PNEUMOCOCCAL VACCINE IMPACT ON HIGH RISK ADULTS FOR PNEUMONIA

The clinical effectiveness of 23-valent polysaccharide pneumococcal vaccine (PPV) on the prevention of pneumonia is debatable. PPV prevents uncommon but serious episodes of invasive pneumococcal disease. *Streptococcus pneumoniae* is the cause of at least 30-50% of all cases of community-acquired pneumonia (CAP). This issue of CLIPS briefly summarizes a cohort study that evaluated whether PPV reduces mortality or additional hospitalizations caused by vaccine-preventable infections in high risk patients previously hospitalized for CAP. If you need further information, please contact the Samford University Drug Information Service at (205) 726-2659.


Background

- CAP affects 5-20 out of 1000 adults per year.
- Approximately 20-40% of adults with CAP require hospitalization.
- Mortality for patients hospitalized for CAP is 10% and 50% of patients who survive hospitalization die within 5 years.
- Current guidelines recommend vaccinating adults at increased risk of CAP with PPV.
- *S. pneumoniae* is the most common organism that causes serious pneumonia and meningitis and is one of the top three causes of community-acquired bacteremia.
- No study has evaluated the effectiveness of PPV in individuals who have survived an episode of hospitalization for CAP, which makes them at the greatest risk of pneumonia.
- This study was conducted in Alberta, Canada where PPV is widely available for a small copayment to any patient and free for older patients (age ≥65 years), patients with a chronic disease, nursing home residents, or patients who could not afford to pay out-of-pocket.

Objective

- To determine whether PPV is associated with reduced mortality or additional hospitalizations for vaccine-preventable infections in individuals at high risk of CAP during 5 years of follow-up.

Endpoints

- The primary endpoint was prevention of all-causes of mortality or additional hospitalization for vaccine-preventable infections by PPV. The vaccine-preventable infections were determined to be sepsis, meningitis, pneumonia, sinusitis, otitis media, and mastoiditis.
- The secondary endpoint was all-causes of mortality, infections requiring additional hospitalization, and additional hospitalization for pneumonia.

Methods

- A total of 3415 CAP patients aged ≥17 years were admitted to 6 hospitals within 2000 to 2002.
  - CAP was defined as radiographic evidence and ≥2 signs or symptoms present for CAP: cough, pleuritic chest pain, shortness of breath, temperature >38°C, and crackles or bronchial breathing on auscultation.
  - Exclusion criteria were patients that had tuberculosis or cystic fibrosis, immunocompromised, or pregnant.
  - Once the patient was discharged from the hospital, they were followed for up to 5 years.

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Patient Characteristics
- Mean age: 68 ± 18 years
- Male: 52%
- Admitted from a nursing home: 17%
- Severe pneumonia: 59%

Results
- Of the 3081 patients who survived their initial CAP hospitalization, 2950 patients were evaluated in the study.

Hazard Ratios According to Timing of PPV for Death, Potentially Vaccine-Preventable Infection, and Pneumonia

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Vaccination status before hospitalization</th>
<th>Vaccination status before discharge</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number (%) of patients</td>
<td>Number (%) of patients</td>
</tr>
<tr>
<td>Death or Infection</td>
<td>Vaccinated (n=667)</td>
<td>Not vaccinated (n=1994)</td>
</tr>
<tr>
<td>Death</td>
<td>442 (66)</td>
<td>1037 (52)</td>
</tr>
<tr>
<td>Infection</td>
<td>395 (59)</td>
<td>876 (44)</td>
</tr>
<tr>
<td>CAP</td>
<td>124 (19)</td>
<td>308 (15)</td>
</tr>
</tbody>
</table>

- The risk of the primary outcome of mortality or additional hospitalization for vaccine-preventable infections increased with the PPV vaccinated group (589 [62%]) compared to the non-vaccinated group (1037 [52%]) (HR, 1.27; 95%CI, 1.14 to 1.40; P<0.001).
- There was an increased percentage of deaths in the vaccinated group (528 [55%]) compared to the non-vaccinated group (876 [44%]);(P<0.001).

Conclusions
- Several strengths of the cohort study were identified including the large population, multi-center study and the use of defined clinical measures for CAP.
- The extrapolation of the study results may be hampered due to the nonrandomized design of the trial; unknown timing of the PPV administration for 70% of the patients; assumption that a group of common infections were potentially related to pneumococcal infection and assumed to be vaccine preventable; significant inequity for some baseline characteristics between vaccinated and nonvaccinated groups; unknown causes of pneumonia-related deaths that could have been prevented by PPV administration.
- Within 5 years of follow-up, more than half of the individuals died or were hospitalized with a vaccine-preventable infection.
- PPV did not significantly reduce the risk of death or hospitalization for vaccine-preventable infections.
- More effective strategies to prevent pneumococcal disease are needed.