a spectrum type of disease, you can focus your investigations and, eventually, our- our m- more complete knowledge, much more clearly.

Diane (10:37):

So as you were saying, the- the definition is very important. So what does... Let me ask you this. So what does disease duration... How is that defined and what does that refer to?

Dr. Hassig (10:51):

Duration is a different parameter of a disease experience than severity-

Diane (10:57):

Okay.

Dr. Hassig (10:58):

... but it sometimes can contribute to severity. Uh, so duration is simply time. You know, we think about how long is the power going to be out after a hurricane?

Diane (11:08):

Oh, that's well said. Thank you. (laughs)

Dr. Hassig (11:11):

(laughs) There's a... That's a duration that we're all acutely aware of, and we want it to be as short as possible, and hopefully never to happen in the first place, but for a disease, we can have diseases that may be very short in terms of their impact on us physically. Um, so you can think about, um... Oh, I don't know, let's see, um, a common cold. It- it hits us, we feel unwell for a few days, and then it's gone, and there's no identifiable run-on problems. There's no consequences. It's just over. It's very brief, a short duration disease, but something like HIV infection... Uh, when you experience and become infected with it, it doesn't leave. It stays, and so it is a long duration, infectious disease that we need to continually work to control and, um, fight against over the period of time that... you know, until we can figure out a way to cure it, which we haven't done very well for most diseases caused by viruses.

Dr. Hassig (12:25):

So duration can be highly flexible. Some diseases are lifelong once they are acquired. Others may last for a week or a month, perhaps a year or two, um, but obviously the longer a disease lasts, it's going to push, likely, the severity level of that particular disease further because continued experience with something like diabetes can ultimately... that- that control and management of your sugar metabolism is eventually potentially going to have impact on your vision, on your kidneys-

Diane (13:04):

Yes. Yes. Yeah.

Dr. Hassig (13:05):

... on your circulatory system. So duration often feeds into severity, but just because a disease lasts a long time doesn't necessarily mean it's severe.

Diane (13:18):

So the duration, possibly, in other words, kind of goes hand in hand with the... how the... uh, how it affects the disease severity in the instances that you just gave us, as the common cold or diabetes or HIV.

Dr. Hassig (13:33):

Mm-hmm.

Diane (13:33):

So I think that helps us understand a whole lot... a whole lot better. Um, can the- the presentation of di- disease severity... You've been talking about that. Can you give us, uh, some more examples of the specific, uh, disease... of its... the presentation of disease-effect severity?

Dr. Hassig (13:53):

Well, and certainly what the- the... And- and specifically, if we're talking about infectious diseases, um, what that pathogenic organism does to the human host is a really important part of, ultimately, what we identify as severity. So for example, right now, here in the fall of 2022, we're in the middle of West Nile Virus being present in the state of Louisiana, and, um, many... It's a virus that can cause infection in individuals and many, many people will not experience any kind of severe impacts. They might feel a little fatigued or unwell for a few days, but then nothing happens. But this particular virus is drawn to the neurologic system to humans, and so it can present with a neuroinvasive format that can result in, um, coma. It can result in death. And so, depending upon, you know, where that path... how... what pathway that pathogen, uh, takes when in an individual host is going to contribute to its presentation. The likelihood of that severe outcome for West Nile is relatively low, relatively small, so most people don't get that particular neuroinvasive disease, but when it occurs, it's an extremely severe problem.

Diane (15:27):

It seems like we don't hear that much anymore about West Nile. Interesting that you brought that up, Doctor, but it's still around. You know, people can't just say-

Dr. Hassig (15:36):

Yes.

Diane (15:36):

It's not been eradicated. It's still around.

Dr. Hassig (15:39):

Oh, and it's bad this year in Louisiana. We already have 33 neuro-invasive cases-

Diane (15:44):
Mm. Mm.

Dr. Hassig (15:44):
... diagnosed this season, and, um, there is... You know, that's not good. Last year-

Diane (15:50):
No, it's not.

