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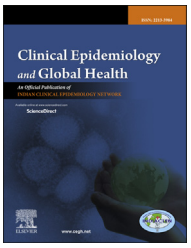

Evidence Summaries

Vaccines for preventing pneumococcal infection in adults. Summary of the evidence and implications for public health programmes

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ABSTRACT

An update of a Cochrane systematic review summarised the evidence for the efficacy of pneumococcal polysaccharide vaccines (PPVs) from randomized controlled trials (RCTs) or quasi-RCTs that compared PPV with placebo, control vaccines or no intervention; and from non-RCTs that assessed pneumococcal vaccine effectiveness against sterile site, culture confirmed IPD where the trial design allowed for the control of important confounding factors (case–control and cohort studies). Of 25 included studies, 18 were RCTs including 64,852 participants and seven were non-RCTs – five case–control studies and two cohort studies including 62,294 participants; the non-RCTs contributing outcomes for culture-confirmed invasive pneumococcal disease (IPD) only.

The review found consistently strong evidence that the vaccine is effective in preventing the rarer outcome of invasive pneumococcal disease. Evidence from the included studies indicates vaccination might not afford as much protection in adults with chronic illness as it does for healthy adults. The available evidence did not demonstrate that pneumococcal polysaccharide vaccines prevent pneumonia (of all causes) or mortality in adults. This review did not consider adverse events.

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1. The evidence

An updated Cochrane systematic review identified 25 studies that gave pneumococcal polysaccharide vaccines (PPVs) to adults in different settings. Of the 25 studies, 18 were randomized controlled trials (RCTs) involving 64,852 participants and seven were non-RCTs involving 62,294 participants; the non-RCTs contributing outcomes for culture-confirmed invasive pneumococcal disease (IPD) only.

2. Meta-analysis of the RCTs found

- Consistently strong evidence of the efficacy of pneumococcal polysaccharide vaccines against IPD (Protective

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vaccine efficacy of 74%, 95% CI 55%–86%; 11 trials, 36,489 participants). This efficacy for PPVs against IPD was seen in subgroups of trials done in adults from low-income countries (one trial, 5373 participants), and in trials done on otherwise healthy adults in high-income countries (five trials, 27,886 participants); but not in trials done on adults with chronic illnesses in high-income countries (five trials, 3230 participants), possibly because of inadequate numbers included in these trials in adults with chronic illnesses.

- Consistent evidence of protective efficacy against pneumonia due to all causes in adults from low-income countries (vaccine efficacy 46%, 95% CI 33%–57%%; four trials, 14,562 participants); but not in adults with chronic illness in high-income countries (six trials, 4010 participants), or in adults from high-income countries without chronic illnesses (six trials, 29,186 participants).
- No evidence of protective efficacy against all-cause mortality (14 trials, 47,560 participants).
- Non-RCTs provided evidence for protection against IPD in populations for whom the vaccine is currently utilized (vaccine effectiveness of 52%, 95% CI 37%–61% for all serotypes; and 55%, 95% CI 38%–54% for vaccine-type disease; seven studies – five case–control studies, and two cohorts, 62,294 participants).
- The review however did not consider adverse events.
- The review concluded that pneumococcal vaccine is effective in preventing IPD in adults. The evidence for those with chronic illness was less clear. The review also concluded that the evidence does not support the routine use of PPV to prevent all-cause pneumonia or mortality.

3. Why is this question important?

- Pneumococcal pneumonia and other diseases caused by *Streptococcus pneumoniae* (*S. pneumoniae*) continue to cause substantial morbidity and mortality throughout the world. Pneumonia is the most common presentation of pneumococcal disease in adults. Bacteraemic pneumonia is the most common cause of invasive pneumococcal disease (IPD), accounting for 90% of all cases. Mortality associated with invasive pneumococcal pneumonia in adults has remained unchanged at about 20% over the past 60 years.
- The continuing burden of pneumococcal disease is worsened by increasing numbers of people with chronic disease or HIV infection and an ageing population in many high-income countries.
- Antibiotic resistance continues to present a major threat to the successful treatment of infections.[1]
- In low-income countries large numbers of people lack access to basic curative health care but might be reached by vaccination programmes.
- The 23-valent PPV has been utilized internationally to varying extents but mainly limited to older adults and adults with medical risk factors for IPD in high-income countries.[2]
- This review updates a previous Cochrane Review of the same topic published in 2008,[3] and addressed whether PPV is effective in all adult populations or whether only some groups benefit.

Review on which this evidence summary is based: Moberley S, Holden J, Tatham DP, Andrews RM. Vaccines for preventing pneumococcal infection in adults. Cochrane Database of Systematic Reviews 2013, Issue 1. Art. No.: CD000422. http://dx.doi.org/10.1002/14651858.CD000422.pub3.

This evidence summary presents an overview of the findings and the implications for developed and developing countries. For further details, please read the full review that can be downloaded, free of charge (through various funded provisions) in most parts of the world, from *The Cochrane Library* (www.thecochranelibrary.com).

4. What did the systematic review seek and what did they find?

Review objectives: To assess the efficacy and effectiveness of PPVs in preventing pneumococcal disease or death in adults. The review did not assess adverse events.

	What did the review authors search for?	What did the review find?
Types of studies	1. Prospective, randomized controlled trials (RCTs) or quasi-RCTs that compared PPV with placebo, control vaccines or no intervention. 2. Non-RCTs that assessed pneumococcal vaccine effectiveness against sterile site, culture confirmed IPD where the trial design allowed for the control of important confounding factors (case–control and cohort studies	Twenty-five studies met inclusion criteria (18 RCTs involving 64,852 participants and seven non-RCTs – five case–control studies and two cohort studies involving 62,294 participants). This review update excluded three RCTs (in two only the abstract was available, and in the third, the effects of steroids could not be separated); and 13 non-RCTs (due to not considering culture-confirmed IPD as an outcome in 12, and one study which used ICD codes to diagnose IPD).

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