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Pneumococcal vaccination in adults: a review of the current recommendations

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Abstract

English:

Pneumococcal disease remains a significant cause of morbidity and mortality, particularly in older adults and individuals with underlying medical conditions. To address this public health threat, pneumococcal vaccines have been developed and recommended for use in adult populations. This article provides a comprehensive review of the current recommendations for pneumococcal vaccination in adults and discusses the burden of pneumococcal disease in the adult population, including risk factors for developing the disease. The article concludes with a discussion about future directions for pneumococcal vaccination in adults, including the use of new and improved vaccines, which are developed to ensure wide protection against pneumococcal disease.

Keywords

pneumococcal disease • vaccination

Vaccinarea pneumococică la adulți: o revizuire a recomandărilor actuale

Rezumat

Romanian:

Boala pneumococică rămâne o cauză semnificativă de morbiditate și mortalitate, în special în rândul adulților în vârstă și al persoanelor cu afecțiuni medicale subiacente. Pentru a aborda această amenințare pentru sănătatea publică, vaccinurile pneumococice au fost dezvoltate și recomandate pentru utilizare la populațiile adulte. Acest editorial oferă o revizuire cuprinzătoare a recomandărilor actuale pentru vaccinarea antipneumococică la adulți și discută povara bolii pneumococice la această categorie de vârstă, inclusiv factorii de risc pentru dezvoltarea bolii pneumococice. Lucrarea se încheie cu o discuție despre direcțiile viitoare privind vaccinarea antipneumococică la adulți, inclusiv utilizarea vaccinurilor noi și îmbunătățite, dezvoltate pentru a asigura o protecție largă împotriva bolii pneumococice.

Cuvinte-cheie

boală pneumococica • vaccinare

Burden of disease and unmet medical needs in adults

Worldwide, lower respiratory tract infections such as influenza and pneumonia are leading causes of death from communicable diseases. Community-acquired pneumonia (CAP) is the most common type of pneumonia, with incidence rates dramatically increasing with age (1,2). This is due to the changes associated with ageing immune systems,

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a process known as immunosenescence, and the higher prevalence of coexisting health conditions in older adults, which increases their susceptibility to infections and can also worsen the severity of the disease (3–6). These factors result in increased risk of hospitalisation, disability risk and rate of mortality from infections, as well as decreased quality of life (7–10). *Streptococcus pneumoniae* is a significant cause of illness and death in adult populations worldwide and is a leading cause of CAP (1,2,11–16). Although invasive infections caused by *S. pneumoniae*, such as pneumonia with bacteraemia, bacteraemia and meningitis, are less frequent but often more severe, noninvasive CAP (cases without bacteraemia) is the main contributor to the burden of pneumococcal disease in adults, accounting for 75% of these infections (1,2,12). According to the literature data, 30% of all pneumonia cases requiring hospitalisation across all age groups can be attributed to pneumococcus, 20% of cases of pneumonia treated in outpatients and between 42% and 60% of cases of meningitis in individuals aged ≥18 years (2).

In Romania, the burden of pneumococcal disease is significant. A study published in 2021 analysed the pathology potentially associated with *S. pneumoniae* infection in Romanian hospitals. The number of cases discharged from Romanian hospitals with a primary or a secondary diagnosis code of pneumonia (including infections caused by *S. pneumoniae*) and meningitis was presented for the years 2018–2019, both for inpatient and outpatient hospitalisations (17). The study concluded that in 2018, 245,171 cases of pneumonia with a primary or a secondary diagnosis on diagnostic codes were discharged from Romanian hospitals after continuous hospitalisation. In 2019, 236,746 cases with the same diagnosis were discharged. Based on the estimation that *S. pneumoniae* is responsible for 30% of all hospitalised cases of pneumonia, this would indicate that there were approximately 73,551 cases of pneumococcal pneumonia requiring hospitalisation in 2018 and 71,024 cases in 2019 (2,17).

