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1066. Trends in the Burden and Seasonality of Rotavirus in the United States, 2000–2016

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Session: 140. Assorted Pediatric Vaccines
Friday, October 6, 2017: 12:30 PM

Background. Before implementation of rotavirus vaccination in 2006, rotavirus caused 55,000-70,000 hospitalizations and 410,000 clinic visits annually in US children. This report examines the long-term impact of vaccine introduction on rotavirus detection and seasonality through comparison of pre (2000–2006) and post (2007–2016) vaccine seasons through the National Respiratory and Enteric Virus Surveillance System (NREVSS).

Methods. NREVSS is a passive laboratory system collecting results of weekly total and rotavirus-positive stool specimens. Seasons are defined as July through June. To characterize changes in rotavirus detection, total and positive specimens for each post vaccine season from 11 continuously reporting (≥26 weeks per season) laboratories were compared with median values for 2000–2006. Data from 20 participating laboratories were used to determine changes in season characteristics. ArcGIS software was used to document the annual geographic trend across the United States between 2000 and 2015. For season 2015–2016, data are available through April and are not included in the ArcGIS analysis.

Results. Nationally, there was a 53–93% reduction in rotavirus positivity in the post vaccine period as compared with the median in 2000–2006. Trends in rotavirus positivity declined steeply after vaccine introduction in 2006, and have remained low compared with the pre-vaccine period, with alternating years of lower and greater activity (figure). All regions had similar reductions in positive tests. ArcGIS data indicate that peak seasonal activity was largely restricted to January-April for each pre-vaccine year. In the 2006–2007 season, peak activity occurred during January-April, for 2007–2008, this shifted to March-April, for 2008–2009, the peak activity nationwide occurred at all months of the year from the reporting laboratories. This diffuse activity occurred for all subsequent years, save 2009–2010 and 2012–2013, where peak seasonal activity was again confined to January-April.

Conclusion. Rotavirus vaccine substantially and sustainably reduced the burden and changed the epidemiology of rotavirus in US children. The biennial pattern observed may be explained by accumulating unvaccinated children over two successive seasons resulting in stronger rotavirus seasons every alternate year.

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1067. Differential Gene Expression Elicited by Children in Response to the 2015–2016 Live Attenuated vs. Inactivated Influenza Vaccine

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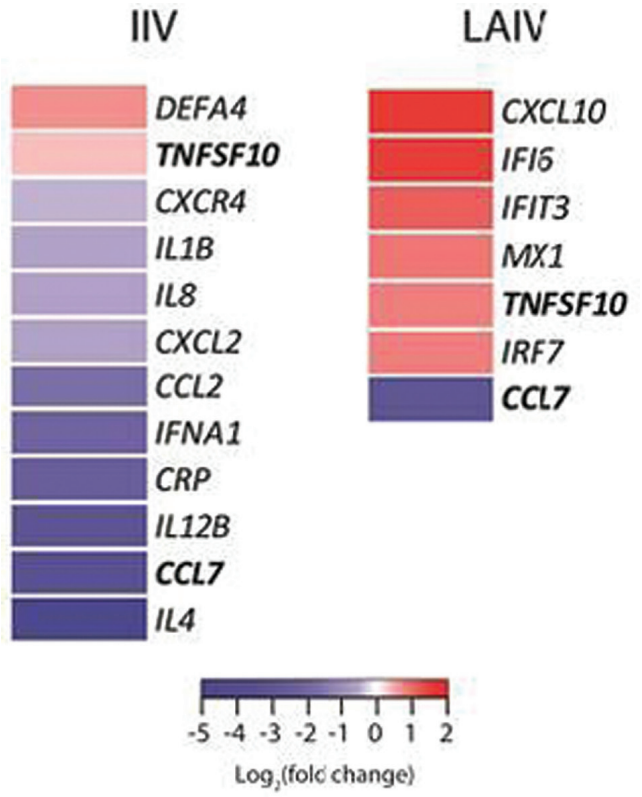
Session: 140. Assorted Pediatric Vaccines
Friday, October 6, 2017: 12:30 PM

Background. In recent influenza seasons, the live attenuated influenza vaccine (LAIV) has not demonstrated the same level of vaccine effectiveness as that observed among children who received the inactivated influenza vaccine (IIV). To better understand this difference, this study compared the mRNA sequencing transcription profile (RNA seq) in children who received either IIV or LAIV.