Dr. Hassig (15:50):
... we only had 10, I think. So it's- it's, uh... It's in... It's around and I think, you know, people, because we've been focusing on other things-

Diane (16:02):
Exactly. Yeah.

Dr. Hassig (16:02):
... may not be thinking so much about the importance of mosquito avoidance right now, but- but it's an example, I think, of one of the challenges with severity because something bad can happen but doesn't necessarily always happen. And so that's one of the challenges we have in trying to figure out, you know, how to focus and how to intervene and how to try and prevent any given disease and when a vaccine might be the best option. Another disease I would point to is something that most people have probably heard of, which is rabies. And rabies-

Diane (16:43):
Oh, of course. Yeah. Yeah.

Dr. Hassig (16:45):
Rabies is a really, really severe disease. It's probably, in my mind, one of the most extreme-

Diane (16:53):
Mm-hmm.

Dr. Hassig (16:54):
... because it is, uh, I think, in closest as we can come, to saying 100% fatal, and that death occurs in a very short period of time.

Diane (17:05):
I don't think I realized that, Doctor. So rabies-

Dr. Hassig (17:08):
Yes. Yes.

Diane (17:09):

... almost 100% fatal-

Dr. Hassig (17:11):
Yes.

Diane (17:12):
... even in this day and age?

Dr. Hassig (17:13):
It is.

Diane (17:13):
Oh my gosh.

Dr. Hassig (17:15):
Yes, because we have no way to stop it once it establishes it- itself in a human host, but we don't vaccinate everybody... every human against rabies. We vaccinate the way that rabies gets to us to protect ourselves, so we vaccinate companion animals. We vaccinate our dogs and our cats and, you know, other- other animals that can carry rabies, can bring it into us. And it's also why, if an individual interacts with an animal in a- an unfortunate way, they're bitten or scraped or scratched or, in some way, has their skin broken by an animal, um, it's r- extremely important that they interact with public health or clinical practitioner and that that animal be identified, if at all possible, because we can intervene before the disease starts to present itself, but once it starts presenting, there's nothing we can do.

Diane (18:17):
So-

Dr. Hassig (18:18):
We have a human vaccine we can use.

Diane (18:20):
Okay.

Dr. Hassig (18:20):
We have monoclonal antibodies against rabies we can use, and even just really, really aggressive cleaning of the wound that has occurred. Um, and if we- we do that, it can greatly reduce the possibility of infection, but once someone begins to present with any of the clinical signs and symptoms of rabies, there's nothing we can do.

Diane (18:44):
Time is of the essence. I mean, that is crucial.

Dr. Hassig (18:44):

Time is of the essence. Absolutely, yes. So that's why it's so important to vaccinate not necessarily all the humans in the world but- but all of the companion animals, because a dog or a cat that goes outside can interact with a raccoon. Raccoons are very frequently reservoirs for rabies because they eat everything. Bats are also a, uh-

Diane (19:07):

You hear about that a lot. Yeah, bats.

Dr. Hassig (19:09):

... a possible way to acquire rabies as well. Um, and so people that go spelunking or go into cave exploring or anything like that, they need to be very aware, um, of that potential contact or interaction. Even slight interaction could be potentially a problem.

Diane (19:29):

So let me ask you this, Dr. Hassig, about the, uh, severity classification.

Dr. Hassig (19:33):

Mm-hmm.

Diane (19:34):

About th- the sever- the classification of an infectious disease... Does that classification ever change?

