



Letter to the Editor

Optimization of Diphtheria, Tetanus and Pertussis (DTP) vaccination strategy in China



We read with interest the recent article on pertussis, which reported the atypical surge of pertussis in the latest 2 years in China.¹ Indeed, China began to face the challenge of pertussis resurgence recently. According to the epidemic situation of notifiable infectious diseases nationwide,² an unusual increase in the number of reported cases and deaths of pertussis has been observed in recent years (Fig. 1). In 2023, 41,124 cases were reported, with 5 deaths. While in 2024, as of November, reports indicated a sharp rise in the number of cases of pertussis, reaching 487,658, approximately 12 times that of 2023. Among the cases, 28 deaths were reported. The increased disease burden of pertussis in China was partly due to the immunization gap that emerged after the shift of the prevention and control strategies against COVID-19.¹ In addition, the detection and diagnosis capabilities for respiratory infections have been significantly improved because of coping with the COVID-19 epidemic in the past three years. The recent inclusion of nucleic acid testing methods in China's national diagnostic criteria for pertussis at the end of 2023 might also contribute to the sharply increased reported cases in 2024.

Pertussis, a highly contagious respiratory disease caused by *Bordetella pertussis*, was one of the leading causes of morbidity and mortality among infants and young children and continued to pose a significant public health challenge globally.³ In recent years, the recrudescence of pertussis has also been reported in various countries besides China, including UK, Denmark, and so on,^{4,5} leading to an increase in the number of cases around the world.

Given the recent resurgence of pertussis globally and especially in China, targeting pertussis, a vaccine-preventable-disease, it was necessary to adjust and optimize the Diphtheria, Tetanus and Pertussis (DTP) Vaccination Strategy in China. To address this issue, numerous studies have been conducted in China to evaluate the effectiveness of the previous vaccination strategy of pertussis and explore the potential directions for improvement. Based on a previous study, the antibody levels of children gradually decreased over time after receiving the DTP vaccine. The fitted anti-PT concentrations were only 5.60 IU/mL at 5 years following the last vaccination dose at 18 months of age.⁶ Besides, a study conducted in Henan Province in China revealed that the PT-IgG level of pertussis in the population was generally at a low level and the estimated infection rate of pertussis reached the peak at age 6.⁷ The findings suggested that the population at age 6 not only had lower levels of pertussis antibodies but also a higher risk of infection. Furthermore, it was notable that the combination vaccines providing protection against pertussis varied across different countries (Table 1). In countries like the United States, Australia and so on, besides the basic vaccination, at least two booster doses were offered to children and adolescents.

While in China, before the optimization, only a booster dose of Diphtheria, Tetanus, and acellular Pertussis vaccine (DTaP) was offered to the population at age 18 months. To sum up, switching Diphtheria-Tetanus combined vaccine (DT) for 6-year-old population to the DTP vaccine seemed necessary and was likely to reduce the risk of infection for the relevant population effectively.

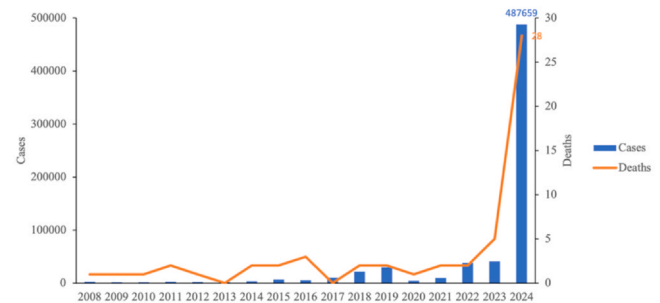


Fig. 1. Number of reported cases and deaths of pertussis in China from 2008 to 2024 (as of November).

Table 1

Comparison of current combination vaccine strategies that include protection against pertussis in some countries.

Country	Basic Vaccination (months)	Childhood and Adolescent Booster Immunization
United States	2 (DTaP) 4 (DTaP) 6 (DTaP)	15–18 months (DTaP) 4–6 years (DTaP) 11–12 years (Tdap)
United Kingdom	2 (DTaP/IPV/Hib) 3 (DTaP/IPV/Hib) 4 (DTaP/IPV/Hib)	3–4 years (DTaP-IPV) 14 years (Td/IPV)
Australia	2 (DTaP/IPV/Hib) 4 (DTaP/IPV/Hib) 6 (DTaP/IPV/Hib)	18 months (DTaP) 4 years (DTaP-IPV) 11–12 years (Tdap)
Italy	3 (DTaP) 5 (DTaP) 11 (DTaP)	5–6 years (DTaP) 12–18 years (Tdap) in some regions
Finland	3 (DTaP/IPV/Hib) 5 (DTaP/IPV/Hib) 12 (DTaP/IPV/Hib)	4 years (DTaP-IPV) 15 years (DTaP-IPV)
China (Before the optimization)	3 (DTaP) 4 (DTaP) 5 (DTaP)	18 months (DTaP) 6 years (DT)

DTaP (Diphtheria, Tetanus, and Acellular Pertussis vaccine); DT (Diphtheria-Tetanus combined vaccine); Tdap (similar with DTaP vaccine, which includes a lower dose of pertussis antigens suitable for older children and adults); DTaP/IPV/Hib (Diphtheria, Tetanus, Pertussis, Polio, and Hemophilus influenzae type b vaccine); DTaP-IPV (Diphtheria, Tetanus, Pertussis, and Polio vaccine); Td/IPV (Tetanus, Diphtheria, and Polio vaccine).

Table 2
Comparison of the Diphtheria, Tetanus and Pertussis (DTP) Vaccination Strategy before and after the optimization.

		Vaccination age						
		2 months	3 months	4 months	5 months	6 months	18 months	6 years
Before the optimization	DTP		1	2	3		4	
	DT							1
After the optimization	DTP	1		2		3	4	5
	DT							

DTP (Diphtheria, Tetanus, and Pertussis vaccine); DT (Diphtheria-Tetanus combined vaccine).

Under such a background, National Disease Control and Prevention Administration of China has declared the optimization of the Diphtheria, Tetanus and Pertussis (DTP) vaccination strategy on December 25th, 2024.⁸ The updated strategy, effective from January 1st, 2025, has added a fifth dose of the DTP vaccine for 6-year-old population and adjusted the schedule for the basic vaccination. As is shown in Table 2, previously, children were vaccinated with the DTP vaccines at 3, 4, 5, and 18 months, with an additional DT vaccine at age 6. The updated strategy now includes DTP vaccination at 2, 4, 6, and 18 months, followed by the fifth dose of DTP vaccines at age 6, for a total of five doses of the pertussis-containing vaccines. The updated Chinese vaccination strategy for pertussis aligns more closely with the global practices and will probably help improve the protective effect of the vaccines and play a huge role in the prevention and control of pertussis in China.

The optimization of the DTP vaccination strategy is an important step in controlling pertussis in China. However, there are a few important considerations moving forward. First, the implementation of this strategy will require robust communications with healthcare providers to ensure smooth transitions and minimize confusion, as this change impacts both vaccination protocols and the distribution of vaccines. Furthermore, additional researches are necessary to evaluate the long-term effectiveness of the new vaccination strategy. Future studies should focus on monitoring antibody levels across different age groups post-vaccination and the overall impact of the additional fifth dose of DTP vaccines on disease burden of pertussis. There is also a need for exploring the development of new vaccines that provide longer-lasting immunity.

Ethical approval statement

Approval is not required in this study.

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Author contributions

Data collection: Shimo Zhang, Jue Liu. Writing: Shimo Zhang, Jue Liu.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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