Reactions of Pediatricians to the Recommendation for Universal Varicella Vaccination

Robert D. Newman, MD, MPH; James A. Taylor, MD

Objectives: To determine the rate of self-reported adherence by pediatricians to the 1995 American Academy of Pediatrics and the Advisory Committee on Immunization Practices varicella immunization recommendations and to evaluate factors that might influence adherence.

Design: Mail survey.

Setting and Participants: Washington State pediatricians.

Main Outcome Measure: Logistic regression was used to identify demographic characteristics, attitudes about varicella vaccine, and previous experiences with the disease that were associated with self-reported adherence to universal varicella immunization recommendations.

Results: Completed surveys were returned by 76% of contacted pediatricians, of whom 42% reported following a policy of universal varicella immunization. In multivariate analysis, agreement with statements regarding the effectiveness of varicella vaccine in reducing rare but serious complications of the disease (odds ratio [OR], 4.90; 95% confidence interval [CI], 2.30-10.50) and in decreasing work loss by parents (OR, 4.21; 95% CI, 1.14-15.50) were associated with recommending universal immunization. Disagreement with statements concerning the lack of the need for varicella immunization because complications are rare (OR, 2.54; 95% CI, 1.12-5.74), it is not required for school entry (OR, 2.52; 95% CI, 1.37-4.64), and it is not medically cost-effective (OR, 2.25; 95% CI, 1.21-4.18) were also associated with universally recommending the vaccine. In addition, experience with varicella encephalitis was also associated with adherence to the recommendations (OR, 1.96; 95% CI, 1.06-3.65). Conversely, those who were concerned that varicella vaccine might not provide lifelong immunity were less likely to report recommending universal vaccination (OR, 0.36; 95% CI, 0.19-0.68).

Conclusions: Fewer than 50% of responding Washington State pediatricians reported recommending universal varicella vaccination. Adherence to the recommendations appears to be influenced by personal experience, perceptions about the potential seriousness of varicella, and beliefs about the societal and medical cost-effectiveness of varicella vaccine.

Arch Pediatr Adolesc Med. 1998;152:792-796

Editor’s Note: It takes a lot more than recommendations from an expert committee to influence practice. Experience with bad outcomes seems to do it, but that’s pretty drastic. Any other ideas?

Catherine D. DeAngelis, MD

On March 17, 1995, the Food and Drug Administration licensed live attenuated varicella vaccine for use in children 12 months of age and older. Both the American Academy of Pediatrics (AAP) and the Immunization Practices Advisory Committee (ACIP) of the Centers for Disease Control and Prevention have recommended universal varicella vaccination for children aged 12 months old and older who do not have a reliable history of varicella. In addition to reducing morbidity and mortality associated with varicella infection, universal varicella vaccination has been shown to be theoretically cost-effective, saving more than $5 at the societal level for each dollar spent on immunization. This finding was based in part on a 1992 survey indicating that the mean value of the parental time lost from work was $183 for each case of varicella.

However, routine immunization against varicella has not been unanimously endorsed by the medical community. Numerous editorials and letters criticizing the implementation of universal varicella immunization have been published. Of concern is the possibility that immunization of preschool-aged children may lead to varicella becoming a dis-
eas of older children and adults, with a concomitant increase in disease severity.2 Theoretical models using varying rates of vaccine efficacy, waning immunity, and immunization predict that routine vaccination will result in an age shift in varicella cases toward older individuals.2 However, these models also suggest that the overall morbidity from chickenpox will be reduced.2

Another theoretical barrier to the acceptance of the varicella vaccine has been the lack of direct medical cost savings. Varicella infection is usually a medically benign event; it has been estimated that a major complication requiring hospitalization occurs only 1.5 times per 1000 cases of chickenpox among 5- to 9-year-old children.3 Because complications are rare, the medical cost savings of a varicella immunization program are likely to be outweighed by the cost of the program itself, leading to an estimated cost of approximately $2 for every case of varicella prevented.3

Cognizant of the debate surrounding varicella immunization, the Washington State Department of Health Vaccine Advisory Committee (WVAC) reviewed the AAP's recommendation for universal varicella immunization. In 1995, a statement (L. Johnson, RN, MHA, written communication, September 1997) was sent to health care providers throughout the state that read in part:

The WVAC noted the lack of consensus with regard to the AAP and ACIP recommendation for universal varicella immunization of healthy children age 12 months to 12 years who lack a reliable history of varicella. The WVAC concluded that parents of children age 12 months to 12 years should discuss the risks of VZV [varicella zoster virus] infection and the benefits and risks of live attenuated varicella vaccine with their child's health care provider. If a decision to vaccinate is made, the vaccine should be available for these children.