Dr. Hassig (19:44):

Um, it... The p- the- the severity potential of the pathogen doesn't change, generally, unless the pathogen itself changes, as we've seen mutations in SARS-CoV-2, for example. Uh, the initial and the Delta variant seemed to generate much more severe clinical consequences for individuals infected with them than some of the other variants we've seen more recently. And that could be for a variety of reasons, but it does seem like the- the pathogenicity severity kinds of components were part of what got modified. But what often will change and modify severity in terms of experience is that we develop tools, as- as humans, to buffer individuals against those potentially severe impacts, and that's where vaccines play a hugely important role. Um, millions of children have died over the globe, and even today, from measles, um, on an annual basis because they aren't vaccinated. Measles in the United States has b- had basically been eliminated, until parents stopped vaccinating their children routinely and at very high levels, but the measles virus is still capable of killing. And so part of our protection to keep that severity at bay is to vaccinate and to vaccinate early, so new groups of susceptible, vulnerable individuals are protected as soon as possible.

Diane (21:22):

So vaccines do definitely affect disease severity.

Dr. Hassig (21:27):

Absolutely. They- they buffer, and they provide a kind of a... Think about it as a bit of armor against it, but they aren't necessarily or almost never are 100%, so once again, it's the idea of lessening the likelihood of that severe event from happening and not necessarily being, uh, 100% protection against it. We've seen that with SARS-CoV-2, um, and COVID disease. People who are vaccinated

can still get infected, but they are far less likely to experience hospitalization and, um, mortality, death, from COVID-19 if they have been vaccinated, compared to people who are unvaccinated.

Diane (22:17):

A- and that's what some of my friends were talking about, the, uh, severity of, uh, for instance, getting shingles. Y- you know, when you don't have the vaccine, the shingles... I've had a friend say that it was probably one of the most horrible experiences he ever had, and that prompted a lot of folks, you know, in- in my workplace to get the shingles vaccine. And I was told, "Now, this doesn't mean you won't get it, but it will not be the severity of what you could have."

Dr. Hassig (22:47):

That's a great example. Um, the... And what you have to remember is the reason you're getting shingles or have the potential to get shingles is because you got chickenpox as a child.

Diane (22:58):

Yes. Yes.

Dr. Hassig (22:59):

And so we think about chicken pox as being a very mild and moderately unpleasant disease if you got it when you were young, you know, the- the itchiness of the scabs and everything else, but even in that acute phase, it has some consequences if the person that gets an initial, uh, chickenpox infection is an adult. It has potential consequences for some systemic problems that are quite substantial and severe, but the biggest problem with chickenpox is the fact that the virus, even though it no longer causes disease, again, doesn't go away. It just hangs out-

Diane (23:38):

Mm-hmm.

Dr. Hassig (23:38):

... in the body, waiting (laughs)-

Diane (23:40):

Right.

Dr. Hassig (23:41):

... to reemerge.

Diane (23:42):

Yeah.

Dr. Hassig (23:43):

And- and that's what we see when people experience shingles, and it is... It's an incredibly painful, um, disease manifestation of that- that old infection. And so the- the emergence of that shingles vaccine... We've gone through a couple of different iterations of it, um, is- is really tremendously beneficial. We now have a- a chickenpox vaccine for kids, so far, far, far fewer children are getting that initial infection with chickenpox. So we're- we're working on primary prevention of shingles in the

young people, so that when they age up to the- the age range when you're likely to get shingles, they will never have had that original chickenpox infection to allow them to risk having shingles.

Diane (24:34):

That- that's fabulous. When you were talking about primary prevention, boy, that says it all. Be proactive. Be proactive about what you need to do for your health. So does a disease's severity... Does that affect the decision to routinely recommend or require a vaccine?

Dr. Hassig (24:53):

I would say that it goes even further back. And so-

Diane (24:55):

Oh.

Dr. Hassig (24:55):

... I- I mentioned early on, it may even determine whether or not we have a vaccine.

Diane (25:00):

Oh, I- I understand. Okay.

Dr. Hassig (25:02):

So once we have a vaccine, we've developed it because we think it's important. And so the tremendous benefit of vaccines is to deliver them as early as possible with, you know, understanding how the vaccine is going to interact with the human immune system-

Diane (25:23):

Mm-hmm.

