

Friday 05 November 2010

Pneumococcal vaccines cut flu deaths

Re-analysis of historical data suggests benefit of bacterial vaccines in influenza pandemics



Photomicrograph of *Streptococcus pneumoniae* bacteria.

Image credit: CDC

Pneumococcal vaccines that offer protection against several serotypes of bacteria that cause pneumonia could be a cheap weapon in the fight against flu pandemics, suggest public health scientists online this month in the *Journal of Infectious Diseases*.

“The data are generally consistent with a protective effect for the 2 types of bacterial vaccines designed to prevent infection with what are now accepted as the major causes of pneumonia and death in the 1918–1919 pandemic: pneumococci and haemolytic streptococci,” write Yu-Wen Chien and colleagues from Emory University in Georgia and the US National Institutes of Health.

Although the analysis is not conclusive, they say, the biases are not strong enough to rule out a beneficial effect.

Bacterial pneumonia was recently recognised as a major cause of death associated with influenza. Evidence first **came to light in 2008**, when researchers looked at epidemiological and clinical records from the 1918 ‘Spanish flu’ pandemic to find that the flu virus was not the direct cause of most deaths that occurred at the time. Instead, mortality rates had a strong link with bacterial pneumonia caused primarily by *Streptococcus pneumoniae*.

Following up on this initial evidence, a team led by David Morens, one of the co-authors of the current paper, **published a separate analysis** of data from earlier pandemics and reached the same conclusion.

The findings suggest that instead of causing deadly infections directly, the influenza virus could be increasing patients’ susceptibility to secondary infections with invasive bacteria. They led to calls to include antimicrobial drugs and vaccines in pandemic preparedness planning.

Chien and colleagues first made the case for a potential benefit of pneumococcal vaccines in an **article published** last year, after the 2009 flu pandemic emerged. Several months earlier, the US Centers for Disease Control and Prevention re-issued recommendations for use of the 23-valent polysaccharide pneumococcal vaccine to protect certain population groups from severe pandemic flu. But some **experts cast doubt** on the strategy based on concerns over the adequacy of supplies of the vaccine, and limited data on its effectiveness.

Although the 2009 pandemic turned out to be relatively mild for most people, the Spanish flu pandemic was the most severe in history, leading to 20–100 million deaths worldwide. Antimicrobial drugs were unavailable at the time, and because the cause of influenza was unknown, various pathogens were put forward as potential suspects.

Bacterial vaccines were produced and administered towards the end of that pandemic because health scientists generally believed that pneumonia was behind most deaths. The authors conducted a meta-analysis of studies conducted at the time to assess the ability of these vaccines to prevent illness and death in civilian and military populations.

They had to contend with flawed study designs by today’s standards — such as non-random selection of participants, not controlling for confounding variables, and unequal observation periods between vaccinated and unvaccinated groups. So they re-analysed the published data to answer questions less likely to be compromised by these flaws.

The meta-analysis was designed to determine whether influenza patients who had been vaccinated against bacterial infections were less likely to catch pneumonia or to die, compared with unvaccinated patients. It found that bacterial vaccines could cut the incidence of pneumonia by at least 34%, and cut case-fatality rates by at least 42%.

“The estimated VE [vaccine efficacy] of bacterial vaccines containing pneumococci for preventing case fatalities in the military studies (70%) may be the most accurate figure in our analyses, because of less confounding, misclassification, and self-selection,” write Chien and colleagues.

Few studies have evaluated the effect of bacterial vaccination on the health impacts of influenza epidemics, according to the authors. A **clinical trial published in 2004** found that 45% of cases of pneumonia associated with seasonal influenza in infants could be prevented by a nine-valent pneumococcal conjugate vaccine.

Data from the 2009 flu pandemic suggest that even in an age where antibiotics and antiviral drugs are available, bacterial infections played a part in up to 55% of all deaths in the USA. The authors say that “bacterial vaccines containing pneumococci could potentially reduce influenza-associated pneumonias and deaths in modern pandemics.”

Reference and link

1. Chien YW, Klugman KP, Morens DM. Efficacy of whole-cell killed bacterial vaccines in preventing pneumonia and death during the 1918 influenza pandemic. *J Infect Dis* 2010, **202**:1639–48. doi: [10.1086/657144](https://doi.org/10.1086/657144)

US Centers for Disease Control and Prevention information about pneumococcal vaccine

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