Australian researchers: Whole-cell pertussis vaccine provided best protection

Sheridan SL. *JAMA*. 2012;308:454-456.

Incidence of pertussis in Australia was lower among infants who received whole-cell pertussis vaccine compared with infants who received acellular pertussis vaccine, according to a researcher letter published online this week.

Sarah L. Sheridan, BMed, MAppEpid, and colleagues from Queensland Children's Medical Research Institute, University of Queensland in Brisbane, Australia, reported that children who received a three-dose series of diphtheria, tetanus and acellular pertussis vaccine had higher rates of pertussis than children who received three doses of diphtheria, tetanus and whole-cell pertussis vaccine (DTwP).
"This difference persisted for more than a decade, being evident in pre-epidemic and outbreak periods," Sheridan and colleagues wrote in their letter published in the Journal of the American Medical Association.

The Australian researchers calculated pertussis rates in both the pre-epidemic (1998-2008) and outbreak periods (2009-2011), by number and order of DTwP doses given before the first birthday. The investigators linked data from the Queensland vaccination register with case reports of pertussis. However, the Queensland vaccination register is not a population-based register, so there was no cohort of wholly unvaccinated children for comparison.

The analysis included more than 58,000 children, 69.5% of whom received at least three doses of any pertussis-containing vaccine in the first year after birth. Overall, 267 pertussis cases were reported from this cohort between 1999 and 2011.

Among the children who received a mixture of DTwP and DTaP vaccines, rates in the current epidemic were highest for children who received DTaP as their first dose, according to the study findings.

Sheridan and colleagues concluded that the challenge for future pertussis vaccine development is to address the benefit–risk trade-off of acellular vs. whole-cell pertussis vaccines and to develop vaccines that induce long-lasting protection from the first dose, without the adverse events.

Disclosure: Drs. Grimwood and Lambert reported receiving honoraria for serving on the GlaxoSmithKline advisory boards for pneumonia and pneumonia conjugate vaccine, serving as an investigator on clinical studies sponsored by GlaxoSmithKline and Sanofi-Pasteur (both manufacturers of pertussis-containing vaccines), and serving on GlaxoSmithKline and Sanofi-Pasteur advisory boards for pneumococcal and influenza.

Kathryn M. Edwards

The news out of Australia supports recent reports in the United States that the effectiveness of the acellular pertussis vaccine wanes more rapidly than that of the whole-cell vaccine and that the outbreaks of pertussis in children who have completed their entire acellular pertussis vaccine series are concerning.

What are the solutions to this problem? Can we give repeated doses of acellular pertussis vaccine to bolster immunity throughout adolescence and adulthood? How often do the boosters need to be repeated? Or do we need to reconsider going back to the old whole-cell vaccine? For those of us who are old enough to remember the whole-cell pertussis vaccine, we recall that it was associated with a high rate of local and systemic reactions. It was not well accepted during the 1980s and 1990s, and it is very unlikely that the reaction profile would be accepted in this current "vaccine-hesitant" climate. However, could we add adjuvants to the current acellular products to make them more immunogenic but less reactive than the whole-cell vaccines? Do we need to consider the live-attenuated pertussis vaccine that is being tested in France? Will widespread adult immunization eliminate the reservoirs of disease and reduce the overall pertussis burden? There are many unanswered questions that need to be investigated. It is very clear that we need to take these outbreaks seriously and rethink new approaches to the pertussis problem.

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