Dr. Hassig (25:23):

... to allow the greatest protection for the individual, as well as the community, because that's the other thing that vaccines can do, is by... They provide individual protection, which is incredibly valuable for that individual, but they also cumulatively, when the entire community is well vaccinated, greatly reduce the likelihood that the... The less than 100% vaccines will collectively prevent that, uh... the infection from being able to spread, really, at all. It's that herd immunity we talked about a lot-

Diane (26:01):

We heard so much about, yes.

Dr. Hassig (26:04):

... in the beginning of the COVID pandemic.

Diane (26:04):

Yes.

Dr. Hassig (26:04):

It's a really complicated concept, and, um, it- it's very challenging... It's got a lot of kind of statistical underpinnings that probably is not worth talking about, but the idea that, um, individual protection is tremendously important and can be provided by vaccines, but the added benefit, given that most vaccines aren't 100%, is when a- a whole community is highly vaccinated. Whatever that pathogen is doesn't really have anywhere to go, and so it- it protects us all a little bit more in that regard.

Diane (26:43):

So how wonderful if we had the- the pathogens that said, "I give up. I have nowhere to go. There's nothing dormant waiting for me," and that would... That would be a fabulous outcome to the diseases, to the- the vaccines. That's what we want, for them to have nowhere to go.

Dr. Hassig (27:01):

That... And that's what disease elimination is.

Diane (27:03):

Yes.

Dr. Hassig (27:04):

Disease elimination means that the pathogen is still out there, but it can't make any headway in our community. And we've had that in the United States for measles. We've had that... We have that, uh, hopefully, still in this... the United States, for example, for polio, but we've seen that an individual in New York was just recently diagnosed with paralytic polio. That person was unvaccinated, and so that is a lifetime consequence. Polio is a very severe disease. Not everyone gets paralyzed, but it is a- a not uncommon outcome of that infection. And- and we've had the capacity to prevent that from happening through vaccination for... since the 1950s.

Diane (27:54):

I was going to say, "For many years," because many of our- our- our listeners, who are older individuals... They remember FDR, our president, who had polio and who was in a wheelchair.

Dr. Hassig (28:06):

Absolutely. And, you know, we don't see that anymore.

Diane (28:10):

No, we don't.

Dr. Hassig (28:10):

We don't see people walking with those... the- the crutches to help them. They've got... don't have the withered leg from polio any longer. Um, the individuals that wound up in the iron lungs from the- the bad days of polio... They never got out of those-

Diane (28:26):

Mm.

Dr. Hassig (28:27):

... because they were there because the muscles of their diaphragm that allowed them to breathe on their own, um, weren't functioning any longer. If they got out of the iron lung, they may have wound up on some kind of portable ventilation device, once that technology became available, but it... Those muscles don't ever reactivate. We don't yet have the ability to do that.

Diane (28:49):

Y- you... We talked about... or you talked about it and touched on it at the beginning of our podcast, but could you go a little bit further and maybe give us some examples of minor, moderate, and major, uh, infection diseases... infectious diseases? Would you go through those categories for us, please?

Dr. Hassig (29:09):

Uh, sure. Sure. Um, I think, when we're thinking about minor diseases, um, probably most of us would consider, uh, a gastrointestinal disease relatively minor-

Diane (29:21):

A bug. A bug.

Dr. Hassig (29:22):

... something that causes diarrhea-

Diane (29:23):

Yeah.

Dr. Hassig (29:24):

... stomach flu, although it's not flu. (laughs)

Diane (29:26):

Mm-hmm.

Dr. Hassig (29:28):

It's- it's, say, a pathogen, usually a bacteria, that will cause your intestines, your gastrointestinal tract to, you know, just not function normally for a while.

Diane (29:40):

Uh-huh.

Dr. Hassig (29:40):

It's usually a self-limiting disease, and so most cases of diarrhea never get to the healthcare system. It's a minor problem-

Diane (29:49):

Right.

