In whooping cough, an epidemic but different vaccine issues

By Arthur Allen

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It’s an epidemic that has killed 32 babies and infected at least 100,000 Americans — most of them children — since 2012. But vaccine-averse parents aren’t the real culprits behind the spread of whooping cough. Inadequate vaccines are.

The disease has returned in recent years with a ferocity that’s unlikely to abate anytime soon. Even Americans who thought they were protected have fallen ill. Yet whooping cough’s resurgence hasn’t triggered the public attention and congressional hearings that several dozen measles cases traced to Disneyland provoked in barely a month. There’s been no new examination of what went wrong with the current vaccines, no intense push for accelerated development of an alternative.

This troubling arc makes it hard to see a path to containing the disease. And the current vaccines’ shortcomings pose a real public relations problem for public health officials, one that feeds into the skepticism of the anti-vaccine movement.

“We need better vaccines, but it will be some time before they are available,” said Tami Hilger Skoff, an epidemiologist with the CDC’s Meningitis and Vaccine Preventable Diseases Branch. “We have a lot to learn.”

Whooping cough was never declared eliminated in the United States, as measles was in 2000. But the prevalence of pertussis — the medical term for this highly contagious disease — fell steadily for decades after the first vaccine was introduced in the 1940s.

In the late 1990s, pertussis vaccines were reformulated, and cases began climbing sharply even as vaccination rates remained stable. Researchers would soon discover that the new agents were far less protective.

Since 2002, the United States has never had a year with fewer than 10,000 cases. Although the recent outbreaks have been less deadly than in the past, 11 babies still succumbed to whooping cough in the 2010-11 season. In 2012, another wave peaked at 48,277 cases — the highest count in six decades.

In both 2013 and 2014, CDC data show about 28,000 cases. California remains hardest hit, with about 10,000 cases last year alone.

“So much for the myth of pertussis vaccine-acquired herd immunity,” Barbara Loe Fisher, the leading U.S. vaccine critic, wrote in a recent attack on the nation’s vaccination program.
Whooping cough is named for the sharp intake of breath as a person struggles to breathe, but not everyone who falls ill gets the whoop. Adults often have a bad cough for several months. Babies sometimes suffocate without coughing at all.

Although outbreaks of whooping cough are most severe among unvaccinated people, and death occurs almost exclusively in babies too young to have gotten their first shot, the disease is now spreading among Americans who thought they were immunized. That includes many tweens and teens.

To understand why requires a trip through history.

The current vaccines against whooping cough were developed in the 1990s. Unlike the older, so-called whole-cell vaccine, the newer shots contain purified pertussis proteins. They are given, as a diphtheria-tetanus-pertussis combination, five times in the first seven years. A booster is recommended after age 11.

Today’s vaccines lack the ingredient that caused the whole-cell formulation to provoke high fevers and seizures in babies. Such side effects were rarely lasting, but they frightened parents, and many parents of brain-damaged children were convinced the pertussis vaccine was the cause.

With lawsuits driving most manufacturers out of the vaccine market by the early 1980s, Congress created a federal program to protect the industry from liability while compensating apparent victims of vaccination. Meanwhile, the NIH and scientists it funded worked double-time to come up with other pertussis agents. They succeeded, but over time their results have proven to be less effective.

Studies have found that teenagers who were vaccinated as infants with the newer vaccines — two varieties are currently marketed in the United States — are four to eight times more likely to get whooping cough than teens in their communities who got the whole-cell shot. And recent FDA studies with baboons showed that the newer vaccines are less effective at preventing the growth of the germ. The older vaccine had ingredients that better stimulate the immune system.

In addition, the pertussis bacteria has mutated over the past decade or two. A growing percentage of the bugs circulating in the United States lack a protein called pertactin, which the vaccines are designed to target. It’s not clear how big a role this mutation has played in the disease’s spread.

“Until we understand the pertussis germ better it is going to be difficult to develop new vaccines,” CDC’s Skoff said. “That’s where the research is focused right now.”

NIH is supporting a range of pertussis studies, and various companies are at the early stages of testing new vaccines, but the prospects of success are remote. To compare any new vaccine against the existing shots might require immense trials lasting years and costing hundreds of millions of dollars.
“The big hang-up is, how are you going to license a new vaccine?” said pediatric infectious disease specialist James Cherry of the University of California, Los Angeles. “There’s really no way you can test a vaccine with a control group because that would be unethical.”

Back when the current vaccines were tested, about a dozen trials were conducted in Europe and Africa with several thousand children each. “Now we’re talking about maybe 100,000 per group,” Cherry said.

William Schaffner, an infectious disease expert at Vanderbilt University, also sees few options.

“Nobody wants to go back to the old vaccine because it was so reactive,” he said. “That’s dead on arrival.”

With little hope of stopping whooping cough, CDC is concentrating its energy on protecting babies. Its vaccine advisory committee recommended in 2013 that women be vaccinated during the third trimester of each pregnancy to pass antibodies to their babies.

Plus, adds Schaffner, “We’re promoting the notion of cocooning — you can’t come see the new baby unless you’ve been vaccinated against pertussis. Young parents seem to be catching on.”

For all the vaccines’ faults, they’re the only preventive tool medicine has for now. And, as Skoff noted, “Even a single dose of vaccine is protective against death.”

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