



THE IMPACT OF UNIVERSAL VARICELLA VACCINATION ON HERPES ZOSTER INCIDENCE IN THE UNITED STATES

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BACKGROUND

- At the start of the U.S. varicella vaccination program in 1995, impacts on herpes zoster (HZ) epidemiology were not precisely known
- Universal varicella vaccination may have complex individual and population level impacts on HZ epidemiology and risk
- These impacts would differ by age (people born pre-vaccine and those born at a time that made them eligible for vaccine (post-vaccine))

STUDY OBJECTIVE

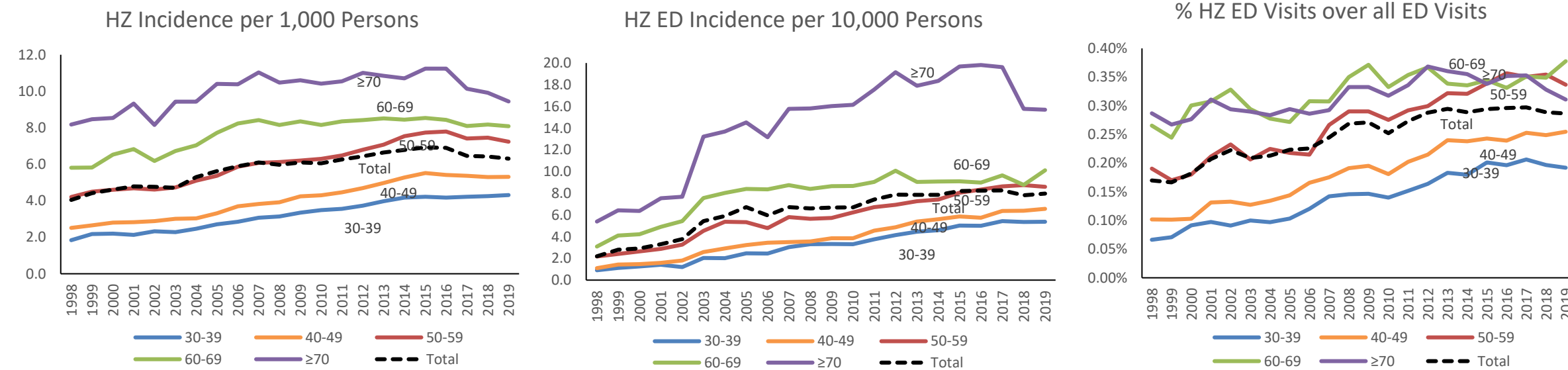
- We assessed national HZ incidence in the U.S. during 1998–2019 in cohorts of persons born before and after varicella vaccine introduction using a large national claims database

METHODS

- Data Source:**
 - IBM MarketScan® Databases, healthcare claims database from 1998–2019
- Study Population:**
 - Persons aged ≥30 years:** Persons born before 1990, five years before the start of the varicella vaccination program, the pre-vaccine cohort
 - Persons aged 1–29 years:** Persons born in 1990 or after (i.e., ≤5 years of age at the time of varicella vaccine introduction, therefore age-eligible for routine vaccination or a catch-up campaign), the post-vaccine cohort. Also includes some persons born before 1990 and were aged 1–29 years during the study period
- Study Definitions:**
 - HZ: outpatient and emergency department (ED) claims with ICD–9/10 diagnostic codes (053.xx/B02.xx) for HZ
- Data Analysis:**
 - Calculated age-specific incidence for persons aged ≥30 years (all born pre-vaccine) and persons aged 1–29 years (includes persons born post-vaccine)
 - To assess whether trends were affected by biases related to health-care seeking behavior or case ascertainment, examined HZ incidence in ED settings, and the proportion of HZ visits among all ED visits for ≥30 year-olds
 - Also examined HZ incidence by age, stratified by birth cohort: 1981–1989 (pre-vaccine), 1990–2001 (early post-vaccine), and 2002–2019 (late post-vaccine)

RESULTS

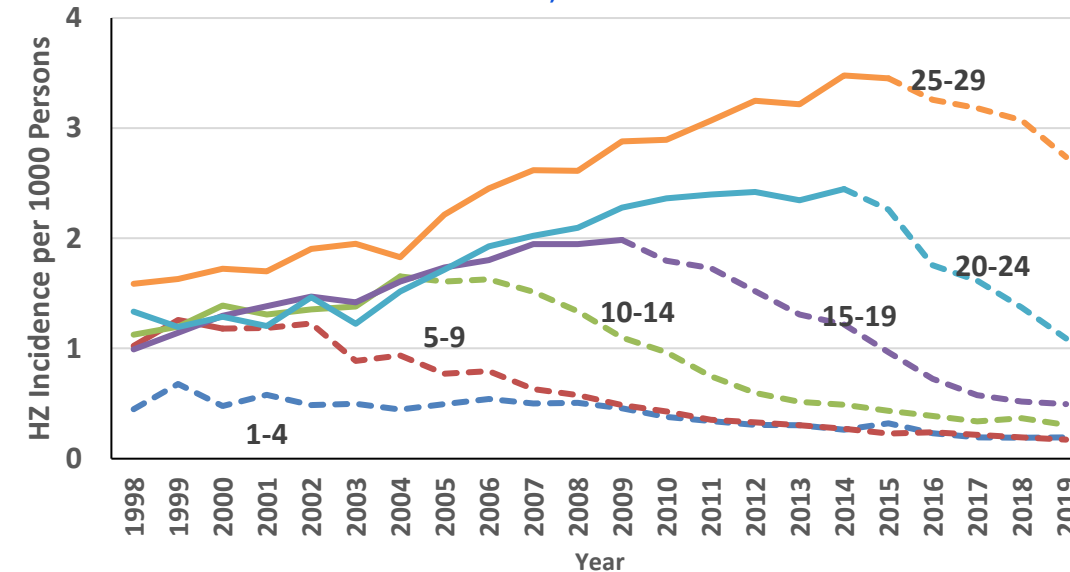
Figure 1. Herpes zoster (HZ) incidence among adults, by age group among persons born before the varicella vaccination program (pre-vaccine cohort; persons aged ≥30 years), IBM® MarketScan® — United States, 1998–2019^{ab}