Dr. Hassig (29:49):

... inconvenient, unpleasant-

Diane (29:52):
Mm-hmm.

Dr. Hassig (29:52):
... but generally, not life-threatening, but there are-

Diane (29:55):
Your gut is saying, "Pay attention to me." Your gut is saying, "Pay attention to me. Pay attention. I'm having a little issue," but it's not going to last long, so...

Dr. Hassig (30:03):
Right, for most of them-

Diane (30:04):
Okay.

Dr. Hassig (30:04):
... but there are gastrointestinal diseases that can be much more problematic. Um, some forms of a bacteria called E. coli can cause severe renal damage if they... if they establish themselves, particularly in young people, in children, but probably the- the best example of a... of a moderate, uh, disease to ma- yeah, it might be m- more severe, is cholera. We used to have, uh-

Diane (30:33):
Cholera? Okay.

Dr. Hassig (30:33):
The... You know, that's still a problem in some parts of the world, if you... You may or may not remember when Haiti had an earthquake back in 2010. Um, the country was devastated. Their infrastructure was destroyed, and so there were a lot of agencies... global agencies that came in to assist in recovery and everything else. Um, Haiti hadn't had cholera for decades in their country, um, but cholera was reintroduced because some of the people who came to help were carrying it in their gastrointestinal tract, and we saw tens of thousands of people become severely dehydrated and- and s- a fair number of people die because of cholera. The benefit of cho- uh, the benefit of our knowledge about cholera now is we know that it can be treated with a fairly basic antibiotic, and we know we can keep people alive if they're infected with cholera by rehydrating them, giving them fluids, sometimes by mouth but sometimes by intravenous fluid delivery. And so we can buffer that severity of that- that particular condition, so functionally, cholera, I would put in as a moderate disease right now, because we can do something about it. The pathogen itself is still potentially severe.

Dr. Hassig (32:00):
And then we get into something like HPV, human papillomavirus, which, when we were just thinking about it as a- a, uh, sexually transmitted infection, um, then it was not something that was particularly problematic. It created, uh, warts, a- a little skin disruption that didn't seem to have any

important consequences, but what we have found in further investigating the problem is that it's a very strong predictor and determinant of developing cancers, cancers of the cervix, cancers in a variety of other locations in the body. And so now, we have... and that... Cancer, of course, is a very severe consequence, a very severe outcome. So the initial presentation of that particular infectious disease appears mild, but it has very severe consequences, and we can't treat or eliminate HPV once it's there, so vaccines give us a chance to prevent people from getting that virus. And we're already seeing, in populations that have moved through the, um, age period when they would get vaccinated, that we're actually seeing slight reductions in things like cervical cancer, in individuals that have been vaccinated. So-

Diane (33:29):

So we are seeing results with them. I'm sorry, Doctor. That's fabulous.

Dr. Hassig (33:32):

... we're seeing results in terms of the severe consequences of that otherwise relatively mild and- and, uh, ignored, frankly, disease for- for a long time. And then the- the- the most severe, I think, is the example I've already given you, the rabies example, where it- it's caused... There's no ambiguity about that. If- if you get infected with rabies and you don't have access to or don't realize that you've been exposed to it, that, um, once you start experiencing symptoms, you have a very minimal amount of time, three to five days, probably, left, um, of your life. And there's- there's no intervention that we have available yet that will derail that process, so I think that there are...

Dr. Hassig (34:24):

You know, there's a whole array, but we've got, um, for these... All of these... We have a vaccine, actually, for cholera as well. I guess we don't use it in the United States because it's not a- a regular threat for us, but it is a... There is a vaccine for cholera that's used in places where we still see emergence of cholera on an intermittent basis. So each of those, because of not necessarily their initial presentation but perhaps because of the consequences of their presence in a human hosts, that they are, um, targets for development of vaccine, promotion of a vaccine, encouragement of- of utilization of a vaccine to avoid those severe consequences, hopefully entirely, but at least minimize their impact if they do ultimately occur.

