

Does Rotavirus Vaccine Decrease Seizures in Children?

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For most clinicians, the connection between rotavirus, an intestinal pathogen, and seizures in children is counterintuitive. There is good reason to suspect a connection, but does the rotavirus vaccine have much impact on seizure rates?

Source: Pringle KD, Burke RM, Steiner CA, et al. **J Infect Dis** 2018; 217:581-8. doi: 10.1093/infdis/jix589. See **AAP Grand Rounds commentary by Dr. Rebecca Brady** (subscription required).

Before rotavirus vaccine was introduced, albeit with some hiccups related to vaccine-associated intussusception, rotavirus was the most commonly identified cause of gastroenteritis in the United States. This infection wasn't commonly appreciated to result in seizures, especially afebrile seizures, but there is a biologically plausible explanation for this. First, viremia is relatively common in rotavirus infection, and any time a pathogen makes it to the bloodstream, other organ systems can be affected. Although cases of rotavirus antigen being found in spinal fluid are rare, an enterotoxin produced by the virus likely can produce seizures.

Enter this study using an administrative database, the Agency for Healthcare Research and Quality's Healthcare Cost and Utilization Project, the same group that manages the KID database that we've discussed **recently**. I won't bother to detail again all the limitations of administrative databases; I have another point to make with this study.

First, the authors performed an excellent analysis and discussion. They found a drop in seizure-associated hospitalizations after rotavirus vaccination was introduced, compared to the period before: from 388/100,000 in the years 2000-2006 to 382/100,000 from 2008-2013 in children between the ages of 0 and 59 months, a result that reached statistical significance. The drop was primarily in ages more affected by rotavirus infections, occurred during the rotavirus season, and was more evident as vaccine coverage increased over the years, all lending support to their findings.

The finer details of their analysis, including subgroup analysis, revealed some quirks in the results. First, they did not find a drop in seizures in the 6-11 month age group, which one would thought might have been expected to benefit most from vaccine. Second, the group of infants 0 - 2 months of age did see a drop, but this is below the age range recommended to receive vaccine. Another minor point is that, unlike natural rotavirus infections that tend to alternate heavier with lighter years in terms of infection rates, the seizure decline was more uniform. I suspect a lot of these discrepancies could be explained by the shortcomings of administrative data generally.

But, let's forget these shortcomings and try to think about the bottom line. Should pediatric healthcare providers be "selling" rotavirus vaccine as protecting children from seizures? Let's assume the study findings are true. In that case and using the rates above, the seizure rate in the first 5 years of life dropped from 0.388% to 0.382%. We can easily develop a **number needed to treat** from that view: to prevent 1 additional seizure case in this population, we would need to immunize $100/(0.388-0.382)$, or about 16,700 children. That's not a great return on investment.

Don't misunderstand me, rotavirus vaccination in the US has greatly lessened illness and hospitalization for gastroenteritis in infants, well worth the economic costs. I just wouldn't sell it to parents as a big benefit in preventing seizures.

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