

Impact of vaccination on the epidemiology of varicella

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Thank you for publishing reviews of our paper (Baxter R, Tran TN, Ray P, *et al.* Impact of vaccination on the epidemiology of varicella: 1995-2009. *Pediatrics* 2014;134:24-30), and for giving us a chance to respond. We agree with all the reviewers, that our study was very reassuring, in that it did not show a trend to worsening disease in older individuals, as a result of broad immunization of younger children. We appreciate the discussion of other areas of the world which are not as well immunized as our integrated medical care organization (Kaiser Permanente) (1,2), and the finding that even lower levels of immunization have been found to provide herd immunity.

Clearly this is a potent and safe vaccine that provides individual and community benefit, and downsides to the vaccine has not been clearly demonstrated, despite concerns. In areas where vaccine has not yet been implemented, if cost is a consideration, one dose is of great benefit. After the first dose, although we found evidence of circulating virus and disease, we had almost no cases of serious (greater than 300 lesions) disease. The second dose resulted in near eradication of disease in our community, and this second dose may provide added benefit to the older group, with increased herd immunity. This may be of greater importance where there is not a strong catch-up program, as we had in our older children. For us, the high rates of coverage were due as much to the California State-mandated immunization for school age children as by our medical system.

Streng and Liese note that rates of chicken pox increased from 2003 to 2006, and hypothesize possible waning of the first dose. In the case of this live vaccine, it seems more probable to us that some recipients of the vaccine had a less potent “take” from the initial immunization, allowing mild disease to manifest (3). A second dose is less of a booster

than just giving some a second chance to mount a good response. We couldn't extrapolate waning from the small number of cases in vaccinees, all of which were mild. It seems to us that one dose provides excellent protection for the individual, but the second dose is needed for potent herd immunity. These same authors are correct that very mild cases of varicella may have escaped detection, leading to an initial overestimation of effectiveness.

While we saw a decrease in herpes zoster (HZ) in our younger population following varicella implementation, we agree with Lin *et al.*, that there remains the question of whether HZ in adults is increasing as a result of varicella immunization (4,5). Does widespread immunization of children inadvertently result in an increase in zoster in adults by decreasing immune boosting over time? There has been conflicting evidence for this (5,6). In our health plan, looking at primary hospitalization diagnosis rates for HZ, we found an age-adjusted increase from 1994 through 2006 of 2.6 to 4.6 per 100,000 members. We were not able to disentangle the results from both a large increase in elderly (and immunocompromised elderly) in the health plan, and the change to a new electronic medical records system. In addition, as others had found (7), we noted the HZ increase prior to the introduction of the varicella vaccine. More recently, we examined outpatient diagnostic codes for HZ, and found that from 2004 through 2013, there was a slight gradual increase in incidence among members 50-59 years of age, with a generally stable rate in members 60 years and older. In the older group there appeared to be a possible slight drop off starting around 2006 (internal, unpublished data). Although this was the year of licensure of Zostavax for adults, our penetration of the vaccine was quite low for the first couple of years, so we don't see how the vaccine could account for this.

So overall, there may have been an uptick in HZ after

varicella was introduced, but the pattern appeared to follow pre-vaccine trends, and by about 8 years we saw no more increase in the group at greatest risk for HZ, those over age 65. We would expect that eventually, HZ cases will decrease as unvaccinated persons die, and vaccinated individuals take their place (8). We know that HZ in vaccinated patients can and does occur, and that vaccine virus can cause HZ, but it appears to happen less frequently than with wild type virus. It should be interesting to monitor vaccinated persons over longer periods of time, to see if the risk of HZ increases greatly with age, as it does with the unvaccinated. The great increases come after age 60, so we still have a ways to go.

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Footnote

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