Methods. Children 3–17 years of age receiving quadrivalent influenza vaccine were enrolled. Blood samples were collected on Day 0 prior to vaccination and again on Day 7 (range 6–10 days) following vaccination. Total RNA was isolated from PAXgene tubes and sequenced for a custom panel of 89 transcripts using the TruSeq Targeted RNA Expression method. Fold differences in normalized RNA seq counts from Day 0 to Day 7 were calculated, $\log_2$ transformed and compared between the two vaccine groups.

Results. Of 73 children, 47 received IIV and 26 received LAIV. Following IIV vaccination, 12 genes demonstrated significant differential expression at Day 7. In contrast, following LAIV vaccination, seven genes demonstrated significant differential expression at Day 7, five of which were not differentially expressed by IIV. Two genes demonstrated similar patterns of regulation in both IIV and LAIV recipients.

Conclusion. Differential regulation of genes was observed between 2015 and 2016 LAIV and IIV recipients. These results help to elucidate the immune response to influenza vaccines and might help explain the difference in vaccine effectiveness observed in recent years between LAIV and IIV.



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1068. Varicella Vaccination Coverage among Adolescents Ages 13–17 Years, United States, National Immunization Survey, 2007–2014

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Session: 140. Assorted Pediatric Vaccines
Friday, October 6, 2017: 12:30 PM

Background. Varicella is typically a self-limiting disease but it can be more severe in adolescents and adults. In 2007, 2-doses of varicella vaccine were routinely recommended for children, with a catch-up second dose for persons who received 1 prior dose.

Methods. We used 2007–2014 NIS-Teen data to examine trends in ≥2 dose varicella vaccination coverage and proportions of adolescents with/without evidence of immunity to varicella. Evidence of immunity included receipt of ≥2 doses of varicella vaccine or varicella disease history. Additionally, using 2014 data, we assessed characteristics of ≥2 dose varicella vaccination coverage: 1) factors associated with ≥2 dose vaccination, 2) timing of receipt of second dose and 3) missed opportunities for second dose vaccination among adolescents who had received 1 prior dose of varicella vaccine.

Results. During 2007–2014, the proportion of adolescents with ≥2 doses of varicella vaccine increased from 8.3% to 66.9% in 13–15 year olds, and from 3.6% to 56.7% in 16–17 year olds. The proportion of adolescents with evidence of varicella immunity also increased for both age groups, from 68.0% to 84.1% in 13–15 year olds and from 78.6% to 83.4% in 16–17 year olds. Among adolescents who received ≥2 doses of varicella vaccine by 2014, a higher proportion of 13–15 year olds received their second dose at 4–6 years compared with 16–17 year olds (13.4% vs. 3.2%). Factors significantly associated with lower ≥2 dose coverage included non-Hispanic White race/ethnicity; rural residence; living at >133% of the income-to-poverty ratio; no 11- to 12-year well-child visit; not receiving an adolescent vaccine; and residence in a state with no 2-dose immunization school entry requirement. Among the 2,478 adolescents who received only 1-dose of varicella vaccine, 77.1% (1,922) had at least 1 missed opportunity to receive their second dose; potentially 2-dose coverage could have increased from 79.5% to 94.8%.

Conclusion. The ≥2-dose varicella vaccination coverage and the proportion of adolescents with evidence of immunity to varicella increased during 2007 to 2014, though 16% lacked evidence of immunity in 2014. Though catch-up campaigns

have succeeded, decreasing missed vaccination opportunities will help with further improvement.

