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REVIEW ARTICLE

The impact of varicella vaccination on varicella-related hospitalization rates: global data review



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KEYWORDS

Varicella/chicken pox;
Hospitalization;
Varicella vaccination;
Vaccine

Abstract

Objective: To describe the impact of varicella vaccination on varicella-related hospitalization rates in countries that implemented universal vaccination against the disease.

Data source: We identified countries that implemented universal vaccination against varicella at the http://apps.who.int/immunization_monitoring/globalsummary/schedules site of the World Health Organization and selected articles in Pubmed describing the changes (pre/post-vaccination) in the varicella-related hospitalization rates in these countries, using the Keywords “varicella”, “vaccination/vaccine” and “children” (or) “hospitalization”. Publications in English published between January 1995 and May 2015 were included.

Data synthesis: 24 countries with universal vaccination against varicella and 28 articles describing the impact of the vaccine on varicella-associated hospitalizations rates in seven countries were identified. The US had 81.4%–99.2% reduction in hospitalization rates in children younger than four years, 6–14 years after the onset of universal vaccination (1995), with vaccination coverage of 90%; Uruguay: 94% decrease (children aged 1–4 years) in six years, vaccination coverage of 90%; Canada: 93% decrease (age 1–4 years) in 10 years, coverage of 93%; Germany: 62.4% decrease (age 1–4 years) in 8 years, coverage of 78.2%; Australia: 76.8% decrease (age 1–4 years) in 5 years, coverage of 90%; Spain: 83.5% decrease (age <5 years) in four years, coverage of 77.2% and Italy 69.7%–73.8% decrease (general population), coverage of 60%–95%. **Conclusions:** The publications showed variations in the percentage of decrease in varicella-related hospitalization rates after universal vaccination in the assessed countries; the results probably depend on the time since the implementation of universal vaccination, differences in the studied age group, hospital admission criteria, vaccination coverage and strategy, which does not allow direct comparison between data.

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PALAVRAS-CHAVE

Varicela/catapora;
Internação
hospitalar;
Vacina contra
varicela;
Vacina

Impacto da vacina varicela nas taxas de internações relacionadas à varicela: revisão de dados mundiais

Resumo

Objetivo: Descrever o impacto da vacina varicela nas taxas de internações hospitalares associadas à varicela nos países que adotaram a vacinação universal contra a doença.

Fontes de dados: Identificaram-se países que adotaram a vacinação universal contra varicela pelo site http://apps.who.int/immunization_monitoring/globalsummary/schedules da Organização Mundial de Saúde e selecionaram-se os artigos no Pubmed que descrevem a variação (pré/pós-vacinal) nas taxas de internações relacionadas à varicela desses países, com auxílio das palavras chaves: “varicella”, “vaccination/vaccine” e “children” (ou “hospitalization”). Incluíram-se publicações em inglês entre janeiro de 1995 e maio de 2015.

Síntese dos dados: Foram identificados 24 países com vacinação universal contra a varicela e 28 artigos que descrevem o impacto da vacina nas internações associadas à varicela em sete países. Os EUA tiveram 81,4%-99,2% de redução na taxa de internação em crianças menores de quatro anos, após 6-14 anos do início da vacinação universal (1995), com cobertura vacinal de 90%; Uruguai: 94% de queda (crianças de 1-4 anos) em 6 anos, cobertura vacinal de 90%; Canadá: 93% de redução (1-4 anos) em 10 anos, cobertura de 93%; Alemanha: 62,4% de redução (1-4 anos) em 8 anos, cobertura de 78,2%; Austrália: queda de 76,8% (1-4 anos) em 5 anos, cobertura de 90%; Espanha: 83,5% de queda (< 5 anos) em 4 anos, cobertura de 77,2%; e Itália: queda entre 69,7%-73,8% (população geral), cobertura de 60%-95%.

Conclusões: As publicações revelaram variação no percentual de queda na hospitalização por varicela após a vacinação universal nos países pesquisados; os resultados provavelmente dependem do tempo decorrido após introdução da vacinação universal, diferenças na faixa etária estudada, critérios de internação, cobertura vacinal e estratégia de vacina, não permitindo comparação direta entre os dados.

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Introduction

Varicella is caused by a DNA virus of the *Herpesviridae* family. It is highly contagious, with an annual incidence of 26–61 cases per 1000 unvaccinated individuals; it usually has a benign course, but can evolve with complications from the virus itself or from secondary bacterial infections in both immunodeficient patients and immunocompetent individuals.¹⁻⁴

Complications from varicella virus itself are pneumonia, acute obstructive respiratory disease, cerebellitis, encephalitis, meningitis, and other rarer conditions such as neutropenia, thrombocytopenia, Henoch–Schonlein, synovitis, and Reye’s syndrome.^{5,6} The complications from secondary bacterial infection include impetigo, abscesses, cellulitis, necrotizing fasciitis, pneumonia, toxic shock syndrome, and sepsis.^{7,8} Mortality by varicella is considered low (6.7/100,000 infected), but the disease may have temporary or permanent sequelae.⁹

The varicella vaccine (VV) with live attenuated virus (Oka strain) was developed in Japan in 1974 and its commercialization started in 1987. In 1995, the United States (USA) became the first country to include it in the national immunization schedule.¹⁰ The local epidemiological scenario was characterized by an incidence of four million cases, 11,000 hospitalizations, and 100 deaths yearly due to varicella.⁵ In 2006, the country introduced the second dose of vaccine for children between 4 and 6 years, in order to reduce community outbreaks. Over the past 20 years, other countries have

implemented universal vaccination against this disease in one or two doses, according to the criteria of each country or region, and several studies analyzing the impact of this measure have been published.

In Brazil, varicella is not a compulsory notification disease, and its epidemiological data are restricted to schools and kindergartens outbreak reports, and DATASUS (Ministry of Health) information generated by Hospital Admissions Authorizations (Autorizações de Internação Hospitalar [AIH]) from the National Unified Healthcare System (Sistema Único de Saúde [SUS]).¹¹ According to DATASUS, the number of hospitalizations for varicella in Brazil has varied between 4200 and 7800 cases yearly, but this number accounts only for the hospitalizations in the public healthcare system.

Following the global trend of universal implementation of VV, the Brazilian Ministry of Health announced, in September 2013, the inclusion of this vaccine in the National Immunization Program for children born from June 2012 onwards. The one dose schedule associated with the measles, mumps, and rubella (MMR) vaccine at 15 months, without a booster dose; varicella-related hospitalizations are expected to decrease by 80%.¹² Two years after the implementation of this vaccine, the impact of this measure on varicella-related hospitalizations in Brazil is still undetermined.

This study aimed to describe the impact of VV in varicella-related hospitalization rates in countries that have adopted universal vaccination against the disease, in order

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