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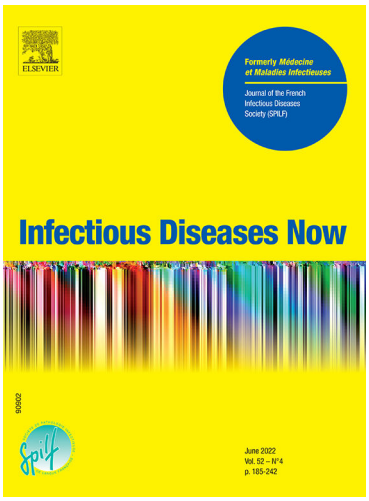

Editorial

Toward a simplified vaccination schedule in France: How can the tools we possess be put to better use?

Robert Cohen, Odile Launay, Catherine Weil-Olivier, Pierre Bakhache, Pierre Bégué, Marie-Aliette Dommergues, Véronique Dufour, Joël Gaudelus, Isabelle Hau, Didier Pinquier, Georges Thiebault, Franck Thollot, François Vie le Sage, Corinne Levy, Maeva Lefevre, Hervé Haas

PII: S2666-9919(25)00165-4
DOI: https://doi.org/10.1016/j.idnow.2025.105186
Reference: IDNOW 105186

To appear in: *Infectious Diseases Now*

Received Date: 5 November 2025
Accepted Date: 7 November 2025

Please cite this article as: R. Cohen, O. Launay, C. Weil-Olivier, P. Bakhache, P. Bégué, M-A. Dommergues, V. Dufour, J. Gaudelus, I. Hau, D. Pinquier, G. Thiebault, F. Thollot, F.V. le Sage, C. Levy, M. Lefevre, H. Haas, Toward a simplified vaccination schedule in France: How can the tools we possess be put to better use?, *Infectious Diseases Now* (2025), doi: https://doi.org/10.1016/j.idnow.2025.105186

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Toward a simplified vaccination schedule in France: how can the tools we possess be put to better use?

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Key words: vaccination, schedule, children, pneumococcal conjugate vaccine, HPV vaccination

There exists a broad consensus that vaccination has played a pivotal role in improving public health and increasing life expectancy worldwide [1]. Current vaccination programs remain among the most cost-effective public health interventions, providing substantial benefits for both children and adults [2, 3]. After a long period without significant change, over the past few years the French immunization schedule has undergone major transformations, making it one of the most comprehensive among high-income countries. On this score, comparison between the vaccine schedules recommended and reimbursed in 2017 and 2025 is instructive [4, 5]. We wish to emphasize the key role played by the French National Health Authority (HAS), especially the last two Technical Committees on Vaccination (CTV), which have effectively impelled many of these paradigm shifts. Changes came into effect before the COVID-19 pandemic, and have since accelerated. Above and beyond SARS-CoV-2 vaccines, new forms of immunization encompass pertussis vaccination during pregnancy, Bexsero® for infants and toddlers, rotavirus vaccination,

meningococcal ACYW vaccination for infants and adolescents, and respiratory syncytial virus (RSV) prevention using monoclonal antibodies in infants or maternal immunization.

In adults, recommendations have likewise evolved, and now include: 20- and 21-valent pneumococcal conjugate vaccines (PCVs) for all individuals aged 65 years and older, as well as for those with underlying medical conditions at any age, recombinant adjuvanted herpes zoster vaccine for adults ≥65 years or immunocompromised ≥18 years; HPV vaccination catch-up extended up to age 26 for all men and women; and RSV vaccination for adults ≥75 years and those with cardiac and/or pulmonary comorbidities ≥65 years. Though not necessarily cost-saving, most vaccination programs are considered highly cost-effective.

Contrary to initial concerns, the expanded schedule in children has not led to declining coverage rates. Indeed, following the introduction of mandatory infant vaccination, France now ranks among the European countries with the highest coverage levels. Adolescent coverage, especially for HPV, is improving markedly with school-based vaccination but has not yet met the established goals. Adult vaccination remains suboptimal, but with one remarkable exception: pertussis vaccination uptake in pregnant women, which rose, following the 2024 epidemic, from 20% to > 60% within a year [6].

In light of these remarkable advances, it is now time to reconsider modifying vaccination schedules by reducing the number of doses. This would not be the first such reduction in France; as early as 2011, a first simplification of the immunization schedule had already been successfully implemented. Such an approach could substantially decrease costs in a constrained economic environment, while simplifying logistics and improving public acceptance — even if the proposed regimens were to diverge from those formally approved by European marketing authorization. Since its creation in 2003, under the impetus of Professor Claire-Anne Siegrist, InfoVac France (https://www.infovac.fr/) has served as a trusted national network dedicated to vaccination knowledge. It provides on-the-field healthcare professionals with up-to-date, evidence-based recommendations and expert guidance on a case-to-case basis, in conjunction with Its mission, which is to support informed vaccination practices and improve children's health.

