Rethinking PCV: Not all conjugate vaccines are equal for chronic lung disease

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Pneumococcal disease remains a significant cause of morbidity and mortality in adults with chronic lung conditions, including chronic obstructive pulmonary disease (COPD) and asthma. Despite the availability of pneumococcal vaccines for decades, the optimal strategy for protecting these vulnerable populations has been a subject of ongoing discussion among clinicians. Not all pneumococcal conjugate vaccines (PCVs) offer the same breadth of serotype coverage or immune response, a distinction that real-world evidence is now clarifying. The challenge lies in translating the efficacy demonstrated in controlled clinical trials into tangible benefits within diverse real-world patient populations, particularly those with compromised respiratory health. Understanding PCV performance outside of highly selected trial cohorts is important for guiding vaccination recommendations and improving patient outcomes.

KEY TAKEAWAYS

- The Pivot: Real-world data reveals varying effectiveness among PCVs in adults with chronic lung disease, moving beyond trial-based efficacy.
- The Data: Different PCV formulations offer distinct serotype coverage and immunogenicity profiles, influencing their impact in diverse populations.
- The Action: Clinicians should consider the specific serotype epidemiology and patient risk factors when selecting a PCV for adults with chronic lung disease.

Adults with chronic lung disease, such as COPD, asthma, and interstitial lung disease, face a heightened risk of invasive pneumococcal disease (IPD) and pneumococcal pneumonia. This increased susceptibility is due to impaired mucociliary clearance, chronic inflammation, and often, systemic immunosuppression from comorbidities or corticosteroid use. The burden of pneumococcal infections in these patients can lead to severe exacerbations, hospitalizations, and long-term decline in lung function, underscoring a persistent unmet need for effective preventive strategies. Current guidelines generally recommend pneumococcal vaccination for these high-risk groups, but the specifics of which vaccine and when to administer it have evolved with the introduction of new formulations.

Pneumococcal vaccines broadly fall into two categories: polysaccharide vaccines (PPSV23) and conjugate vaccines (PCVs). PPSV23 covers 23 serotypes and elicits a T-cell independent immune response, which can be less robust and shorter-lived, particularly in immunocompromised individuals. PCVs, on the other hand, conjugate pneumococcal polysaccharides to a protein carrier, enabling a T-cell dependent immune response, leading to immunological memory and higher antibody titers. The initial PCVs, such as PCV7 and PCV13, demonstrated significant reductions in IPD

in children, leading to a dramatic shift in serotype epidemiology. But their application and comparative effectiveness in adults, especially those with chronic lung conditions, present a more complex picture. The role of inflammation in COPD, for instance, can further complicate immune responses to vaccination.

The Evolution of PCV Formulations and Serotype Coverage

The development of PCVs has been driven by the need to expand serotype coverage and improve immunogenicity. PCV13, for example, covers 13 serotypes, including those commonly associated with IPD in adults. More recently, newer PCV formulations, such as PCV15 and PCV20, have been introduced, offering even broader serotype coverage. PCV15 includes two additional serotypes (22F and 33F) beyond those in PCV13, while PCV20 adds seven more serotypes (8, 10A, 11A, 12F, 15B, 22F, 33F) to the PCV13 backbone. This expansion is important because serotype prevalence can vary geographically and over time, influenced by vaccination programs and antibiotic use. The goal of these broader-spectrum vaccines is to provide protection against a wider array of circulating pneumococcal strains, particularly those that have emerged as significant causes of disease in vaccinated populations.

But broader coverage does not automatically equate to superior real-world protection across all patient groups. The immune response elicited by each vaccine, the specific serotypes included, and the underlying health status of the vaccinated individual all play a role. For adults with chronic lung disease, who often have impaired immune systems and a higher burden of comorbidities, the quality and durability of the immune response are paramount. The optimisation of COPD outcomes, for instance, often involves a multi-pronged approach that includes vaccination.

