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Oregon School/Facility Immunization Advisory Committee:

Review of Second Dose Varicella Vaccine Against Twelve Criteria for School Immunization Requirements

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Process for Reviewing Antigens for Potential Inclusion in OAR 333-050-0050, 333-050-0130 and 333-050-0140.

Request for the inclusion of additional antigens or vaccines can come from the Oregon Immunization Program, IPAT (Immunization Policy Advisory Team), or from the community. Proposed changes to vaccine requirements are discussed with IPAT either in a regularly scheduled meeting or through electronic communication. IPAT will submit their comments and a request for consideration to the Oregon Immunization School Law Advisory Committee.

The Oregon School/Facility Immunization Advisory Committee was established as a part of the school law immunization requirements when the original legislation was passed in 1980. This Committee is composed of immunization stakeholders from the fields of public health, school health, school administration, medicine, day care, child advocacy and consumers (parents). Through consensus, the committee determines what vaccines (antigens) should be included in Oregon school immunization requirements.

Information about new vaccines and the diseases they prevent, including transmission within schools, burden of disease, cost-effectiveness, effect on schools/counties and vaccine availability is presented at a scheduled meeting for committee consideration. The following criteria are an integral part of the discussion and the decision-making process. All 12 criteria must be considered. Members of the Committee are expected to rely on their professional and scientific judgment as well as available data when applying the criteria.

The Committee's recommendation is then submitted to the Oregon Immunization Program for consideration and possible action.

The 12 Criteria to Consider in Evaluating Antigens

The following information is being presented for Committee consideration.
Consideration: Adding a second dose of varicella vaccine to the requirements for school attendance.

1. **The vaccine is recommended by ACIP (Advisory Committee on Immunization Practices) and included on its recommended childhood and adolescent immunization schedule**.

   Two doses of varicella vaccine are recommended for children without a history of chickenpox disease. The first dose is recommended at 12-18 months of age. The second dose is recommended at 4-6 years of age, and can be given as soon as 3 months after the first dose for children 1-12 years of age. For children 13 years of age and older, the second dose can be given 4 weeks after the first dose.

   CDC. Recommended Immunization Schedules for Persons Aged 0 Through 18 Years — United States, 2010. *MMWR*. January 8, 2010: 58(51&52);1-4.
   Available at: http://www.cdc.gov/mmwr/PDF/wk/mm5851-Immunization.pdf

2. **The vaccine prevents disease with a significant morbidity and mortality in at least some subset of the Oregon's population.**

   Before the introduction of varicella vaccine in the U.S. in 1995, chickenpox disease was contracted by almost all individuals, usually during childhood. Chickenpox is not a nationally reportable disease.

   From:
   CDC. Prevention of Varicella: Recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR*. June 22, 2007. 56(RR04);1-40 (page 22) (available at http://www.cdc.gov/mmwr/pdf/rr/rr5604.pdf)

   > "Prelicensure and postlicensure studies have demonstrated that 1 dose of single-antigen varicella vaccine is approximately 85% effective in preventing varicella. Breakthrough varicella disease that occurs after vaccination frequently is mild and modified. Varicella vaccine is >95% effective in preventing severe varicella disease."

   From:
   CDC. *Epidemiology and Prevention of Vaccine-Preventable Diseases*, 11th Edition, pages 289-292 (available at http://www.cdc.gov/vaccines/Pubs/pinkbook/downloads/varicella.pdf)

   > "Despite high one-dose vaccination coverage and success of the vaccination program in reducing varicella morbidity and mortality, varicella surveillance indicates that the number of reported varicella cases appears to have plateaued. An increasing proportion of cases

represent breakthrough infection (chickenpox occurring in a previously vaccinated person). In 2001–2005, outbreaks were reported in schools with high varicella vaccination coverage (96%–100%). These outbreaks had many similarities: all occurred in elementary schools; vaccine effectiveness was within the expected range (72%–85%); the highest attack rates occurred among the younger students; each outbreak lasted about 2 months; and persons with breakthrough infection transmitted the virus although the breakthrough disease was mild. Overall attack rates among vaccinated children were 11%–17%, with attack rates in some classrooms as high as 40%. These data indicate that even in settings where almost everyone was vaccinated and vaccine performed as expected, varicella outbreaks could not be prevented with the current one-dose vaccination policy. These observations led to the recommendation in 2006 for a second routine dose of varicella vaccine."