PARTICIPANTS AND METHODS

A 4-page questionnaire, personalized cover letter, and a return envelope were mailed to all 574 pediatricians on the AAP Washington State Chapter mailing list. From the original list of 792 physicians, we excluded all pediatric residents and all pediatricians known to deliver only specialty care. Approximately 94% of practicing pediatricians in Washington State are members of this chapter (T. Pendergrass, MD, MSPH, AAP Washington State Chapter, written communication, December 1997). Only those pediatricians who deliver preventive (well-child) care and offer immunizations completed the survey. However, all pediatricians were asked to return the survey to accurately assess the response rate. A second mailing was sent to all nonrespondents 4 weeks after the first. The survey was divided into 3 parts. The first part primarily addressed whether the respondent was following the AAP/ACIP recommendations. The question contained structured choices ranging from recommending universal vaccination to actively discouraging the vaccine. Respondents were also offered the option selecting “other,” and writing in their own policy. The second part consisted of a series of statements, representing both potential advantages and disadvantages of the varicella vaccine. After each statement, the pediatrician was asked to indicate his or her level of agreement using a 6-point Likert scale, with possible responses ranging from “completely agree” to “completely disagree.” The final part of the questionnaire pertained to practice location and type, sources of vaccine-related information, and physician demographics.

The reliability and validity of the questionnaire were tested by administering it to 29 pediatric residents at Children's Hospital and Medical Center, Seattle, Wash. Validity was assessed by examining the internal consistency between positive responses to positively worded questions and negative responses to negatively worded questions that addressed specific subtopics of vaccine necessity, cost-effectiveness, and potential risks (weighted \( \kappa: 0.618, 0.747, 0.767 \), respectively). Therefore, the composite Likert score appeared to represent a valid assessment of physician opinion about varicella, and the questionnaire displayed good internal reliability.

For all analyses, physician varicella policy was reduced to a dichotomous variable: complete adherence to the AAP/ACIP guideline or some other policy. For univariate analysis, Likert-scale questions were reduced to a dichotomous variable: completely agree/agree vs any other response. Univariate analyses were performed using \( \chi^2 \) tests to compare proportions for categorical variables and \( t \) tests to compare means for continuous variables. Tests were considered significant when the 2-sided \( P \) value was <.05.

For multivariate analysis, Likert responses were also reduced to dichotomous variables: completely agree/agree vs any other response and completely disagree/disagree vs any other response. For each Likert statement, the stronger of these 2 predictors was included in the initial multivariate model, which was performed using logistic regression (SPSS, Version 7, SPSS, Chicago, Ill). Only those variables found to be significantly associated with adherence to AAP varicella recommendations in univariate analysis were included in the initial multivariate model. Variables viewed as surrogate outcome measures (stocking varicella vaccine, agreement with AAP/ACIP policy, and belief that varicella vaccine should be given because it is recommended by AAP/ACIP) were excluded from multivariate analysis. Variables were retained in the final model if the 95% confidence interval (CI) for the odds ratio (OR) did not include 1.

Throughout the text and in Table 1 and Table 2, we have used the word “agree” to include those responding “agree” and “completely agree,” and the word “disagree” to include those responding “disagree” or “completely disagree.”

The study was approved by the Institutional Review Board (IRB) of Children's Hospital and Medical Center.

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State funds have been made available for the provision of free varicella vaccine to all children in Washington State. However, the state system for the purchase and distribution of varicella vaccine was not in place until April 1997 (L. Johnson, RN, MHA, Immunization Program Manager, Washington State Department of Health, oral communication, December 1997).

To determine the rate of adherence to the new AAP/ACIP varicella immunization recommendations, to understand sources of concern about the vaccine, and to evaluate factors that might influence adherence to these recommendations, we undertook a statewide survey of pediatricians in Washington State.

