The reactivation mechanisms of varicella zoster virus are not fully understood. While the immune response to varicella zoster virus (VZV) predicts a transient increase in herpes zoster incidence among unvaccinated individuals, the incidence rate peaks in adults aged 60-70 years at 8 to 10 years after the introduction of universal varicella vaccination (UVV).

**BACKGROUND**

- **Objective:** To evaluate the age-specific annual incidence of herpes zoster and varicella zoster in the United States before and after the widespread use of varicella vaccination to determine whether the incidence of herpes zoster following varicella vaccination has indeed been reduced.

- **Methods:** A retrospective analysis of the state-wide administrative claims data from the United States TennCare Health MarketScan© commercial database for the period 1991-2016.

- **Findings:**
  - The annual incidence of varicella and herpes zoster disease per 100,000 person-years was presented for the state of Tennessee in 2007.
  - The annual incidence of herpes zoster was analyzed using interrupted time series (ITS) analysis implemented through a negative binomial generalized segmented linear regression model over three time periods.
  - To obtain the 5% confidence intervals of the coefficients estimated using ITS, we applied a bootstrap approach with 1000 independent Poisson-distributed samples to each state, with separate slopes and intercepts for each time period as shown in the equation below.

\[ y = \beta_0 + \beta_1 \times \text{Zoster Incidence Rate} + \beta_2 \times \text{Years After Vaccination} + \epsilon \]

**RESULTS**

- **Vaccine Coverage:** Varicella vaccination coverage rose over time and became more concentrated around the targeted age of vaccination. The presentation of vaccine coverage shown here, as a proportion of individuals in an age group vaccinated at a specific point in time, differs from the usual presentation of vaccination coverage to make comparisons over time.

- **Herpes Zoster Vaccination Coverage:** Herpes zoster vaccination coverage remained relatively low through the two-dose varicella vaccination period (2007-2016).

**CONCLUSIONS**

- **Deceleration of HZ Increase During One- and Two-Dose UVV:** Herpes zoster incidence rates continued to increase in those aged 65+ and those aged 65-74 years; however, the observed increase was lower in those aged 75+.

- **Further Work:** There is a need to better understand the dynamics of why HZ incidence in those aged 65+ has experienced a significant increase, while incidence in those aged 75+ has remained fairly stable.

**Figure 1:** Herpes Zoster Incidence Rates 1991-2016 by Age

**Figure 2:** Herpes Zoster Vaccination Coverage 1995-2016

**Figure 3:** Varicella Vaccine Coverage 2007-2016

**Figure 4:** Varicella Vaccine Coverage 2007-2016

**Figure 5:** Herpes Zoster Vaccination Coverage 2007-2016

**Figure 6:** Estimated Varicella Incidence Rates 1995-2016

**Figure 7:** Herpes Zoster Incidence Rates 1995-2016 by Sex

**Figure 8:** HZ Disease Rate, by Age

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