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1069. Human Papillomavirus (HPV) Knowledge, Vaccine Acceptability and Acceptability of Text Message Reminders for Vaccine Doses in Adolescents Presenting to an Urban Emergency Department (ED)

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Session: 140. Assorted Pediatric Vaccines
Friday, October 6, 2017: 12:30 PM

Background. HPV vaccination has been shown to reduce the incidence of high grade cervical abnormalities in girls under 18 years old and the incidence of genital warts in young men and women under 21 years old. HPV vaccine uptake in the US is low. The 2012 National Immunization Survey–Teen indicated that of girls and boys aged 13–17 years, 33.4% and 6.8% respectively had completed the three dose HPV vaccine. It has been suggested that opportunities for HPV vaccination in less traditional health care settings and using reminder and recall systems may improve HPV vaccine uptake.

Methods. Adolescents aged 13–18 years old were recruited prospectively from two pediatric EDs in New York City. Recruited patients took part in a researcher-administered questionnaire based on the validated Carolina HPV Attitudes and Beliefs Scale. Demographic information was also collected. Patients were recruited between 8 am and 8 pm and approached consecutively within 4-hour time blocks. Standard descriptive statistics were used to summarize response data.

Results. Between September 21, 2016 and May 31, 2017, 117 adolescents were interviewed (70 females, 47 males). 76 (65%) had never had their parent or anyone else talk to them about the HPV vaccine. 71 (61%) of adolescents knew the HPV vaccine was not for girls only. 83 (71%) thought that the HPV vaccine was safe. Only 10 (8.5%) of participants thought they were too young to get the vaccine. 35 (30%) answered "yes" when asked if they had ever had sex but only 14 (12%) thought that the HPV vaccine was only for people who are sexually active. 83 (71%) of adolescents would agree, if their parent agreed, to have the HPV vaccine in the ED on the day they were interviewed. 104 (89%) of interviewed adolescents had a mobile phone and 88 (75%) stated they would have no problem with receiving a text message reminder for a vaccine shot.

Conclusion. Adolescents find it acceptable to receive HPV vaccination in these EDs and text message reminders for subsequent vaccine doses. Exploration of initial HPV vaccination of unvaccinated adolescents in the ED, with follow up doses in more traditional clinic settings aided by text message reminders warrants further investigation. Though a challenging care environment, the ED should not be ignored as a potential site for public health interventions such as HPV vaccination in adolescents.

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1070. Perception of Japanese Physicians about Human Papillomavirus Vaccine

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Session: 140. Assorted Pediatric Vaccines
Friday, October 6, 2017: 12:30 PM

Background. Current vaccination coverage of Human Papillomavirus vaccine (HPVV) in Japan is less than 1% because the Ministry of Health, Labour and Welfare (MHLW) suspended its proactive recommendations for HPVV in 2013 after some reports of possible adverse events following immunization. We evaluated the perception of Japanese physicians about HPVV in order to consider the appropriate countermeasure to improve HPVV coverage in Japan.

Methods. We conducted a cross-sectional study using a postal questionnaire targeting 330 Japanese physicians (78 pediatricians, 225 internists and 27 obstetricians-gynecologists (OB-GYNs)) in Kawasaki, Japan in 2016. The questionnaire comprised questions about education frequency, physicians' perception and recommendation behavior related to adolescent vaccines (HPVV, diphtheria tetanus toxoid (DT) and inactivated influenza vaccine (IIV)).

Results. Valid responses were obtained from 148 (44.9%) physicians (pediatricians 80.8%, internists 31.6% and OB-GYNs 51.9%). Very few (8.0%) of physicians provided HPVV during the past month. Only 21.3% of physicians educated aggressively about HPVV, which was significantly less frequently than DT (61.7%) and IIV (88.6%). Similarly, 53.1% of physicians recommended HPVV aggressively, which was significantly less frequently than DT (83.1%) and IIV (80.3%). We found no significant differences in the frequency of HPVV education or recommendation by pediatricians, internists and OB/GYNs (22.4% vs. 16.9% vs. 35.7% and 54.8% vs. 47.9% vs. 71.5%, respectively). However, 90.0% of physicians answered that if MHLW were to reinstate its HPVV recommendation, they would more aggressively recommend HPVV for adolescents.