### RESULTS

Of the initial mailing of 574 surveys, 6 were undeliverable. Surveys were returned by 434 of the remaining 568 pediatricians, for a response rate of 76%. After excluding responses from 89 physicians who indicated that they did not currently practice general pediatrics or offer preventive services, data from 345 surveys were analyzed.

Among the 345 pediatricians completing the survey, 146 (42%) reported recommending universal varicella vaccination. Of the remaining 199 (58%), 17% recommended the vaccine for susceptible adolescents but not for younger children; 14% did not routinely discuss the vaccine but believed they gave a balanced discussion if questioned; and 13% recommended the vaccine for adolescents and gave a balanced discussion for younger children. The remaining 14% of physicians had other policies.

There were few significant differences in demographic characteristics between those pediatricians who recommended universal varicella vaccination and those who did not. The mean age of all respondents was 45 years (age range, 28-74 years), and the mean number of years in practice was 15 (range, 1-45 years). Most of the pediatricians in both groups worked in either solo or group private practice (70%) in metropolitan areas (71%). The percentage of pediatricians working in neighborhood or community health centers was greater among those not following the varicella recommendations (7% vs 1%, \( P < .01 \)).

Varicella vaccine was stocked and available in 88% of the primary offices of responding pediatricians. Pediatricians in practices that stocked the vaccine were significantly more likely to recommend universal vaccination than pediatricians in practices that did not stock the vaccine (46% vs 17%, \( P < .001 \)).

Virtually every pediatrician (99%) responded that they used AAP policy statements for vaccine information. Eighty-five percent responded that they used the Red Book,13 81% indicated that they used journal articles, 62% used continuing medical education for vaccine information, and 62% relied on colleagues for this information. These percentages did not differ significantly between those who did and did not recommend universal varicella vaccination. The most commonly identified primary source for vaccine-related information was policy statements by the AAP (52%). Those citing the AAP as their primary information source were more likely than other pediatricians to recommend universal vaccination (56% vs 31%, \( P < .001 \)).

Overall, 80% of respondents had seen at least one serious complication resulting from varicella infection, including 55% who had seen pneumonia; 44%, encephalitis; and 14%, serious complications.

### Table 1. Pediatrician Responses to Likert Statements About Varicella Vaccine, by Following AAP* Recommendations

<table>
<thead>
<tr>
<th>Statement</th>
<th>All Respondents (N = 345)</th>
<th>Following Recommendations (n = 146)</th>
<th>Not Following Recommendations (n = 199)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Policy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AAP policy appropriate</td>
<td>44 (81)</td>
<td>17</td>
<td>&lt;.001</td>
<td></td>
</tr>
<tr>
<td>Should administer because recommended by AAP</td>
<td>22 (46)</td>
<td>5</td>
<td>&lt;.001</td>
<td></td>
</tr>
<tr>
<td>Little impetus to give because not required for school</td>
<td>16 (10)</td>
<td>21</td>
<td>&lt;.01</td>
<td></td>
</tr>
<tr>
<td>Serious complications rare, so need is less</td>
<td>33 (13)</td>
<td>48</td>
<td>&lt;.001</td>
<td></td>
</tr>
<tr>
<td>Financial</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Varicella vaccine not medically cost-effective</td>
<td>17 (7)</td>
<td>25</td>
<td>&lt;.001</td>
<td></td>
</tr>
<tr>
<td>Parents may have to pay out of pocket</td>
<td>60 (56)</td>
<td>63</td>
<td>.18</td>
<td></td>
</tr>
<tr>
<td>Administration mechanics</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Handling cumbersome, costly to store</td>
<td>41 (37)</td>
<td>45</td>
<td>.12</td>
<td></td>
</tr>
<tr>
<td>Difficult to know which adolescents to immunize</td>
<td>33 (33)</td>
<td>32</td>
<td>.89</td>
<td></td>
</tr>
<tr>
<td>Potential benefits</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Will reduce rare but serious varicella complications</td>
<td>66 (89)</td>
<td>50</td>
<td>&lt;.001</td>
<td></td>
</tr>
<tr>
<td>Will reduce varicella infection discomfort</td>
<td>75 (90)</td>
<td>64</td>
<td>&lt;.001</td>
<td></td>
</tr>
<tr>
<td>Parents lose less time at work</td>
<td>85 (97)</td>
<td>76</td>
<td>&lt;.001</td>
<td></td>
</tr>
<tr>
<td>Will help to prevent congenital varicella</td>
<td>41 (55)</td>
<td>30</td>
<td>&lt;.001</td>
<td></td>
</tr>
<tr>
<td>Potential risks</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>May adversely affect other vaccination rates</td>
<td>11 (6)</td>
<td>15</td>
<td>&lt;.05</td>
<td></td>
</tr>
<tr>
<td>May be serious unknown side effects from vaccine</td>
<td>7 (4)</td>
<td>10</td>
<td>&lt;.05</td>
<td></td>
</tr>
<tr>
<td>Fewer natural infections, leading to larger pool of susceptible adults</td>
<td>44 (39)</td>
<td>48</td>
<td>.12</td>
<td></td>
</tr>
<tr>
<td>Vaccine immunity may not be lifelong</td>
<td>41 (19)</td>
<td>57</td>
<td>&lt;.001</td>
<td></td>
</tr>
</tbody>
</table>

