

Sound Advice

This is an edited transcript of a telephone interview recorded in July 2010.

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Q: Dr. Long, can you give us some background on pertussis, or whooping cough and what causes it?

Dr. Long: Pertussis is a disease known to mankind since the beginning of medical history. It's caused by a bacterium called *Bordetella pertussis*, and it causes a cough illness that is characteristically very prolonged. So that an average case in a 5-year old may start with two weeks of an escalating kind of a cough, followed by two weeks of bursts of coughing episodes with cough, cough, cough, cough, cough, cough, cough, cough, cough, cough, and on the end of that breath, frequently followed by a whoop. And then two more weeks of decreasing cough. So it's a six-week problem cough in healthy children of school age. For very young infants, it can be a life-threatening disease when they don't have the ability to whoop at the end, and sometimes as they gag and gasp and have difficulty breathing or stop breathing in the middle of a coughing episode. And for adults, it still can occur in adults, even if someone was immunized in childhood, even if someone was infected in childhood, the protection from the vaccine or from the disease wanes, so that we're all susceptible as adults. It causes a very prolonged coughing illness. Usually four to six weeks, as in younger children, and it frequently is not recognized because adults don't usually have a whoop.

Q: How does it spread?

Dr. Long: It's the most contagious bacterium we know. In unvaccinated families, for instance, there's almost a 95 to 98 percent transmission. My mother remembers when the five of us, born six years apart, in 1945, just before the vaccine became widely available, all five of us had whooping cough at the same time in Washington State. And she said she didn't change her clothes for two weeks, with the kettles of water to make steam... and concern that one of us wouldn't breathe at the end of a coughing episode. So it's highly contagious, probably by droplets from a coughing individual, and very, very able to cause disease then in those who aren't protected by immunization or recent disease.

Q: Why are some states in the U.S. having an epidemic now?

Dr. Long: We know, as I said earlier, that neither the disease nor the vaccine causes lifetime protection. So since the mid-1940s in the United States, we have given whooping cough vaccine to young infants and children through the age of 6 years. And we did not realize that there would be vulnerability of older people because of waning immunity until that vaccination program

reduced the very common recurrences of exposure to the bacterium that actually led to more prolonged immunity when we had a lot of pertussis around.

So two things happened over 40 years. One was that there was less disease because vaccine partially controlled that. And we had waning immunity because we didn't give vaccination after the age of 6 years. So it led to recognition in the '90s and early in the first decade of the 21st century that adolescents and adults were the primary reservoir of whooping cough, of pertussis, and were spreading it to young children and to unprotected young infants and other adults, adolescents and the elderly. After we had begun to control pertussis so that there was more than a 90 percent decrease, there was all of a sudden erosion of that protection. So there got to be 10, 15, 20, 25,000 cases a year in the United States before the introduction of the adolescent dose of Tdap, which has a smaller amount of pertussis antigen and a smaller amount of diphtheria antigen than is in the early childhood vaccine.

Since the introduction of that vaccine dose in adolescents, there's already evidence that there's reduction in cases in adolescents, but we still know that we don't have enough coverage of the adolescent age group. We still have adults who are not properly immunized. We should have gotten, all of our lives, Td vaccines, tetanus/diphtheria vaccine, every 10 years. How many of us have had that vaccine every 10 years? And now that vaccine is meant to be supplanted by the use of Tdap vaccine in adults as well as adolescents. So we still have large groups of unprotected individuals. We still have some cyclic nature to the occurrence of pertussis that we don't understand, but we're beginning to think probably is because the bacteria changes just a little bit over time, finds enough susceptible individuals who haven't been immunized recently, and then is so easily spread that it can cause disease.

Now, I couldn't leave this topic without also mentioning that in the outbreaks of pertussis that have occurred in schools, there almost always are groups of individuals who have not subscribed to immunization who have been the change agent to increase the likelihood of spread of pertussis. Vaccination is the only strategy that we have.

Q: Who is most at risk of this disease?

Dr. Long: Everybody's at risk for acquiring the infection, and the only question is then do you have any protection from getting the full extent of the symptoms? For most individuals older than 1 year of age, it's more than a nuisance. It leads to people losing sleep, parents losing work, children having these coughing episodes that are very frightening for the children and the families. But the group that is most at risk is the neonate, the young infant, under 2, 3 months of age. If that infant gets pertussis he may have not even much of a cough illness. He may have gagging, gasping, sneezing, watery eyes for a couple of days and then either a cough or gagging and not breathing; or a secondary pneumonia that occurs because the pertussis makes them more vulnerable. The real morbidity and the mortality of this disease occurs in young infants.

Q: How is it treated?

Dr. Long: This is one of the frustrating parts of pertussis. We have antibiotics that make the patient non-contagious, makes the organism go away. After you've been coughing for about a week to 10 days, there isn't much evidence that the treatment helps you. Meaning that your cough illness may not be shortened by the treatment, but it does protect others around you who still may be infected because your cough bursts can sometimes have the organism in them. So, there really is only supportive therapy for the vast majority of people with pertussis.

For very young infants, because they come to medical attention very quickly because this is a clinical problem that their family notices right away, we think that antibiotic treatment of those infants may turn some of them around more quickly. And then for extremely affected infants, we have all kinds of extraordinary procedures that we do for those that have respiratory failure or cardiac failure.

Q: What advice do you give to parents who have young infants? The recommendation for the vaccine is to give it to infants at 2, 4, and 6 months of age. Is that the best way they can protect their child?

Dr. Long: The best way to protect your child is to get that vaccination on the first day that the child is recommended to get it. So that's somewhere between six and eight weeks of age the pertussis vaccine is recommended. And you really need to get the first three series. The first one just kind of gets you set to respond better to the second, so getting all of those immunizations on time is one key thing.

Now, because I just said we can only give the vaccines at the age of six or eight weeks, and many, many, many of the early cases would already have occurred, the other way you can protect that infant who's too young to be protected by immunization is to get yourself immunized if you're the mother, if you're the sibling, if you're the grandmother, if you're the father. We need to be sure to make a cocoon around that newborn baby to protect that newborn baby by gearing up the immunization of a new mother, new father, all the siblings, the grandparents, etc., to be sure that they're not the sources. Because we know that three out of four times that very young infant, who has life-threatening pertussis, gets it from a person in their family, usually a parent or a sibling.

Q: When do people need to get a pertussis booster?

Dr. Long: The word "booster" is a little confusing about pertussis. There's the first three series in the first year of life, and then the next dose is at about 15 to 18 months of age, and then the next dose is between 4 and 6 years of age, and then the next dose is between 11 and 12 years of age, and then the next dose is 10 years after that. Some people call everything after 18 months or some people call everything after 6 months "boosters", but they really are reinforcing doses. So we know that on entry to school at 6 years, 93 percent of people in the United States have had their scheduled DTaP vaccination. It's the time after that that we fall down and we know the coverage isn't close to what we need, either for the adolescent or for adults.

Q: Will pertussis ever be eradicated?

Dr. Long: Pertussis is going to be with us into perpetuity because the vaccines that we have really only protect against clinical infection. They probably don't protect against infection. So this is not going to be something that we can wait three or four or five years and think we've got this nailed. We have eradicated smallpox. We can eradicate polio with more vaccination in certain countries where it is still endemic. Pertussis isn't going to be like that. It is always going to be around, and we have to keep ahead of it by continuing to protect ourselves with what I think is the best deal at the moment, which is repeated immunizations over a lifetime.