From:
CDC. Prevention of Varicella: Recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR*. June 22, 2007. 56(RR04);1-40 (page 22) (available at http://www.cdc.gov/mmwr/pdf/rr/rr5604.pdf)

"The rationale for the second dose of varicella vaccine for children is to further decrease varicella disease and its complications in the United States. Despite the successes of the 1-dose vaccination program in children, vaccine effectiveness of 85% has not been sufficient to prevent varicella outbreaks, which, although less than in the prevaccine era, have continued to occur in highly vaccinated school populations. Breakthrough varicella is contagious. Studies of the immune response after 1 and 2 doses of varicella vaccine demonstrate a greater-than-tenfold boost in GMTs when measured 6 weeks after the second varicella vaccine dose… The second dose of varicella vaccine is expected to provide improved protection to the 15%–20% of children who do not respond adequately to the first dose… The risk for breakthrough disease was 3.3-fold lower among children who received 2 doses than it was among children who received 1 dose. How this increase in vaccine efficacy (typically higher than observed under field conditions) will translate into vaccine effectiveness under conditions of community use will be an important area of study."

Oregon made one dose of varicella vaccine mandatory for school entrance in 2000. One dose of varicella vaccine is currently required for all children 18 months and older without history of chickenpox disease in children's facilities and schools in Oregon; two doses are required if the first dose was received at or after 13 years of age.

3. **The vaccine (antigen) is cost-effective from a societal perspective in Oregon.**

From:
CDC. Prevention of Varicella, Recommendations of the Advisory Committee. *Morb Mortal Wkly Rpt.* June 22, 2007 (Available at http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5604a1.htm):

"A recent analysis was performed that used current estimates of morbidity and mortality … and current direct and indirect costs... The model considered that the second dose will reduce varicella disease residual after the first dose by 79%. From a societal perspective,

both 1-dose and 2-dose vaccination programs are cost saving compared with no program. The vaccine program cost was estimated at $320 million for 1 dose and $538 million for 2 doses. The savings from varicella disease prevented were estimated at approximately $1.3 billion for the 1-dose program and approximately $1.4 billion for the 2-dose program. Compared with the 1-dose program, the incremental cost for the second dose was estimated to be $96,000 per quality-adjusted life year (QALY) saved. If benefits from preventing group A streptococcus infections and HZ [herpes zoster] among vaccinated persons are added, incremental costs per QALY saved are $91,000 and $17,000, respectively. Because of the uncertainty of the modeled predictions of an increase in HZ among persons with a history of varicella and the fact that no consistent trends demonstrate an increase in HZ attributable to the varicella vaccination program in the United States, HZ among persons with a history of varicella was not included in the model."

Most of the cost-effectiveness of vaccination with varicella vaccine is with the first dose, and it is unclear that requiring a second dose will achieve substantial additional benefit from a cost-effectiveness perspective.

4. The vaccine (antigen) has been used in the general population to demonstrate reduction in disease activity with similar level of effectiveness to that demonstrated prior to FDA approval.

From:
CDC. *Epidemiology and Prevention of Vaccine-Preventable Diseases*, 11th Edition, pages 291-292 (available at http://www.cdc.gov/vaccines/Pubs/pinkbook/downloads/varicella.pdf):

"After one dose of single-antigen varicella vaccine, 97% of children 12 months to 12 years of age develop detectable antibody titers. More than 90% of vaccine responders maintain antibody for at least 6 years. In Japanese studies, 97% of children had antibody 7 to 10 years after vaccination. Vaccine efficacy is estimated to be 70% to 90% against infection, and 90% to 100% against moderate or severe disease.