Populations at risk: adults at risk for pneumococcal disease

The list of sample populations at risk is large. In this editorial, we only refer to adults. Adults who are at increased risk of pneumococcal disease are as follows (18):

1. Older adults: Pneumococcal disease is more common in people 65 years of age and older.
2. Individuals with chronic medical conditions: People with chronic illnesses such as cardiovascular disease, pulmonary disease, diabetes, hepatic impairment and renal disease are at higher risk.
3. People with altered immune system: People with conditions such as HIV and cancer and those undertaking immunosuppressive drugs are more susceptible to pneumococcal disease.
4. Adults who smoke cigarettes: People who smoke are at a higher risk for pulmonary damage and pneumococcal bacteria invasion.
5. Adults who abuse alcohol: Excessive alcohol consumption can damage the liver and weaken the immune system, increasing the risk of pneumococcal disease.

It is crucial for healthcare professionals to talk to the people under these categories about their risk and whether they need to be vaccinated against pneumococcal disease. Pneumococcal vaccines are an important tool for protecting this group of vulnerable people.

Available pneumococcal vaccines

Currently, there are two types of pneumococcal vaccines available for use in adults: pneumococcal polysaccharide vaccines (PPVs) and pneumococcal conjugated vaccines (19,20).

PPVs

These vaccines contain purified polysaccharide capsules of the pneumococcus. They stimulate the immune system to produce antibodies against the pneumococcus, but they do not impart long-lasting immunity, especially in young children and elderly people (19,20). This category also comprise the 23-valent pneumococcal polysaccharide vaccine (PPSV23) (21).

Pneumococcal conjugate vaccines

These vaccines are developed by conjugating pneumococcal polysaccharides to a carrier protein. This carrier protein helps stimulate the immune system to impart longer lasting immunity and to respond more effectively to the pneumococcus, especially in young children and elderly people (19,20). There are several conjugated vaccines available for use in adults, such as 13-valent pneumococcal polysaccharide conjugate vaccine (PCV13), 15-valent pneumococcal polysaccharide conjugate vaccine (PCV15) and 20-valent pneumococcal polysaccharide conjugate vaccine (PCV20) (21). Overall, conjugate vaccines provide a more effective and longer lasting immunity than plain polysaccharide vaccines. It is important to note that both types of vaccines provide protection only against those serotypes present in the vaccine

Table 1. Adults aged ≥65 years (23).

Prior vaccine	Option A	Option B
None*	PCV20	PCV15 → ≥1 year† → PPSV23
PPSV23 only at any age	≥1 year → PCV20	≥1 year → PCV15
PCV13 only at any age	≥1 year → PCV20	≥1 year† → PPSV23
PCV13 at any age and **PPSV23** at <65 years	≥5 years → PCV20	≥5 years§ → PPSV23

PCV13, 13-valent pneumococcal polysaccharide conjugate vaccine; PCV15, 15-valent pneumococcal polysaccharide conjugate vaccine; PCV20, 20-valent pneumococcal polysaccharide conjugate vaccine; PPSV23, 23-valent pneumococcal polysaccharide vaccine.

*Applies to people who received PCV7 at any age and no other pneumococcal vaccines.

†Consider a minimum interval (8 weeks) for adults with an immunocompromising condition, cochlear implant or CSF leak.

§For adults with an immunocompromising condition, cochlear implant or CSF leak, the minimum interval for PPSV23 is ≥8 weeks since the last PCV13 dose and ≥5 years since the last PPSV23 dose; for others, the minimum interval for PPSV23 is ≥1 year since the last PCV13 dose and ≥5 years since the last PPSV23 dose.

(19,20). There are many recommendations for using the vaccines, especially in the last year. I attempt to update these recommendations.

Current vaccination recommendations (2023)

The Advisory Committee on Immunization Practices (ACIP) recommends that all adults aged ≥65 years and that certain high-risk individuals, including those with certain medical conditions,[1] receive a pneumococcal vaccine, following the below recommendations (22):

– For adults aged ≥65 years, it is recommended that they receive a single dose of PCV20 or PCV15 followed by a dose of PPSV23 given at least 1 year after the PCV15 dose, if they have not been vaccinated or if their vaccination history is unknown.
– For adults aged 19–64 years who have underlying medical conditions or are at risk, it is advised that they receive a single dose of PCV20 or PCV15 followed by a subsequent dose of PPV23 given at least 1 year after the PCV15 dose, if they have not been vaccinated or if their vaccination history is unknown.

