INTERNATIONAL MULTIDISCIPLINARY JOURNAL FOR RESEARCH & DEVELOPMENT SJIF 2019: 5.222 2020: 5.552 2021: 5.637 2022:5.479 2023:6.563 2024: 7,805

elSSN :2394-6334 https://www.ijmrd.in/index.php/imird Volume 11. issue 09 (2024)

EPIDEMIOLOGICAL RATIONALE FOR CHANGING THE STRATEGY AND TACTICS OF SPECIFIC PREVENTION OF WHOOPING COUGH IN MODERN CONDITIONS

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Abstract: The aim of the study is to determine the main directions for improving the epidemiological control of whooping cough infection based on the study of the manifestations of the epidemic process and its determinants.

Keywords: whooping cough, immunization tactics, morbidity.

INTRODUCTION

Despite the success of vaccination, whooping cough remains a serious public health problem in many countries around the world. According to the World Health Organization (2024), 143,963 cases of whooping cough will be registered worldwide in 2023. In 2023, whooping cough claimed the lives of 63 thousand children under 5 years of age. There is reason to believe that this number is significantly higher, since in many countries the diagnosis and registration of whooping cough cases is not at the proper level [1,2]. Thus, according to CDC (Center for Disease Control and Prevention, USA), about 16 million people fall ill with whooping cough worldwide every year and approximately 195,000 cases end in death [3]. If vaccination were not carried out, then more than 1.3 million children would die from whooping cough worldwide in 2021 [1].

MATERIALS AND METHODS

A comparative analysis of morbidity among vaccinated and unvaccinated children, the conditions of infection of children under one year of age were studied based on an examination of 382 epidemiological survey cards of whooping cough foci (form No. 357/u), registered in 2013–2023.

RESULTS AND DISCUSSION

The long-term dynamics of whooping cough incidence among the population of Andijan for the study period (2013–2023) was characterized by uneven distribution over the years and a pronounced downward trend with a decline rate of 12.6%. The average long-term incidence rate was 4.2 per 100 thousand population with fluctuations from 1.0 in 2022 to 12.2 in 2023.

Throughout the analyzed period, the incidence of unvaccinated children was 14.4–75.3 times higher than the incidence of vaccinated children, indicating high prophylactic efficacy of pertussis vaccines. The proportion of unvaccinated children in the total number of children who fell ill was $67.7 \pm 2.4\%$. However, the distribution of morbidity among vaccinated and unvaccinated children in different age groups was uneven. In the age groups under one year and 1–2 years, unvaccinated children predominated in the structure of those who fell ill. With increasing age, the proportion of vaccinated children in the structure of those who fell ill increased and at the age of 3–6 years it was already 33.8 \pm 6.6%, among schoolchildren – 73.3 \pm 6.2%, exceeding the proportion of unvaccinated children by 2.7 times.

The above, as our studies have shown, is due to the low level of seroprotection against whooping cough in children aged 3–6 years. According to the results of serological monitoring, in the group of children aged 3–4 years who received a complete vaccination course and one revaccination at the age of 18 months, only 30.3% of children were protected from this infection, which correlates with the high incidence rate of vaccinated children in this age group. At the same time, in the age group of 6–7 years, the proportion of protected children was $65.9 \pm 3.8\%$, 2 times higher than that in the group of 3–4 years. The proportion of individuals with a high content of pertussis

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antibodies in their blood serum (1:640 and higher) also increased by 34.7 times, which, in the absence of revaccination vaccinations, was obviously the result of a booster effect due to exposure to Bordetella pertussis (a hidden component of the epidemic process of pertussis infection).

The obtained results indicate the loss of pertussis immunity with age, and indirectly indicate a discrepancy between the registered incidence and the actual one, which is consistent with the literature data indicating that the duration of post-vaccination pertussis immunity with whole-cell vaccines is 4-12 years, and with acellular vaccines - 3-10 years [3].

The maximum incidence rate of children under one year and the severe clinical course of whooping cough in this age group [2] was, as our studies showed, the result of low compliance with the immunization schedule in children under one year and high susceptibility of pregnant women.

Among the sick children under one year, only $7.0 \pm 2.1\%$ of children received the first vaccination against whooping cough at 3 months, and $3.9 \pm 1.6\%$ of children received complete vaccination by 12 months. Our previous studies showed that only $15.7\pm3.3\%$ of pregnant women were protected from whooping cough (the level of anti-pertussis antibodies in the blood serum was 1:160 or higher). The low level of anti-pertussis immunity in pregnant women in the current situation does not provide passive protection against whooping cough for children in the first months of life. Transplacental transfer of antibodies can be an effective protective factor only with a sufficient content of antibodies against whooping cough in the blood serum of pregnant women. High susceptibility to whooping cough is also characteristic of the adult population as a whole. A protective level of antibodies in the blood serum of donors was detected in only 22.0±2.6% of those examined, $55.0\pm3.5\%$ were seronegative [5].

An examination of the epidemiological survey cards of whooping cough foci showed that in 45.8% of cases the sources of the infectious agent for children under one year of age were brothers and sisters aged 6 to 15 years (median age 9 years), and in 18.2% they were parents. Similar data were obtained in foreign studies (Canada, France, Germany and the United States of America), where in 76–83% of cases the source of B. pertussis for infants were family members [3].

CONCLUSION

The results of the conducted studies, analysis of data from domestic and foreign literature allow us to conclude that at the first stage it is necessary to introduce a second revaccination against whooping cough into the Calendar of Preventive Vaccinations for epidemiological indications in order to provide regions unfavorable in terms of whooping cough with a legal basis for immunization of children aged 6–7 years, with priority from risk groups: children with bronchopulmonary pathology, immunodeficiency states, from large families living in closed groups, as well as those primarily vaccinated with acellular vaccines, with subsequent administration of a booster dose to adolescents. It is advisable to begin immunization of the adult population with epidemiological and social risk groups (employees of medical, educational, boarding schools, social security institutions, adults in families with newborn children and unvaccinated children under one year of age, as well as women planning a pregnancy) with subsequent introduction of revaccination vaccinations to the adult population every 10 years simultaneously with tetanus and diphtheria toxoids.

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