Characteristics Associated with Failure to Complete the Pneumococcal Vaccine Series among Children with Sickle Cell Disease or Sickle Cell Trait

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BACKGROUND

- The Centers for Disease Control and Prevention (CDC) releases immunization schedules for various age groups that are approved by the Advisory Committee on Immunization Practices, the American Academy of Pediatrics, and the American Academy of Family Physicians (Table 1).
- Children with sickle cell disease (SCD) are at increased risk of acquiring invasive infections.
- Timely completion of the pneumococcal vaccine series, defined as receiving 4 pneumococcal vaccines by 15 months of age, could reduce the number and burden of invasive infections among children with SCD.

RESULTS

- From 2004-2008, 291 newborns were diagnosed with SCD and 14,536 were reported as SCT.
- Through linkages, approximately 97% of these newborns were matched with birth certificate records, and immunization data were available for 99% of the linked NBS/birth certificate records (n=12,743).
- Overall, 45% of children with SCD (n=117) and 36% of children with SCT (n=4,392) completed the pneumococcal vaccine series by 15 months of age (Table 2).
- Children with SCD were similar to those with SCT, though they did differ on a few characteristics.
- Children with SCD were significantly more likely to be admitted to the NICU at birth, to be black, and to reside in the region of Detroit at birth compared to children with SCT.
- Among those with SCD, no characteristics were significantly associated with pneumococcal vaccination series completion in either crude or adjusted analyses.
- Among those with SCT, NICU admission at birth, black race, residing in the Detroit region, maternal education of high school or less, and maternal age <25 years were all significantly associated with increased odds of failing to complete the pneumococcal series in both crude and adjusted analyses.

PUBLIC HEALTH IMPLICATIONS

- Linkages between NBS, live births, and immunization data provide up-to-date, continued information on immunization status. This information was used to develop educational materials to meet the needs of specific high-risk populations.
- Using the lifespan surveillance process as a long-term follow-up strategy for SCD and SCT proved to be an efficient way of identifying unmet needs and developing targeted prevention strategies.

STUDY QUESTIONS

- What proportion of children with SCD or sickle cell trait (SCT) in Michigan completes the pneumococcal vaccine series following the recommended schedule?
- What maternal and infant characteristics are associated with failure to complete the pneumococcal vaccine series?

METHODS

- Newborn screening (NBS) records for all children born from 2004-2008 with SCD or SCT were linked with live birth certificates.
- Through live birth certificates, NBS data were linked with the Michigan Care Improvement Registry (MCIR), a web-based system where all immunizations of Michigan residents are reported.
- Immunization data were retrieved for children with SCD or SCT.
- Data Sources for Maternal and Infant Characteristics
  - Birth certificate records: Birth date, race, maternal age at time of birth, gestational age, maternal education, maternal county of residence at time of birth, sex, and neonatal intensive care unit (NICU) admission after birth
  - Immunization records: Vaccine type and date

CONCLUSIONS

- Children with SCD had slightly higher pneumococcal vaccination series completion rates compared to children with SCT, though both groups had completion rates below 50%.
- The immunization completion rates for the pneumococcal vaccination series should be improved for children with SCD given their increased risk for infections.
- Select characteristics are associated with decreased likelihood of vaccine receipt among children with SCT, while no associations were found among children with SCD. This study finding could be due to a lack of heterogeneity among the SCD population.

REFERENCES

1. Recommended Immunization Schedule for Persons Aged 0 Through 19 Years, United States, 2010.