* AAP indicates American Academy of Pediatrics.
litis; 38%, necrotizing fasciitis; and 19%, death. Sixty-one percent of pediatricians who had seen a death from varicella recommended universal immunization compared with 38% of those who had not (P < .01). Similarly, among those who reported experience with varicella encephalitis, 49% were following the recommendations, while among those who had not the rate was 35% (P < .01). There were no significant differences in following the recommendations among those who had experience with either pneumonia or necrotizing fasciitis secondary to varicella.

While 44% of responding pediatricians agreed with the statement that the AAP/ACIP policy on universal varicella vaccination was warranted, only 22% agreed that pediatricians should administer the vaccine because it is recommended by the AAP/ACIP. More than half of pediatricians agreed that varicella vaccine would significantly reduce the incidence of serious varicella complications (66%), the discomfort of varicella (75%), and parental time lost from work (85%).

The proportion of pediatricians who agreed or completely agreed with statements on the questionnaire regarding attitudes about varicella vaccine are shown in Table 1. With the exception of 4 statements, agreement with all positively worded statements and disagreement with all negatively worded statements were significantly associated with reported varicella immunization practices of respondents.

In multivariate analysis, 7 factors were significantly associated with following the AAP/ACIP varicella recommendations (Table 2). Agreement with statements regarding the effectiveness of the vaccine in reducing rare but serious complications of the disease and in decreasing time lost at work by parents was associated with recommending universal immunization associated with adherence to the recommendation. Disagreement with statements concerning the lack of the need for varicella immunization because complications are rare, because it is not required for school entry, and because it is not medically cost-effective was also associated with universally recommending the vaccine. In addition, experience with varicella encephalitis was also associated with adherence to the recommendation. Conversely, those who were concerned that varicella vaccine might not provide lifelong immunity were less likely to report recommending universal vaccination.

The results of this study indicate that fewer than 50% of Washington State pediatricians report following the AAP/ACIP guideline recommending universal varicella immunization. There were no differences in reported adherence to universal immunization recommendations based on sex, age, practice location, or number of years in practice. Instead, following the varicella immunization recommendations was positively associated with personal experience (having seen varicella encephalitis), concern over the potential seriousness of varicella complications, and a belief that varicella vaccine was a medically and societally cost-effective intervention. Conversely, those who were concerned that varicella immunity might not be lifelong were less likely to report universally recommending varicella vaccine for their patients.

While these results demonstrate that many pediatricians are concerned about the potential for adverse consequences of natural varicella infection, and that these concerns are strongly associated with their reported immunization practices, they also demonstrate that approximately half of those pediatricians not following the recommendations view varicella as a benign illness for which there is little impetus to give a vaccine. Coupled with the concern expressed by nearly 60% of those not following the recommendations that immunity may not be lifelong, it is clear that a large number of practicing pediatricians have important reservations about the necessity for and long-term utility of varicella vaccine.

