Vaccine development needs a booster shot

by Liz Szabo, USA TODAY

Posted 9/21/2012 6:28 PM | Updated 9/21/2012 6:28 PM

A new study, which finds that immunity from the whooping cough vaccine fades sharply over time, underscores the urgent need to develop new vaccines and consider additional booster shots for children, health experts say.

Authors say the study in today's New England Journal of Medicine helps explain part of the resurgence in whooping cough, or pertussis, which has sickened more than 26,000 this year -- the largest outbreak in more than 50 years.

The current vaccine, in use since the 1990s, doesn't protect people as long as previously believed, losing 42% of its effectiveness with each passing year, says author Nicola Klein, co-director of the Kaiser Permanente Vaccine Study Center in Oakland, Calif. So even some fully vaccinated children -- who have received all five doses recommended by age 4 to 6 -- would still be vulnerable to the disease by age 10.

The Centers for Disease Control and Prevention has reached similar conclusions, says Tom Clark, a CDC epidemiologist specializing in whooping cough. While the whooping cough vaccine protects about 98% of children in the first year, it protects only about 70%five years later, Clark says.

"We know the short-term protection is very good," Clark says. "But the protection is wearing off and that is the problem."

The findings shouldn't cause parents to stop vaccinating their children, however, Klein says. Even an imperfect vaccine is better than no vaccine, she says.

Whooping cough is typically more severe among unvaccinated children than among those who've had at least some of their shots, Clark says. Unvaccinated patients also tend to be sick longer and are often more contagious.

Doctors say they're most concerned about infants.

Newborns too young to be fully vaccinated -- whose airways can quickly swell shut -- are the most likely to die from whooping cough, says C. Mary Healy, a pediatric infectious-disease specialist at Texas Children's Hospital in Houston. Eleven of the 13 deaths from whooping cough this year were in infants; the other two deaths were in toddlers, according to the CDC.

Given the vaccine's limitations, Healy says, it's more important than ever to create a "cocoon" of protection around babies by vaccinating everyone around them. About 75% of babies with whooping cough contract the bacteria from a household member, such as a sibling, parent or grandparent.

"If a vaccine does not have 100% protection that's lifelong, then it's even more important that we have 'herd immunity' to stop the virus from circulating into the community," Healy says. "That's an unacceptable level of infant deaths, in the 21st century, in the richest country in the world."

Ultimately, the country needs a better vaccine, says James Cherry of the University of California-Los Angeles.

But "the business of coming up with a better vaccine is not going to be a quick fix," says Edgar Marcuse, a professor of pediatrics at Seattle Children's Hospital. "We still don't fully understand immunity from pertussis."

For example, even those naturally infected with whooping cough don't develop life-long immunity, and can come down with the bacterial infection again in 10 years or less, Marcuse says.

Infection rates today, in spite of the current outbreak, are 23 times lower than in the pre-vaccine days, Cherry says. In the pre-vaccine era, up to 270,000 Americans became sick with whooping cough each year, known as the "100-day cough," and up to 10,000 died, Klein says.

The whooping cough vaccine, available beginning in the 1940s, cut infection rates dramatically. That vaccine, known as DTP, was associated with more reactions than the current vaccine.

Most of those reactions were mild, such as increased crying or sore arms and legs. Some children developed benign -- but frightening -- fever-related seizures, which occured in about one in every 1,750 doses, says Gregory Poland, a professor of infectious disease at the Mayo Clinic in Minnesota.

An analysis by the Institute of Medicine found that DTP could cause rare but more serious problems: a dangerous brain inflammation, occurring in 1 to 10 per million doses; and an unusual, shock-like state, occurring 3 to 300 times per million doses, Poland says.

Whooping cough rates began rising after the current vaccine, known as Dtap, came into widespread use in the late 1990s, Cherry says.

The experience with DTP had far-reaching effects.

Although multiple studies show that today's vaccines are safe, many parents remain nervous about immunizations, delaying or skipping some of their children's shots -- a trend that has helped to fuel outbreaks of a number of infectious diseases, says Tom Belhorn, a pediatric infectious disease specialist at the University of North Carolina-Chapel Hill.

Until researchers produce a better vaccine -- with long-lasting immunity -- health experts could consider changing the vaccine schedule to get the most protection possible from the current shot, Poland says. Researchers would have to first carefully test the safety of any changes, he says, to avoid causing bad reactions.

For example, the CDC's Advisory Committee on Immunization Practices could consider adding an additional booster shot for teens -- who have made up a large number of whooping cough patients -- at around 16 or 17, Clark says. There's not much room in the current vaccine schedule to add extra shots for little kids, and there are currently no whooping cough vaccines licensed for children ages 7 to 10.

To better protect infants, Cherry says, researchers could test the safety of giving babies their first three vaccinations by age 3 months, instead of 6 months. Vaccinating pregnant women also helps protect babies for the first month or two of life, he says.

Posted 9/21/2012 6:28 PM | Updated 9/21/2012 6:28 PM