The aim of our position paper is to suggest reductions in the number of doses administered for existing vaccinations, without thereby compromising their efficacy. This approach is based on evidence of the non-inferiority of a simplified vaccination schedule at the individual level and on considerations of possible herd immunity; in terms of both vaccines and logistics, it minimizes costs, and is essential in the current context of budget restrictions.

A key example is HPV vaccination. Since 2022, the World Health Organization (WHO) has endorsed a single-dose schedule for individuals aged 9–20 years [7]. Over 70 countries, including high-income nations (and provinces) such as England, Australia, Québec, Spain, and Portugal, have implemented this simplified schedule. Even if single-dose immunogenicity is slightly lower, and while prolonged study durations are necessary, available evidence indicates no meaningful loss of long-term protection. We recognize, however, that HPV vaccination coverage among French adolescents may not yet have reached the threshold required to justify a single-dose schedule in a high-income country. For older adolescents and adults, maintaining a 2+1 schedule

is questionable, as multiple studies show no significant immunological advantage over 1+1 [8]. Given a per-dose cost exceeding €130, simplification could substantially improve coverage and cost-efficiency. Rotavirus vaccination is a second example. Independent studies over the past decade have demonstrated that a two-dose RotaTeq® schedule is as effective as a three-dose schedule [9]. Québec has applied it for five years with positive epidemiological impact. Adopting a two-dose regimen in France would simplify guidance and reduce costs; the 2025 price of RotaTeq® is approximately €53 per dose.

Another key issue is pneumococcal conjugate vaccination with Prevenar 20® (PCV20) in pediatrics. In France, this vaccine provides the broadest serotype coverage for infants [10]. However, due to lower immunogenicity versus Prevenar 13® (PCV13) after the primary series in the 2+1 schedule, the European Medicines Agency has approved it only under a 3+1 schedule [11]. However, post-booster antibody levels are comparable, and several studies have demonstrated that clinical protection depends mainly on post-booster herd immunity [12, 13]. Comparable immunogenicity between PCV13 and PCV20 has been observed after the booster dose regardless of the primary vaccination schedule; indeed, along with the high vaccine coverage achieved in United Kingdom, the critical role of the booster in reducing carriage and enhancing herd immunity helps to explain the adoption in that country of a viable vaccination schedule (at four months and 12 months). It is noteworthy that deferring the first dose to four months is expected to result in better priming than would an earlier administration. Combined with effective surveillance of invasive pneumococcal diseases in children, France's high vaccine coverage should lead to an optimal impact of a 2+1 schedule [10].

Regarding meningococcal C or ACYW vaccination, to our knowledge France is one of the few countries including these vaccines with a two-dose schedule (one dose at six months and one dose at one year) in its national immunization program. The rationale for the introduction of one shot before one year was low adolescent vaccine coverage, with no evidence of herd immunity inducing a high number of cases so early in life. The recent increase in adolescent coverage may soon (if coverage in this population reaches the objective) make the six-month dose unnecessary, as herd protection from childhood and adolescent vaccination shall have become sufficient. The current public price per dose is about €44.

Another major topic is RSV prevention during infancy. Two strategies—monoclonal antibody and maternal vaccination—have shown efficacy and effectiveness [14]. Based on robust real-world data, which is not limited to hospitalized infants, Nirsevimab has demonstrated strong impact and effectiveness in France [15-17]. That said, economic issues arise:

• Until what age is prophylaxis still cost-effective? This is an issue because of the inevitability of RSV infection; nearly all children will be infected within their two first years; the two prophylactic interventions merely postpone infection to a safer age. To respond, thorough cost-effectiveness analysis (or even cost-saving) is required and it would incorporate hospitalizations, emergency visits, outpatient morbidity, and antibiotic use.

• What is the most appropriate maternal vaccination timing, given that its administration has a limited window, between 32 and 36 weeks of gestation? In France, administration of Abrysvo®,

currently recommended only between September 1 and January 1, is questionable. A July start would protect newborns from the onset of the RSV season in September. Last year, many mothers were vaccinated after December 1st, and their babies were consequently born at the end or after the outbreak. While these infants were finally not affected in 2024–2025 RSV outbreak, they will no longer be protected during the 2025–2026 season, as the effects of maternal vaccination will have come to an end.

Vaccination against hepatitis A in France is focused on high-risk groups and/or travelers. The licensed schedule in Europe remains a two-dose regimen. For more than twenty years, particularly in South America, it has been amply demonstrated that a single dose provides durable protection [18]. A recent WHO position paper supports this approach, which has been adopted by several Western countries. What is more, the cost of one dose remains modest—around €15.