Diane (35:18):

I- I think that's a very important part of our conversation today, Dr. Hassig, and I really... I appreciated that you took the time to put into categories that we can understand and that we can... we can visualize when you were talking about the different, uh, diseases, the minor, the moderate, the major, and the extreme infectious diseases, because, you know, those of us who are not familiar with your world, with- with, uh, physicians and with infectious diseases and what have you, we need to have something concrete that we can understand. So thank you for breaking that down for us. So I- I would like to ask you, uh, how long does it take to determine if a disease is severe enough for an emergency response on a local or a global level?

Dr. Hassig (36:07):

Oh, that's a very complicated question-

Diane (36:10):

(laughs) Okay. Sorry.

Dr. Hassig (36:10):

... in some respects, but- but in some ways, it's pretty straightforward. It- it's... You know, if something truly is severe, if it's... If it's a really important and, um, potentially deadly or severely debilitating or disabling condition, it's going to become evident pretty quickly. Um, I mean, we had, in the, you know, the first set of data that came out of China about SARS-CoV-2 infection, um, we saw that 20% of people in their first group of cases that were reported wound up in the hospital. That's- that's not good (laughs) for a respiratory disease that is easily transmitted. And so the initial, um, picture that we got about SARS-CoV-2 was really quite disturbing, and, uh, fortunately, we were able to marshal the big "we," the global "we" were able to marshal resources to start trying to figure out how to slow it down through, uh, pharmacologic, through vaccine, through medication almost as soon as we got the genetic information about the virus, um, but the challenge is... with that initial manifestation is combined with the likelihood of having a lot of severe outcomes associated with it, the SARS-CoV-2 virus was also very easily transmitted. And so prevention really becomes a- a priority for something like that fairly quickly. You may or may not remember, but a few years ago, I guess it's seven years ago now, we had another major health threat from a very severe disease, Ebola.

Diane (38:06):

Yes. Yes.

Dr. Hassig (38:06):

It was concentrated in West Africa, but there was a lot of concern around the globe that it would break out and cause a huge problem. Ebola is a really serious disease. People who get infected with Ebola... Um, 40-60% of them will die, generally. Uh-

Diane (38:24):

Now, say that number again. How many?

Dr. Hassig (38:27):

40-60% of the people who-

Diane (38:30):

Oh my goodness.

Dr. Hassig (38:30):

... become infected with Ebola are likely to die.

Diane (38:35):

Mm.

Dr. Hassig (38:35):

Um, and so it is a very severe disease. The one, if you can think about it this way, good thing about Ebola is that it's really difficult to catch because you, as an uninfected person, have to interact with someone's, um, body fluids, blood, things like that, that the infected individual has... you know, that is carrying the virus, that that infected invid- individual is experiencing. So most Ebola transmission happens within the context of care, whether it's formal healthcare, taking care of patients within a

hospital setting, um, if they don't use adequate personal protective equipment, the goggles, the gloves, the gowns, all of those things we see with COVID, but also within the household, because if you think about the countries where Ebola emerged in West Africa, there's not a lot of formal healthcare necessarily available-

Diane (39:40):

No, there's not.

Dr. Hassig (39:41):

... so family members were the first people in caring for people within the home, trying to alleviate their fever, their, uh, discomfort, the agony that they were going through, were trying to care for them, and they had no personal protective equipment. So the challenge with Ebola is that it's- it's a really scary disease because it causes, you know, a really aggressive, very severe clinical outcome, but it's actually really difficult to spread within a community. Just being in a room with someone with Ebola is not going to result in transmission. It does with SARS-CoV-2, potentially. Um, event touching someone with Ebola, as long as your- your skin is intact, is not going to transmit Ebola, so there are, um...