Conclusion. Although Japanese physicians were cautious about HPVV and infrequently provided education or made a recommendation for HPVV compared with other adolescent vaccines, our survey suggested such a passive attitude could be improved by the MHLW resuming its proactive recommendation in Japan.

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1071. Indications for Antibiotic Orders: How Accurate Are They?

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Session: 141. Clinical Practice Issues
Friday, October 6, 2017: 12:30 PM

Background. Documentation of antibiotic indications at the time of ordering can provide helpful information for antimicrobial stewardship programs to track antibiotic utilization patterns and improve antibiotic prescribing. Yet accuracy of indications is not fully understood; antibiotics are often ordered empirically without a clear-cut indication, and orders are not often updated once a diagnosis has been made, or the first listed option may be chosen for convenience. As hospitals are implementing antibiotic indications at the time of order entry to meet stewardship standards, our study sought to assess the accuracy of indications in an antibiotic order compared with true indication for the drug.

Methods. Indications for antibiotics, selected from a standardized list, are a required field in the computerized order entry system at our institution. Study investigators, including at least one infectious diseases attending, performed an in-depth post-hoc review to assess antibiotic indication and appropriateness. The frequency that the true antibiotic indication, as assessed by study investigators, matched with the indication in the antibiotic order was analyzed.

Results. Of 396 antibiotic orders reviewed by the study team, 100 had discordant indications between what was written in the order and the investigator-assessed indication (25.3%). The highest rates of discordance were seen with GU-UTI (11/18 incorrect, 61.1%) followed by bacteremia/sepsis (44 of the 116 incorrect, 37.9%). For GU-UTI, the most common investigator assessed true indications were pulmonary including CAP, HAP and empyema. For bacteremia/sepsis, the discordance was often due to a more specific diagnosis or source being identified.

Conclusion. Discordant indications between what was entered at the time of initial order compared with an investigator assessed indication occurred frequently. This finding is of concern as evaluations of antibiotic appropriateness, utilization and benchmarking by the antimicrobial stewardship team rely on the accuracy of indications in the system. Entering a revised indication during an antibiotic time out could improve the accuracy of antibiotic indications and antimicrobial stewardship data.

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1072. Fixed vs. Free-text Documentation of Indication for Antibiotic Orders

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Session: 141. Clinical Practice Issues
Friday, October 6, 2017: 12:30 PM

Background. Requiring indications for antimicrobial orders can allow stewardship programs to evaluate adherence to guidelines and assess outcomes. We extracted indication data from our institution's EPIC system and found that in a 29-month time frame there were 12,218 uniquely entered indications. Only 136 of these were standardized drop-down (fixed) menu options; the rest were entered manually (free-text). Enormous variation in these uniquely typed entries emphasizes the value and necessity of fixed indication options to allow for better evaluation of stewardship program outcomes.

Methods. We evaluated the 718 most commonly used indications accounting for a total of 113,741 unique antibiotic orders for 42,665 patients. We excluded indications used for less than 36 orders during the study period. We analyzed the characteristics of these orders to identify opportunities for improvement in indication documentation and developed a new list of less than 200 indications that could account for nearly all of the various indications entered.

Results. 66,404 (58%) orders were placed using fixed options available in the menu (Figure 1). 32,427 (29%) orders were placed with no indication listed. The remaining 14,910 (13%) orders were documented with free-text indications. Within these manual entries, 59% were identical or nearly identical to an option that was available in the drop down menu. 37% of free-text indications could not be appropriately placed with an option available in the menu. For example, the menu contained a fixed option for "Severe C. difficile infection" forcing all non-severe cases to be entered as varied free-text alternatives (Figures 2 and 3).

Conclusion. In our sample, use of fixed menu options was high but robust evaluation of proper antimicrobial use was substantially limited by failure to document indication and free-text entry by providers. Free-text entry and blank fields can be