Our results are in contrast to the experience with licensure of a vaccine to prevent *Haemophilus influenzae* type b infections. In one study, 6 to 8 months following the introduction of the *H influenzae* type b vaccine, 86% of pediatricians in New Mexico reported using the vaccine.12 In the case of *H influenzae* type b, the undisputed severity of the disease appears to have led to a very rapid incorporation of a new vaccine into practice patterns.

Universal varicella immunization coverage appears a long way from reality, at least in Washington State. However, the failure of varicella vaccine to be immediately embraced by the pediatric community is not unique to this vaccine. Several months after the Centers for Disease Control and Prevention recommended that all children and adolescents be immunized against hepatitis B, a study in North Carolina demonstrated that only 32% of pediatricians felt that the policy was warranted in their practices.13 However, a follow-up study 8 months later demonstrated that the belief that hepatitis B immunization was warranted had risen to 66%, although only 53% had adopted it into practice.14 Over time, hepatitis B immunization rates have risen significantly; by 1996, it was estimated that 82% of children 19 to 35 months of age had received all 3 doses of hepatitis B vaccine.15 In the case of the varicella vaccine, however, the consequences of failure to achieve universal coverage in a timely
fashion may be more serious. Unlike hepatitis B, varicella has historically established a natural cycle of infection, during which the majority of individuals became exposed and infected during childhood. The varicella vaccine has the potential to interrupt this natural cycle, as there will be fewer susceptible children capable of becoming infected. Therefore, unvaccinated children may have a reduced chance of childhood infection, and consequently a greater chance of entering adolescence or adulthood without varicella immunity.

In a recent editorial discussing the varicella vaccine, Shapiro and LaRussa suggest that waiting until adolescence to vaccinate children is likely to result in decreased coverage levels, since previous work has demonstrated the difficulty in immunizing this group. In a similar vein, Johnson et al., reporting on long-term follow-up of varicella vaccine recipients, suggest that the public sector campaign to immunize the poor and uninsured is particularly crucial as this population is at the greatest risk of not being immunized and of therefore entering adulthood susceptible to varicella. Since it is unlikely that information campaigns will convince those pediatricians who view varicella as a benign illness that they should be universally immunizing children, it seems that future campaigns should focus on both the proven efficacy of varicella vaccine to date and the public health message that anything short of universal vaccination may have profoundly negative consequences for unvaccinated children.

Our study has several limitations. First, our survey was limited to Washington State and may not be generalizable to states with different patient populations. Second, we only surveyed pediatricians in the Washington Chapter of the AAP and were, therefore, unable to elicit the opinions of those who may be even more removed from current vaccine recommendations. However, the high percentage of pediatricians in the state who are members of the Washington State Chapter of the AAP (94%) and our high response rate (76%) suggest that similar concerns about the varicella vaccine might exist in other parts of the country. Finally, our multivariate analysis, while evidence that certain factors are associated with recommendation of universal varicella vaccination, cannot be seen as a model for predicting compliance. Only if the study were now reproduced in a different population of pediatricians, and confirmed with actual varicella immunization rates, could these factors be seen as predictors.

In summary, these data suggest that immunization against varicella remains far from universal in Washington State. These results demonstrate the need for adequately communicating to all pediatricians not only the safety and efficacy of the varicella vaccine but also the public health importance of universal varicella vaccination. The failure of varicella vaccine to be quickly embraced by pediatricians suggests the need to address concerns of primary care physicians prior to the future recommendation of potentially controversial vaccines.

Accepted for publication March 17, 1998.

This work was funded by an Immunization Special Projects Award from the Ambulatory Pediatric Association, McLean, Va, and in part by National Research Service Award 5-T32-P01002 from the National Institutes of Health, Bethesda, Md, to the University of Washington School of Medicine.

The authors thank Bi-Lan Chiong and Kathryn Henne for their assistance with mailings and David Shay, MD, MPH, for reviewing the manuscript. The authors also thank the pediatricians in the Puget Sound Pediatric Research Network, Seattle and Edmonds, Wash, for their help with the questionnaire.

Corresponding author: Robert D. Newman, MD, Health Alliance International, University of Washington, Box 354809, Seattle, WA 98195-6320 (e-mail: rnewman@u.washington.edu).

REFERENCES