Influenza Vaccination Coverage and Effectiveness in a Cohort of Young Children in Bangkok, Thailand

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Background: Since 2009, Thailand has recommended influenza vaccine for several groups at high risk for severe influenza, including children aged 6-24 months. However, the number of persons for which influenza vaccination is recommended far exceeds the supply of influenza vaccine purchased by the Thai government annually. We evaluated influenza vaccination coverage during 2010-2013 and estimated the effectiveness of the 2011 Southern Hemisphere influenza vaccine in young children in Bangkok.

Methods: In August 2011, we began a prospective cohort study of children aged ≤36 months at Queen Sirikit National Institute of Child Health. The study enrolled an equal number of children with and without an underlying medical condition. We followed each child for two years and contacted parents weekly to inquire about whether their child had acute respiratory illness. Ill children came to the hospital and had a combined nasal and throat swab collected and tested for influenza viruses by realtime reverse transcription polymerase chain reaction. Influenza vaccination status was verified since enrollment and every 6 months by reviewing each child's vaccination card. Since Thailand uses Southern Hemisphere vaccine and influenza viruses circulate year-round, we defined the season from June, when vaccine was available, until May. Complete vaccination was defined as having received two vaccine doses in the current season that were administered ≥28 days apart or ≥1 dose in any previous season and one dose in the current season. Partial vaccination was defined as having received only one of two recommended vaccine doses during the current season and no vaccination in the previous season. We limited analysis to children aged ≥6 months at the beginning of each season. For 2011-2012 and 2012-2013 seasons, VE was estimated as 100% x (1-hazard ratio). To adjust for age at respiratory illness and underlying disease condition we used the Cox proportional approach.

Results: During 2010-2013, 1,050 children aged 6-44 months were enrolled (115 during the 2010-2011 season, 308 during 2011-2012, and 627 during 2012-2013); 424 (40.4%) children had ≥1 medical condition considered a risk for severe influenza. Vaccine coverage (partial or complete) by season was 27.8% (32/115), 40.2% (124/308), and 32.0% (201/627), respectively. Complete vaccination was 18.3% (21), 34.4% (106), and 23.9% (150), respectively. Only in the 2011-2012 season, complete vaccination

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was significantly higher among children aged 24-44 months compared to those aged 6-23 months (22/37 [59.4%] vs. 84/271 [31.0%]; p-value <0.01). In 2012-2013, the complete vaccination rate was significantly higher among healthy children compared to children with medical conditions (106/373 [28.4%] vs. 44/254 [17.3%]; p-value<0.01), but this was not found in other seasons. In 2011-2012, there were 246 ARI episodes; of which 8 (3.2%) were influenza positive (age range, 9-36 months; 4.2 per 1,000 vaccinated child-weeks and 7.4 per 1,000 unvaccinated child-weeks). The unadjusted and adjusted VE for complete vaccination was 44% (95% confidence interval [CI]; -154%, 88%) and 62% (CI; -63%, 91%), respectively. In 2012-2013, there were 822 ARI episodes; of which 46 (5.6%) were influenza positive (age range, 7-46 months; 3.6 per 1,000 vaccinated child-weeks and 4.3 per 1,000 unvaccinated child-weeks). The unadjusted and adjusted VE for complete vaccination was 28% (CI; -78%, 71%) and 37% (CI; -63%, 76%), respectively.

Conclusions: Influenza vaccination rates were moderate in this cohort of young children in Bangkok; however, our data may not be representative of all Thai children. Additional efforts are needed to increase vaccination rates particularly in children aged 6-24 months or those with underlying disease. The 2010-2011 VE point estimate suggests the vaccine was moderately effective at protecting young children against influenza; however, it was much lower in 2012-2013. The VE estimates did not reach statistical significance, possibly due to the small number of influenza infections. Continued evaluation of influenza vaccination coverage and effectiveness is merited to evaluate national influenza vaccination program impact among young children who are at high risk of severe influenza.