1 It is specified that the following medical conditions increase the risk of pneumococcal disease: alcoholism, chronic heart disease, chronic liver disease, chronic lung disease, smoking, diabetes, chronic renal failure, nephrotic syndrome, immunodeficiency, suppressed immunity due to medical treatment, cancer, HIV infection, Hodgkin's disease, leukaemia, lymphoma, multiple myeloma, solid organ transplantation, asplenia, sickle cell disease or other haemoglobinopathies, cerebrospinal fluid (CSF) leak or a cochlear implant (22).

Tables 1–3 provide the complete pneumococcal vaccine (CDC) schedules for adults aged ≥65 years (Table 1), adults aged 19–64 years with specified immunocompromising conditions (Table 2) and adults aged 19–64 years with a cochlear implant or CSF leak (Table 3) (23).

The Global Initiative for Chronic Obstructive Lung Disease (GOLD) recently released an updated guideline for the management of chronic obstructive pulmonary disease (COPD), where the latest recommendations regarding pneumococcal vaccination for individuals with COPD were included (24). According to the GOLD 2023 guidelines, all adults with COPD, regardless of severity, should receive the pneumococcal vaccine. The specific type and number of doses may vary depending on the individual's age, previous vaccination history and overall health status. PCV20 or PCV15 followed by a subsequent dose of PPV23 is recommended for COPD patients (24). Altogether, The European Society of Cardiology (ESC) also recommends that pneumococcal vaccination, along with influenza and COVID-19 vaccination, should be taken into consideration in patients with heart failure (25). The American Diabetes Association (ADA) also made considerable changes to the last guideline from 2023 to reflect new indications and guidance for pneumococcal vaccination recommendations. ADA recommends pneumococcal vaccination for all adult patients with diabetes as they are at increased risk for pneumococcal infection. Adults aged ≥65 years whose vaccine status is unknown or who have not received pneumococcal vaccine should receive one dose of PCV15 or PCV20. If PCV15 is used, it should be followed by PPSV23. Adults aged 19–64 years with certain underlying risk factors or other medical conditions whose vaccine

Table 2. Adults aged 19–64 years with specified immunocompromising conditions (23).

Prior vaccine	Option A	Option B
None*	PCV20	PCV15 → ≥8 weeks → PPSV23
PPSV23 only	≥1 year → PCV20	≥1 year → PCV15
PCV13 only	≥1 year → PCV20	≥8 weeks → PPSV23 → ≥5 years → PPSV23 Review pneumococcal vaccine recommendations again when your patient turns 65 years
PCV13 and **1 dose of PPSV23**	≥5 years → PCV20	≥5 years† → PPSV23 Review pneumococcal vaccine recommendations again when your patient turns 65 years
PCV13 and **2 doses of PPSV23**	≥5 years → PCV20	**No vaccines** recommended at this time. Review pneumococcal vaccine recommendations again when your patient turns 65 years
Immunocompromising conditions	• Chronic renal failure • Congenital or acquired asplenia • Congenital or acquired immunodeficiency§ • Generalised malignancy • HIV infection	• Hodgkin disease • Iatrogenic immunosuppression¶ • Leukaemia • Lymphoma • Multiple myeloma	• Nephrotic syndrome • Sickle cell disease/other • Haemoglobinopathies • Solid organ transplant

PCV13, 13-valent pneumococcal polysaccharide conjugate vaccine; PCV15, 15-valent pneumococcal polysaccharide conjugate vaccine; PCV20, 20-valent pneumococcal polysaccharide conjugate vaccine; PPSV23, 23-valent pneumococcal polysaccharide vaccine.

*Applies to people who received PCV7 at any age and no other pneumococcal vaccines.