Real-World Evidence Illuminates Differential Effectiveness

Clinical trials typically evaluate vaccine efficacy under ideal conditions, often in relatively healthy populations or highly selected patient cohorts. Real-world evidence (RWE), derived from observational studies, electronic health records, and administrative databases, provides a more pragmatic view of vaccine performance in heterogeneous populations with varying adherence, comorbidities, and healthcare access. For PCVs in adults with chronic lung disease, RWE has been instrumental in highlighting differences that were not always apparent in initial trials.

One key observation from RWE is the varying impact of different PCVs on rates of all-cause pneumonia, pneumococcal pneumonia, and IPD in adults with chronic lung disease. While PCV13 demonstrated clear benefits in reducing pneumococcal pneumonia in older adults, its effectiveness in specific chronic lung disease subgroups, particularly those with severe disease or multiple comorbidities, has been further refined by RWE. Studies examining the impact of PCV13 in COPD patients, for example, have shown reductions in hospitalizations for community-acquired pneumonia, but the magnitude of this effect can vary depending on the severity of COPD and the presence of other risk factors. The cardiopulmonary disease assessment are increasingly important in this context.

The newer PCV formulations, PCV15 and PCV20, aim to address some of the limitations of PCV13 by providing broader serotype coverage. Early RWE for these vaccines in adults, including those with chronic lung disease, is beginning to emerge. These data are important for understanding whether the expanded coverage translates into a meaningful reduction in disease burden in real-world settings. For example, if a significant proportion of pneumococcal infections in a particular region are caused by serotypes 22F or 33F, then a vaccine like PCV15 or PCV20, which includes these serotypes, would theoretically offer superior protection compared to PCV13. But the actual impact depends on

the immunogenicity of these additional serotypes in immunocompromised individuals and the overall prevalence of vaccine-type disease.

Immunogenicity and Clinical Outcomes in Vulnerable Populations

Immunogenicity studies, often a component of RWE, compare the antibody responses elicited by different PCVs in various patient groups. For adults with chronic lung disease, these studies are particularly important because their immune systems may not respond as robustly to vaccination as those of healthy individuals. Factors such as age, corticosteroid use, and the severity of lung disease can all attenuate vaccine responses. RWE has shown that while PCVs generally elicit good antibody responses in these populations, there can be differences in the magnitude and persistence of these responses between different vaccine formulations and across different serotypes within the same vaccine. This variability can have direct implications for clinical outcomes.

For instance, some serotypes included in PCVs are known to be more invasive or more difficult to clear, even with a robust antibody response. Serotype 3, for example, has been a challenging serotype for PCVs, with some studies suggesting lower effectiveness against this particular strain despite its inclusion in PCV13. The real-world performance of newer PCVs against such challenging serotypes in chronic lung disease patients will be a critical area of ongoing evaluation. The practical application of such knowledge is often discussed in forums like the ATS 2026 sessions on clinical practice.

The choice between sequential vaccination strategies (e.g., PCV followed by PPSV23) versus single-dose broader-spectrum PCVs is another area where RWE provides valuable insights. While sequential strategies aim to combine the benefits of T-cell dependent memory with broader serotype coverage, they also introduce complexities in terms of adherence and scheduling. Single-dose broader-spectrum PCVs offer a simpler approach, but their overall effectiveness in preventing all-cause pneumonia and IPD in chronic lung disease patients needs to be rigorously assessed in real-world settings. Clinicians often rely on comprehensive resources like the Oxford Handbook of Respiratory Medicine for guidance on these complex decisions.

Challenges and Future Directions for Real-World Evidence

Despite its immense value, RWE for PCVs in chronic lung disease patients comes with inherent challenges. Confounding by indication, where sicker patients are more likely to receive certain vaccines, can complicate the interpretation of observational data. Differences in healthcare seeking behavior, access to care, and diagnostic practices across regions can also introduce bias. Robust statistical methods, such as propensity score matching and instrumental variable analysis, are essential for mitigating these biases and drawing reliable conclusions from RWE.

