Vaccinated children: A powerful protection for older adults

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Children who receive a vaccine to prevent blood and ear infections, appear to be reducing the spread of pneumonia to the rest of the population, especially their grandparents and other older adults. Results of a new Vanderbilt study, funded by the Centers for Disease Control and Prevention (CDC), and published in the July 11 issue of the *New England Journal of Medicine* show infant vaccination against pneumococcal bacteria since 2000 has reduced pneumonia hospitalization by more than 10 percent across the board, with the most significant reductions at the extreme ends of the age spectrum.

"Pneumonia is a leading cause of hospitalization in the United States. The protective effect we saw in older adults, who do not receive the vaccine but benefit from vaccination of infants, is quite remarkable. It is one of the most dramatic examples of indirect protection or herd immunity we have seen in recent years," said the study's first author, Marie Griffin, M.D., MPH, professor of Preventive Medicine and Medicine.

James Powers, M.D., associate professor of Medicine in Geriatrics, said the study suggests this herd immunity is an even more effective prevention for elders than the vaccine currently recommended to prevent pneumonia in older adults.

"The reduction in pneumonia hospitalizations among older adults appears to be related to long-term effects following introduction of PCV7 immunization for children. We have not seen a similar response to

the pneumovax 23 vaccine (recommended for older adults) introduced in 1983," Powers said.

Griffin, along with co-author Carlos Grijalva, M.D., MPH, assistant professor of Preventive Medicine, and their colleagues, examined a large national database for hospitalization from pneumonia from 1997 through 2009. The result is a long-term snapshot of how pneumococcal conjugate vaccine (PCV7 or Prevnar) has impacted pneumonia rates since it was added to the childhood vaccine list in 2000.

Results show children under age 2 experienced a 40 percent reduction in pneumonia hospitalizations. Reduction in hospitalizations of older children and adults—who did not receive the vaccine—while less dramatic, was still impressive. But researchers said what began as a slow decline in 2000 in the rate of pneumonia hospitalizations for adults over the age of 65, appeared to accelerate over the last decade. By 2009, more than half the nationwide decline in pneumonia hospitalizations could be attributed to older adults, with some 70,000 fewer annual hospitalizations for those age 85 and older.

"Humans are the only reservoir for the pneumococcus. This group of bacteria can live in the nose and throat of healthy people, especially children. From young children, these bacteria may be transmitted to older age groups. Over time, the vaccine is causing a change in types of pneumococcus carried and transmitted nationwide. We are very fortunate to witness this in our time. These huge indirect effects on the adult population don't happen very often," said Grijalva.

PCV7 was developed to protect children against seven types of pneumococcal bacteria that cause potentially deadly and debilitating blood and spinal infections. The bacteria are also well-known as a leading cause of lung and ear infections in young children. Early studies by the same Vanderbilt investigators showed a 30 percent reduction in

childhood pneumonias in the first years after the vaccine was recommended for all infants, and other studies suggested it reduced ear infections by 20 percent. But questions lingered about whether the pneumonia reduction would last, or if other, less common pneumococcal types might actually increase to fill the void left by those types covered by the vaccine.

"Sometimes when you eliminate one serotype, others become more apparent. Following the introduction of PCV7, there was an increase in pneumococcal diseases caused by a serotype called 19A, not included in that vaccine. That's why it is really important to keep studying this and seeing what happens," Griffin said.

19A is one of the pneumococcal serotypes included in the newer version of the vaccine introduced in 2010. The vaccine now protects against 13 types of pneumococcus. Researchers say they are optimistic the newer vaccine may continue to provide both direct and herd effects in the future.

"PCV13 may cause another large reduction in pneumonia hospitalizations; perhaps another 10 percent, we hope. It is important for people to know that adults are benefiting from our childhood vaccine program. These are adults who won't be hospitalized, won't be getting antibiotics, or complications of hospitalizations, and won't be dying, since the risk of death is 5 percent to 12 percent when older adults are hospitalized with pneumonia. Vaccination of infants with pneumococcal conjugate vaccines results in a tremendous public health benefit," Griffin said.

Provided by Vanderbilt University Medical Center