†Minimum interval for PPSV23 is ≥8 weeks since the last PCV13 dose and ≥5 years since the last PPSV23 dose.

§Includes B-(humoral) or T-lymphocyte deficiency, complement deficiencies (particularly C1, C2, C3 and C4 deficiencies) and phagocytic disorders (excluding chronic granulomatous disease).

¶Includes diseases requiring treatment with immunosuppressive drugs, including long-term systemic corticosteroids and radiation therapy.

Table 3. Adults aged 19–64 years with a cochlear implant or CSF leak (23).

Prior vaccine	Option A	Option B
None*	PCV20	PCV15 → ≥8 weeks → PPSV23
PPSV23 only	≥1 year → PCV20	≥1 year → PCV15
PCV13 only	≥1 year → PCV20	≥8 weeks → PPSV23 Review pneumococcal vaccine recommendations again when your patient turns 65 years
PCV13 and **1 dose of PPSV23**	≥5 years → PCV20	**No vaccines** recommended at this time. Review pneumococcal vaccine recommendations again when your patient turns 65 years

CSF, cerebrospinal fluid; PCV13, 13-valent pneumococcal polysaccharide conjugate vaccine; PCV15, 15-valent pneumococcal polysaccharide conjugate vaccine; PCV20, 20-valent pneumococcal polysaccharide conjugate vaccine; PPSV23, 23-valent pneumococcal polysaccharide vaccine.

*Applies to people who received PCV7 at any age and no other pneumococcal vaccines.

status is unknown or who have not received pneumococcal vaccine should receive one dose of PCV15 or PCV20. As for adults aged ≥65 years, if PCV15 is used, it should be followed by PPSV23. The recommended interval between PCV15 and PPSV23 is ≥1 year. If PPSV23 is the only dose received, PCV15 or PCV20 may be given after ≥1 year (26). All these professional societies have recognised the benefits of pneumococcal vaccination in protecting patients with

comorbidities against pneumococcal disease and in reducing complications and the risk of worsening of the underlying disease (23–26).

Implementation strategies

Effective implementation of pneumococcal vaccination in adults requires a comprehensive approach that addresses a range of patient, provider and health system factors. Considering the specific characteristics of pneumococcal infection and the phenomenon of serotype replacement, to ensure protection against pneumococcal disease, it is important to use vaccines that are effective against a broad number of serotypes. Therefore, higher valent vaccines, which target a larger number of serotypes, are currently authorised and are encouraged to be used (23–26). These higher valent vaccines are designed to provide greater coverage against pneumococcal disease and are expected to play an important role in reducing the burden of pneumococcal disease in adults (27). In Romania, the conjugated vaccine with the highest number of antigens, the 20-valent pneumococcal conjugated vaccine (PCV20), is available, which can be administered for active immunisation for the prevention against invasive disease and pneumonia caused by *S. pneumoniae* in individuals aged ≥18 years (28). The PCV20 vaccine should be administered as a single dose to individuals aged 18 years and older, and the need for revaccination with a subsequent dose of the vaccine has not been established. It can be administered concomitantly with the COVID-19 mRNA vaccine (nucleoside modified) and with a seasonal influenza vaccine (28).

Conclusion

In conclusion, the burden of pneumococcal disease in adults is a significant public health concern worldwide. With ageing populations and the increasing prevalence of underlying medical conditions, adults are at higher risk of contracting pneumococcal infections, leading to increased risk of hospitalisation, risk of disability and rate of mortality. This highlights the importance of increasing awareness of the risk factors and the need for widespread pneumococcal vaccination, particularly higher valent vaccines, to provide comprehensive protection against a wide range of pneumococcal serotypes. With the increasing burden of pneumococcal disease in adults, it is crucial for healthcare providers and public health officials to prioritise preventive measures to reduce its impact on public health. Compliance of doctors and patients in using the pneumococcal vaccine is vital, and the coverage with a high rate of vaccination remains one of the important pillars for preventing the consequences of infectious complications of this disease.

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