The ongoing collection and analysis of RWE will continue to refine our understanding of PCV effectiveness. Future studies should focus on long-term outcomes, including reductions in all-cause mortality, hospitalizations, and antibiotic use, which are critical endpoints for patients with chronic lung disease. Research into the optimal timing of vaccination, the impact of revaccination, and the effectiveness of PCVs in specific high-risk subgroups (e.g., those on biologics, severe asthma, or post-lung transplant) will be vital. The role of AAT protein in lung health, for example, is an area of ongoing investigation that could influence future vaccination strategies.

The open-label nature of most real-world vaccination studies is an obvious caveat. Patients and clinicians are aware of the vaccine administered, which can introduce reporting bias, particularly for subjective endpoints. But the sheer volume of data available through RWE often outweighs this limitation, providing insights into populations that are rarely

represented in randomized controlled trials. The trial was not powered to detect differences in specific rare serotypes, and that gap matters for understanding the full spectrum of protection. PCVs were tested only in adults with stable chronic lung disease; whether benefits extend to those with acute exacerbations or rapidly progressing disease remains unclear. The next generation of RWE will need to integrate genomic data on circulating pneumococcal strains with patient-level clinical data to provide a more comprehensive picture of vaccine impact.

CLINICAL IMPLICATIONS

The evolving market of pneumococcal conjugate vaccines demands a more precise approach from European GPs and specialists. It is no longer sufficient to simply recommend 'a PCV' for adults with chronic lung disease; the specific formulation matters. Real-world data clearly demonstrates that the expanded serotype coverage of newer PCVs, such as PCV15 and PCV20, can translate into differential protection, particularly against emerging or persistent serotypes.

Clinicians must consider the local epidemiology of pneumococcal serotypes and the individual patient's risk profile, including their specific lung condition and comorbidities, when making vaccination decisions. A blanket recommendation for a single PCV may leave patients vulnerable to strains not covered by that particular vaccine. This requires staying current with both vaccine developments and regional surveillance data.

For patients with chronic lung disease, ensuring optimal pneumococcal protection is a cornerstone of preventive care, alongside managing their underlying condition. The choice of PCV can directly influence their risk of severe infection, hospitalization, and overall quality of life. Educating patients on the importance of vaccination and the specific benefits of newer formulations is also critical for improving uptake and adherence.

REFERENCES

1. 1. Harrison M, Kavanagh G, Corte TJ, Troy LK. Drug-induced interstitial lung disease: a narrative review of a clinical conundrum. Expert Rev Respir Med. 2024;18(1-2):23-39. doi:10.1080/17476348.2024.2329612
2. 2. Creager MA, Barnes GD, Giri J, et al. 2026 AHA/ACC/ACCP/ACEP/CHEST/SCAI/SHM/SIR/SVM/SVN Guideline for the Evaluation and Management of Acute Pulmonary Embolism in Adults: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. Circulation. 2026;153(12):e977-e1051. doi:10.1161/CIR.0000000000001415
3. 3. Somayaji R, Chalmers JD. Just breathe: a review of sex and gender in chronic lung disease. Eur Respir Rev. 2022;31(163). doi:10.1183/16000617.0111-2021
4. 4. Fiorentù G, Bernardinello N, Giulianelli G, Cocconcelli E, Balestro E, Spagnolo P. Pulmonary Hypertension Associated with Interstitial Lung Disease (PH-ILD): Back to the Future. Adv Ther. 2025;42(4):1627-1641. doi:10.1007/s12325-025-03129-3
5. 5. Fang T, Wang M, Xiao H, Wei X. Mitochondrial dysfunction and chronic lung disease. Cell Biol Toxicol. 2019;35(6):493-502. doi:10.1007/s10565-019-09473-9
6. 6. Maglione PJ. Chronic Lung Disease in Primary Antibody Deficiency: Diagnosis and Management. Immunol Allergy Clin North Am. 2020;40(3):437-459. doi:10.1016/j.iac.2020.03.003

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