

The Evolution of Pneumococcal Vaccines: Past Findings, Present Work and Future Strategies

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The clinical range of pneumococcal disease ranges from invasive diseases such as osteomyelitis, bacteraemia, and meningitis to non-invasive diseases such as pneumonia without bacteraemia, otitis media, and sinusitis. Pneumococci is the most common cause of community-acquired pneumonia, bacteraemia, and meningitis in children and adults, and is a significant cause of morbidity and mortality worldwide.¹ Children below the age of two, adults above the age of 65, and individuals with comorbidities such as chronic lung and heart conditions, diabetes mellitus, and who are immunocompromised are at higher risk of developing pneumococcal disease.²⁻³

Research has found that pneumococcal vaccination [pneumococcal conjugate vaccination (PCV) and pneumococcal polysaccharide vaccine (PPSV23)] is effective in reducing carriage and transmission of vaccine serotypes, resulting in lower incidences of invasive pneumococcal disease.⁴ Large scale studies such as the CAPiTA trial have demonstrated that among adults 65 years or older, PCV13 has a 46 percent efficacy against vaccine-type pneumococcal pneumonia, 45 percent efficacy against vaccine-type non-bacteraemia pneumococcal pneumonia, and 75 percent efficacy against vaccine-type invasive pneumococcal disease⁵; meanwhile, PPSV23 vaccine efficacy studies have found that PPSV23 is 60-70 percent effective in preventive invasive disease caused by serotypes of the vaccine.⁶ Among children, PCV has been found to be 63-74 percent efficacious in reducing invasive pneumococcal disease.⁷ Given the efficacy of pneumococcal vaccination, the World Health Organisation (WHO) recommended that all countries include PCV in their national infant immunisation schedule in a 2007 position paper,⁸ while pneumococcal vaccination is indicated for adults with risk factors for infection with or severe adverse outcomes from pneumococcal disease.

This issue of the *Singapore Family Physician* highlights the role of pneumococcal vaccines and what family physicians can do to advocate for vaccinations to prevent pneumococcal disease among their patients.

In Unit 1, Dr Tan Seow Yen gives a comprehensive overview on the vaccination and control of infectious diseases and pneumococcal disease. She highlights the important role that healthcare professionals can play in driving vaccine acceptance.

In Units 2 and 3, Dr Zhang Shuwei provides a timely update on pneumococcal vaccine efficacy and the research that has been done thus far. He sheds light on what has been hitherto done in Singapore to improve pneumococcal vaccination uptake amongst Singaporean adults and the challenges involved.

Also in this issue, A/Prof Goh Lee Gan has selected ten current readings on topics related to pneumococcal vaccination pertaining to drivers of vaccine uptake, vaccine hesitancy, and the impact of vaccination.

Lastly, this issue features a PRISM article by Dr Ginny Quek, which details how a multi-disciplinary team is able to effectively transition patients back to the community.

REFERENCES

1. Global pneumococcal disease and Vaccination [Internet]. Centers for Disease Control and Prevention; 2022 [cited 2023 Jun 8]. Available from: <https://www.cdc.gov/pneumococcal/global.html>
2. Tan TQ. Pediatric invasive pneumococcal disease in the United States in the era of pneumococcal conjugate vaccines. *Clin Microbiol Rev.* 2012;25: 409–419. PMID:2276363
3. Jansen AGSC, Rodenburg GD, van der Ende A, van Alphen L, Veenhoven RH, Spanjaard L, et al. Invasive pneumococcal disease among adults: associations among serotypes, disease characteristics, and outcome. *Clin Infect Dis.* Oxford University Press; 2009;49: e23–9. PMID:19522653
4. Musher DM, Anderson R, Feldman C. The remarkable history of pneumococcal vaccination: an ongoing challenge. *Pneumonia.* 2022 Dec;14(1):1-5.
5. Bonten MJ, Huijts SM, Bolkenbaas M, Webber C, Patterson S, Gault S, van Werkhoven CH, van Deursen AM, Sanders EA, Verheij TJ, Patton M. Polysaccharide conjugate vaccine against pneumococcal pneumonia in adults. *New England Journal of Medicine.* 2015 Mar 19;372(12):1114-25.
6. Kraicer-Melamed H, O'Donnell S, Quach C. The effectiveness of pneumococcal polysaccharide vaccine 23 (PPV23) in the general population of 50 years of age and older: a systematic review and meta-analysis. *Vaccine.* 2016 Mar 18;34(13):1540-50.
7. Pavia M, Bianco A, Nobile CG, Marinelli P, Angelillo IF. Efficacy of pneumococcal vaccination in children younger than 24 months: a meta-analysis. *Pediatrics.* 2009 Jun;123(6):e1103-10.
8. World Health Organization. Pneumococcal conjugate vaccine for childhood immunization—WHO position paper. *Weekly Epidemiological Record= Relevé épidémiologique hebdomadaire.* 2007;82(12):93-104.