^aScales are different for the 3 graphs to better visualize the data. "HZ Incidence" includes incident HZ cases from outpatient and outpatient ED. To examine whether trends in HZ incidence may have been affected by case ascertainment biases due to health-seeking behavior, we examined HZ incidence in ED ("HZ ED Incidence") and HZ ED visits as a proportion of all ED visits. Since our objective was to compare trends over time using these 3 methods and not to examine differences by age, the use of different scales would not affect interpretation of findings.

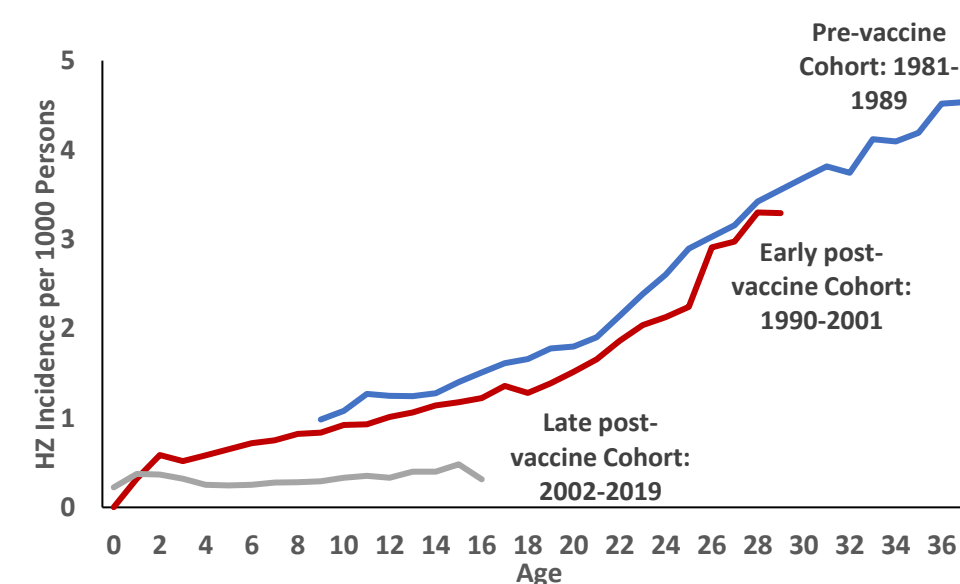
^bED data are from both inpatient and outpatient data, except for 1998–2002, which only includes outpatient data. Among HZ cases with an ED visit, 91% are from the outpatient data. The median number of total ED visits increased from 426,520 in 1998–2002 to 3,763,001 in 2015–2019; median enrollment increased from 2,273,013 to 10,066,904 during this period.

FIGURE 2A: Herpes zoster (HZ) incidence in persons aged 1–29 years by year (includes pre-vaccine and post-vaccine cohorts), IBM® MarketScan® — United States, 1998–2019^a



^aSolid lines represent HZ incidence among age group before eligibility for routine varicella vaccination and dashed lines represent HZ incidence after eligibility for routine varicella vaccination

FIGURE 2B: Herpes zoster (HZ) incidence in persons aged <37 years, by birth cohort (pre-vaccine, early post-vaccine and late post-vaccine), as a function of age, IBM® MarketScan® — United States, 1998–2019



RESULTS

HZ incidence in persons aged ≥30 years

- Increased with age and calendar time (Fig. 1), with rates starting to decelerate in 2007 for 60–69 and ≥70-year-olds
- Similar patterns seen in ED settings, and the proportion of visits for HZ among all ED visits (Fig. 1)
 - Provides re-assurance that observed changing HZ patterns among adults are real and not due to other factors such as health-care seeking or barriers to receipt of healthcare

HZ incidence in persons aged 1–29 years

- Increased early in the study period for the oldest age groups (born pre-vaccine, i.e., born before 1990), but later declined once each age group was comprised of persons born in the post-vaccine period (children and adolescents) (Fig. 2A)
- By birth cohort, rates in early post-vaccine cohort (when co-infection with wild-type VZV was more likely) were similar to pre-vaccine cohort; however, no age-associated increases seen in late post-vaccine birth cohort (Fig. 2B)

CONCLUSIONS

- Our results, corroborated with other published studies, did not find an increase in HZ rates due to the varicella vaccination program
- Our findings do not support previous modeling predictions that the varicella vaccination program would increase HZ rates among adults who previously experienced varicella
- The varicella vaccination program has reduced HZ incidence among children and adolescents born in the vaccine era, most of whom received the varicella vaccine
- Our findings also suggest that continued declines in age-specific HZ incidence as varicella-vaccinated cohorts age are likely

