

# Review: Pneumococcal vaccination does not prevent pneumonia or death in adults

Dear K, Holden J, Andrews R, Tatham D. Vaccines for preventing pneumococcal infection in adults. *Cochrane Database Syst Rev.* 2003;(4):CD000422.

## QUESTION

Is pneumococcal vaccination effective in preventing disease or death in adults?

## DATA SOURCES

Studies were identified by searching the Cochrane Central Register of Controlled Trials, MEDLINE (1966 to June 2003), and EMBASE/Excerpta Medica (1974 to June 2003); scanning the bibliographies of relevant studies and reviews; and contacting experts in the field.

## STUDY SELECTION AND ASSESSMENT

Studies were selected if they were randomized or quasirandomized controlled trials (RCTs) or nonrandomized studies comparing polysaccharide pneumococcal vaccines with placebo, control vaccines, or no intervention in adults ( $\geq 16$  y). A quality assessment of the RCTs was done using the Jadad scale (0 to 5 points).

## OUTCOMES

For RCTs, the outcomes included pneumococcal pneumonia, all-cause pneumonia, pneumonia mortality, and all-cause mortality.

## MAIN RESULTS

15 RCTs met the selection criteria. The trials included 75 197 patients, and follow-up ranged from 18 months to 4 years. 3 trials involved older persons, and 3 trials involved patients with chronic disease. The publication date of the trials ranged from 1947 to 1999, with 14 published since 1976, 10 published since 1980, and 3 published since 1990. 7 of 15 trials with a median publication date of 1987 scored  $\geq 3$  out of 5 for study quality; 8 trials with a median publication date of 1977 scored  $\leq 2$ . Because of significant heterogeneity due to publication year, a random-effects model was used. 14 trials that evaluated all-cause pneumonia had

a combined result that appeared to favor pneumococcal vaccines, but this was not statistically significant (Table). 11 trials that evaluated all-cause mortality showed no benefit of vaccination (Table). Results for pneumococcal pneumonia and pneumonia mortality were heterogenous, with more recent trials showing no effect.

## CONCLUSION

Pneumococcal vaccination is not effective in preventing disease or death in adults.

*Source of funding:* Not stated.

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## Pneumococcal vaccine vs placebo or no treatment to prevent disease or death\*

Outcomes	Number of trials (number of participants)	Weighted event rates		RRR (95% CI)	NNT (CI)
		Vaccine	Placebo or no treatment		
All-cause pneumonia	14 (75 008)	2.9%	3.9%	22% (-1 to 40)	100 (50 to $\infty$ )†
All-cause mortality	11 (72 404)	7.2%	7.2%	9% (-6 to 22)	Not significant

\*Abbreviations defined in Glossary; weighted event rates, RRR, NNT, and CI calculated from data in article using a random-effects model. Follow-up ranged from 18 months to 4 years.

†Borderline significance.

## COMMENTARY

Infection with *Streptococcus pneumoniae* is a major cause of morbidity and mortality, especially at the extremes of age. For example, the risk for invasive pneumococcal disease increases with increasing age from 5 per 100 000 at age 50, to 60 per 100 000 by age 85 (1). When the first pneumococcal vaccines were introduced in the mid-1940s, this organism was very sensitive to penicillin. Now, resistance to penicillin approaches 35% (2).

In the review by Dear and colleagues, the nonrandomized studies suggested a benefit to prevent invasive pneumococcal disease (odds ratio 0.47, 95% CI 0.37 to 0.59), but the randomized studies suggest minimal if any benefit. This may be because the nonrandomized studies are biased or because recent studies had low numbers of patients with definitive pneumococcal pneumonia and thus lacked power (3).

The conclusions reached by Dear and colleagues are valid, based on existing evidence. However, the risk associated with vaccination is minimal (4, 5) and existing studies cannot rule out a benefit to patients at highest risk for pneumococcal infection. Currently, vaccination is recommended for patients with various medical conditions ranging from profound immune compromise to a history of smoking, alcoholism, diabetes mellitus, or even a previous hospital admission. Lack of sufficient power limits studies of vaccine efficacy in these patient groups.

As *S. pneumoniae* increases its resistance to  $\beta$ -lactam antibiotics, physicians must realize that the current pneumococcal vaccine should

not be relied on to reduce the incidence or mortality of pneumococcal pneumonia. It is also unlikely that expansion of use of the current vaccine to the general population would be of any benefit.

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## References

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