Further discussions on other vaccines are probably warranted.

In France, simplification of the immunization schedule is challenging due to the existence of a complex, multi-stakeholder decision process:

• European marketing authorization focuses mainly on evaluation of the individual risk / benefit ratio (vaccine safety, immunogenicity and clinical protection) but overlooks herd protection, which is strongly influenced by national vaccination coverage rates and scheduling, which differ substantially from one European country to another.

The recent example of PCV20 is particularly illustrative. Can vaccination schedules (3+1 vs. 2+1) reasonably be identical in Germany and France, given such radically different contexts? In Germany, some regions report booster coverage rates below 50%, making individual protection critical and likely justifying a 3+1 schedule. In France, due to mandatory vaccination, coverage rates for the full schedule are excellent (> 90%), and as herd immunity constitutes the main source of effectiveness, a 2+1 schedule remains more appropriate.

As regards PCVs, even though antibody responses after the booster dose appear relatively unaffected by the timing of the primary series, early responses are not: immunogenicity is significantly higher with a 3- and 5-month schedule than with a 2- and 4-month schedule, a factor not taken into consideration in the European marketing authorization process [19].

• After marketing authorization (MA) is granted, ownership of the MA specifications lies with the manufacturers; do they really have an interest in reducing the number of doses—and consequently, the overall program cost? That is a legitimate question.

• In theory, during its deliberations the CTV does not take cost-effectiveness into account, a stance that has become increasingly difficult to persuasively maintain.

• Through its ASMR rating (Improvement in the Medical Benefit Provided), the Transparency Commission strongly influences pricing practices; with this in mind, recent decisions (nasal influenza vaccine, nirsevimab, etc.) have raised legitimate concerns.

• Lastly, the Economic Committee for Health Products operates with limited transparency; the gap between list prices and those reimbursed by Social Security remains substantial.

We fully acknowledge the magnitude of the changes we are proposing and, in some cases, advocating. That much said, some decisions could be swiftly applied for the benefit of all. Reducing the number of doses could facilitate the addition of cost-effective vaccines (varicella, etc.) to the national immunization schedule. Given the economic strain that currently affects daily medical practice well beyond the field of vaccination, these changes appear called for and timely.

That said, we are not proposing predefined formulas for reduction in the number of doses in vaccination schedules; our main objective is rather to open a constructive dialogue with the health authorities in a context characterized by significant budgetary constraints.

Contributorship Statement:

RC wrote the manuscript. All the other authors revised and approved the manuscript.

Conflicts of interests:

Robert Cohen received personal fees and non-financial support from GSK, Merck, MSD, Pfizer, Sanofi, AstraZeneca outside the submitted work.

Odile Launay received personal fees and non-financial support from GSK, MSD, Pfizer, Sanofi, and Janssen outside the submitted work.

Catherine Weil-Olivier received personal fees and non-financial support from GSK, MSD, Pfizer, Sanofi, AstraZeneca, Sequirus, Janssen and Novartis outside the submitted work.

Pierre Bakhache: received personal fees and non-financial support from GSK, Merck, MSD, Pfizer and Sanofi, outside the submitted work.

Marie-Aliette Dommergues received personal fees and non-financial support from GSK, Merck, MSD, Pfizer and Sanofi, outside the submitted work.

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Véronique Dufour received personal fees and non-financial support from GSK, Merck, MSD, Pfizer, Sanofi and AstraZeneca outside the submitted work.

Joël Gaudelus received personal fees and non-financial support from GSK, Merck, MSD, Pfizer, Sanofi, AstraZeneca, and Novartis outside the submitted work.

Isabelle Hau received personal fees and non-financial support from GSK, Merck, MSD, Pfizer and Sanofi, outside the submitted work.

Didier Pinquier received personal fees and non-financial support from AstraZeneca, GSK, MSD, Pfizer and Sanofi, outside the submitted work.

Georges Thiebault received personal fees and non-financial support from GSK, MSD and Pfizer outside the submitted work.

Franck Thollot received personal fees and non-financial support from GSK, MSD, Pfizer and Sanofi, outside the submitted work.

François Vie le Sage received personal fees and non-financial support from MSD, outside the submitted work.

Corinne Levy received personal fees and non-financial support from Merck, MSD, Pfizer, outside the submitted work.

Maeva Lefevre received personal fees and non-financial support from Sanofi, Janssen and AstraZeneca outside the submitted work.

Hervé Haas received personal fees and non-financial support from GSK, UPSA, MSD, Pfizer and Sanofi outside the submitted work.

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Ethical considerations

Not applicable

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