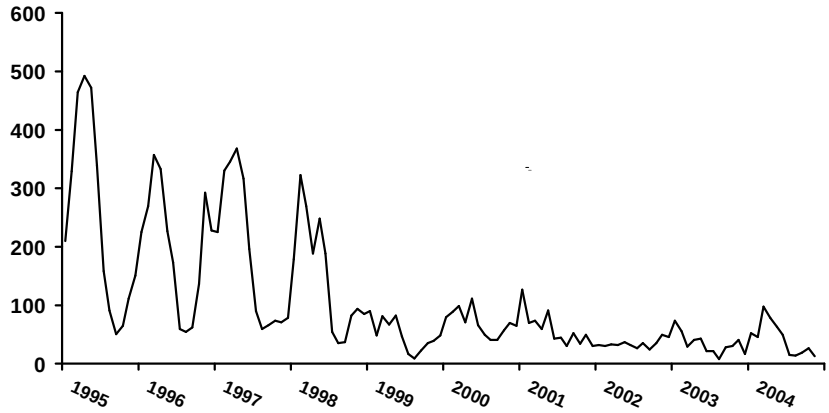
"Among healthy adolescents and adults 13 years of age and older, an average of 78% develop antibody after one dose, and 99% develop antibody after a second dose given 4 to 8 weeks later. Antibody persisted for at least 1 year in 97% of vaccinees after the second dose given 4 to 8 weeks after the first dose.

"Immunity appears to be long-lasting, and is probably permanent in the majority of vaccinees. Breakthrough infection is significantly milder, with fewer lesions (generally fewer than 50) …

"Although findings of some studies have suggested otherwise, most investigations have not identified time since vaccination as a risk factor for breakthrough varicella."

From:
CDC. *Epidemiology and Prevention of Vaccine-Preventable Diseases*, 11th Edition, pages 289 (available at http://www.cdc.gov/vaccines/Pubs/pinkbook/downloads/varicella.pdf)

Varicella Cases by Month -- Antelope Valley, CA, 1995–2004



5. The vaccine is necessary to prevent diseases known to be spread in schools or facilities, and will increase safety in the school/facility environment.

A study conducted by Lee et. al, with Multnomah County Education Service District among public elementary schools, 2002-2007, reported, "Breakthrough varicella rates among exposed students ranged from 6% to 8% per school year; annual incidence rates ranged from 0.2% to 0.3% of public elementary school students; and varicella was more severe and lasted longer in susceptible than in vaccinated students… Vaccine effectiveness was 81%." This was during the phase-in time period for varicella, so some students at the schools were required to have one dose of varicella vaccine, and other students were not required to have this vaccine yet.

Varicella is a disease that is easily transmissible in the school setting. It is not unusual for students infected with chickenpox to miss up to 7-10 days of school, which can impact the continuity of the student's education. Additionally, many schools serve children and adults that are immunosuppressed due to cancer treatment or chronic health conditions, and transmission of varicella disease to these individuals can cause serious harm.

Lee, LE, Ho, H, Lorber, E, Fratto, J, Perkins, S., Cieslak, P: Vaccine-Era Varicella Epidemiology and Vaccine Effectiveness in a Public Elementary School Population, 2002-2007. *Pediatrics* 2008:121;e1548-

e1554. (Available at http://pediatrics.aappublications.org/cgi/reprint/121/6/e1548?maxtoshow=&hits=60&RESULTFORMAT=1&andorexacttitle=and&andorexacttitleabs=and&andorexactfulltext=and&searchid=1&FIRSTINDEX=0&sortspec=relevance&volume=121&resourcetype=HWCIT).

6. Requiring the vaccine for school law will make a significant difference in vaccine coverage in the preschool/school/college populations and vaccinating the infant, child, adolescent or young adult against this disease reduces the risk of person-to-person transmission.

From Sentinel data, for 5 to 10 year old children, 90% (89.9%) had one or more varicella immunization. Of these, 39% (38.6%) had only one varicella immunization, and 61% (61.4%) had two or more.

The Sentinel data used here represent 100,297 children age 5 years through 10 years, (as of 12/31/09), living in Multnomah and Washington Counties who have at least two shots reported to the ALERT Immunization Information System. The uptake reflected here is a significant improvement from the last few years. Adding the 2nd dose vaccine requirement would improve the number of children having two doses of varicella.