Dr. Hassig (40:34):

When we're thinking about how we recognize the severity of a disease, there's kind of the clinical parameter of just how bad is this disease in terms of its impact on people that contract it, and then the broader severity for a broad population may be a very different kind of calculation, and that's why I say it's complicated. The- the clinical severity is clear pretty quickly. The implications for a broader population may take much longer to understand because it will often require all sorts of inputs in terms of clarification of how the pathogen really is being transmitted, h- how easily and quickly it's moving from one geographic region to another. Um, and that's very challenging to determine when it's a brand-new pathogen we haven't seen before, like SARS-CoV-2, as opposed to a pathogen like Ebola, when we have very clear understanding about how this virus is transmitted, how it moves, and what we need to do to prevent its transmission.

Dr. Hassig (41:51):

So the- the real challenge in terms of determining whether or not we've got a pandemic or not, um, in some cases, is going to depend on whether we know the organism that's causing the problem in the first place. And if we do, we can figure that out pretty quickly. If we aren't so clear about what it is that's causing the problem, and sometimes we don't know right away, uh, what organism it actually is, uh, then it can be mo- much more challenging and it can take far longer to figure out that, "Oh, boy, this is going to be a world wide- wide problem."

Diane (42:27):

Yeah. [inaudible 00:42:29]-

Dr. Hassig (42:29):

That's kind of a long explanation, but-

Diane (42:30):

Oh, oh, no, no, no, what... We appreciate that. And that's the whole thing, something that's this complex, and we need to understand it or try to understand the best we can. And what you've been

talking about this morning kind of brings us full circle to what's happened and what we're going through and looking ahead about the importance of vaccines, and you know, with that... you know, with the disease severity. As we're wrapping up our podcast, Dr. Hassig, is there anything that you can think of that possibly we did not touch on that you would like to leave with our viewers, uh, at the top of their mind as we... as we end the podcast that they need to know about?

Dr. Hassig (43:11):

I think that we touched on most of what I think is really critical with regard to this topic, but I would encourage your listeners to think about the- the benefits of prevention and the kind of axioms and sayings that have come down to us on all sorts of different levels, from our grandmas to, you know, whatever, you know, "An ounce of prevention is worth a pound of cure."

Diane (43:36):

Absolutely.

Dr. Hassig (43:37):

"A stitch in time saves nine." Um, you know, preventing something from happening in the first place, even if we have a way to deal with it on the back end, for example. You know, it's- it's much... Makes, to me, far more sense to do what you can to avoid the problem rather than have to go through the process of, uh, correcting, repairing the damage. And so I think that I would hope your listeners would understand that one of the tremendous values of vaccine is that it gr- it gives us an incredibly powerful tool to be that preventative barrier. You know, it's the levees (laughs)-

Diane (44:25):

Yes, it is.

Dr. Hassig (44:26):

... to keep the storm surge away. And it sometimes can get overtopped, but it's there and it's going to make the- the subsequent problem that we have to deal with far less problematic. And so I think it's the- the value of prevention... And it's an axiom of public health, and it's slightly different than the approach that clinical personnel take because they- they can cure things. They can fix things. From a public health perspective, which is where I'm coming from, I'd rather not have to deal with the problem at all.

Diane (45:02):

Me, too. (laughs) Me, too.

Dr. Hassig (45:04):

And so if I can take an action, like, get a vaccine that will greatly reduce the likelihood that I or my kids or my grandkids are going to have to deal with a particular infectious disease problem, I'm all for it.

Diane (45:19):

Absolutely. Dr. Hassig, you said... That- that was a great way to end our podcast today, again, to encourage... Be proactive. I know my mom and dad... They were always proactive, e- even into their 80s about their health. And as you said about your children and grandchildren, we are the examples for the next generation here on this earth, so we need to get it right and we need to do it right. So,

Dr. Susan Hassig, thank you so very much for being with us on this episode of Vax Matters. And all of our viewers, that's all the time we have for today. We hope you enjoyed this episode and thank you again for tuning into this episode and listening to Vax Matters.