

Vaccines and Febrile Seizures: Quantifying the Risk

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Vaccines can cause fever, and fever in young children can lead to febrile seizures; these facts are not new. Febrile seizures are the most common seizure disorder of childhood and occur in ~5% of all children, usually those younger than 24 months. We know that vaccines, often administered to children in this age group, can trigger febrile seizures. The article by Duffy et al¹ in this edition of *Pediatrics* provides pediatric practitioners with a fairly precise estimate of how often influenza vaccine, conjugated pneumococcal vaccine (PCV), and diphtheria-tetanus-acellular pertussis (DTaP) vaccines given alone or in various combinations lead to febrile seizures. This study, conducted by the Vaccine Safety Datalink² (VSD), and others like it, are important as we engage in dialogue with parents about the risks and benefits of vaccines.

The VSD, started in 1990, is a collaborative project between the Centers for Disease Control and Prevention's Immunization Safety Office and 9 health care organizations and was created to address the upsurge of concerns about vaccine safety that have marked the past 2 decades. By leveraging the collective patient populations enrolled in these large organizations and the ability to evaluate the electronic medical records of those patients, the VSD can tell us scientifically, rapidly, and with good precision what happens to people after they receive vaccines. It is perhaps the best tool we have to assess vaccine safety.

Duffy et al¹ used the VSD to follow up on observations made between

2010 and 2012 linking specific influenza vaccine products, sometimes given with other vaccines, to febrile seizures.^{3,4} In the current study, the VSD used its patient power to carefully evaluate the frequency of febrile seizures after influenza vaccine given during 5 seasons (2006–2007 through 2010–2011) either alone or in combinations with PCV and DTaP because these vaccines are recommended to be given together routinely. Each of these vaccines alone was already known to cause fever, so it was reasonable to think that the potential additive fevers caused when these vaccines are given at the same time could lead to febrile seizures. The authors found that, when given alone, only PCV vaccine, but none of the influenza vaccines or DTaP, were associated with an increased rate of febrile seizures. What about the combination of all 3? The answer is that febrile seizures happen, but not often. As reported by Duffy et al,¹ influenza, DTaP, and PCV vaccines given together can lead to febrile seizures at a rate of up to 30 in 100 000 children immunized. This means for the average pediatrician, who may care for 1000 children younger than 5 including 3 to 500 between 6 and 24 months of age annually, one could expect to see at most 1 child who experiences a febrile seizure every 5 to 10 years due to administration of these vaccines together in the first 2 years of life.⁵ This would be in addition to the 30 to 75 patients in each birth year cohort in a practice that would experience a febrile seizure from other causes given the background rate of 2% to 5%.

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Does this mean we should stop giving these vaccines together or stop giving them at all? We say, emphatically, no. With the results of this study, we can accurately calculate the risks and benefits of this practice. The risk is 1 febrile seizure per pediatric practice every 5 to 10 years. Febrile seizures, although frightening to parents, rarely have any long-term sequelae.^{6,7} The benefits of giving these vaccines simultaneously include decreased office visits associated with painful vaccines, decreased episodes of vaccine-associated fussiness, and, most important, the assurance that children will be fully immunized and protected from infections that carry real morbidity and mortality. It is

well established that the vaccines we miss when we fail to give all the vaccines we can (simultaneously at each health care visit) may never be administered to some children, thus leaving them at risk for the diseases the vaccines prevent.⁸ It goes without saying that influenza, diphtheria, tetanus, pertussis, and pneumococcal infections may result in serious illness. These infections also have the potential to cause fevers and febrile seizures. Without vaccines to prevent these illnesses, pediatricians would see many more than 1 case of most of these infections each decade. In fact, they would see children in their practices with both febrile seizures and life-threatening

infections. The risk from these diseases far outweighs the risk from the vaccines. Fortunately, because of the surveillance and research of the VSD, we no longer need to wonder how often adverse events happen after vaccinations; instead, we can measure them scientifically, and studies like that by Duffy et al¹ increase our confidence in vaccines.

ABBREVIATIONS

DTaP: diphtheria-tetanus-acellular pertussis
PCV: conjugated pneumococcal vaccine
VSD: Vaccine Safety Datalink

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