In served by Multnomah Education Service District, 88% of kindergartners have two documented doses of varicella vaccine in their record.

4th Quarter Sentinel Report, 2009. Oregon Immunization Program
Multnomah Education Service District, 2010

7. The vaccine is acceptable to the Oregon medical community and the general public.

It would appear from the above data, the second dose of varicella is generally acceptable to the public and being administered by the medical community.

8. Ensure that sufficient funding is available on a state level to purchase vaccines for children who would need to meet the new law requirements.

A vaccine cannot be added to school law requirements unless it is assured that every child has access to the vaccine and that it is affordable. If the cost of the vaccine exceeds the funding available through federal programs, it will be necessary for the state to set aside funds to purchase the proposed required vaccine. Based on projections developed during the spring of 2009 for SJR1 legislation, the biennial costs for providing second dose varicella would be $853,442. These figures were calculated

based on 2008 Quarter 2 Sentinel data of two dose varicella vaccine uptake of 28% for children 5 – 18 years of age. However, second dose uptake for children 5 – 10 years of age is currently at 61% (2009 Quarter 4 Sentinel data). These numbers reflect children who would have entered kindergarten at or after the new two dose recommendation came out from CDC. If the second dose requirement were to be started within the age range of 5 – 10 years, and considering the higher uptake of vaccine, the estimated state cost would be $426,721 for the biennium.

4th Quarter Sentinel Report, 2009. Oregon Immunization Program
2nd Quarter Sentinel Report, 2008. Oregon Immunization Program
Cost estimate to state general fund prepared by the Oregon Immunization Program in response to Senate Joint Resolution 1, Legislative Session 2009

9. There is a stable and adequate supply of vaccine.

Due to manufacturing problems, ProQuad, the measles/mumps/rubella/varicella combination vaccine, is currently unavailable. Production of Varivax (single antigen varicella vaccine) has been prioritized over ProQuad, and supplies of Varivax are currently sufficient to meet the two dose recommendation for varicella vaccine.

10. The administrative burdens of delivery and tracking of vaccine and Oregon school/facility rule implementation is reasonable in light of any other vaccines currently being phased in to law.

Whenever new immunization requirements are added, schools have to contact more families about needed vaccines and spend time educating parents. Computer software upgrades must be made and paid for, and in turn must be approved by the state. Computer programs are currently designed to accept two doses of varicella vaccine, so programming changes would be less extensive than with other vaccines, and potentially the impact of adding a second varicella would not be as financially significant as with previous new requirements. Since the recommendation for a second dose of varicella was implemented in 2006, some schools have been entering dates of second doses when parents or health care providers have provided the information, or when records are accessed through ALERT. Therefore, the number of exclusion orders for second doses of varicella will most likely not be as great a burden as with previous new requirements. Still, local health departments have to prepare and mail more exclusion orders, provide more community clinics and communicate with local providers and parents about the new rule changes to ensure that children will not be excluded from school. Health plans need to cover the costs of the vaccines when feasible to improve access. Oregon law prohibits local health departments from charging an administrative fee if parents are financially unable to pay, and this has a financial impact on the counties. Adding more vaccines when still phasing in other vaccines complicates the

entire process that can then lead to errors, confusion, and frustration that can potentially overwhelm the partners in the process which may weaken the effectiveness of school law enforcement. Having two different phase-in schedules with new requirements being introduced at different times is very confusing for school staff and parents in understanding which vaccines are required for different grades.

11. The burden of compliance for the vaccine is reasonable for the parent/caregiver.

A second dose of varicella could be administered with other vaccines required for kindergarten, or with the Tdap vaccine required for 7th grade. Adding a requirement at other grades would require one additional visit to the doctor's office for the vaccine.

12. The vaccine is included in Oregon ALERT IIS for tracking and reporting purposes.

Any doses of varicella vaccine reported to the registry are documented in ALERT. A second dose of varicella is forecasted through 18 years of age.