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Adherence to Prophylactic Antibiotic Guidelines Among Tennessee Medicaid Infants with Sickle Cell Disease

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Keywords

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Infants with sickle cell disease have as much as a 100-fold increased rate of pneumococcal infection compared with the general population.¹ Penicillin prophylaxis has been shown to reduce the risk of pneumococcal sepsis by 84%.² Thus, sickle cell management guidelines include twice daily penicillin prophylaxis for infants and young children.³ While studies have described low rates of adherence to prophylactic antibiotic guidelines in older children, little is known about initiation of prophylactic antibiotics in early infancy, a period of great vulnerability.⁴ We describe adherence to guidelines for initiation of prophylactic antibiotics in a cohort of Tennessee Medicaid infants with sickle cell disease and examine risk factors for non-adherence to guidelines.

Methods

We conducted a 10-year retrospective cohort study, using data from Tennessee's Medicaid (TennCare) Program. We used ICD-9 claims to identify children with Hemoglobin SS disease and pharmacy claims to determine if prophylactic antibiotics were filled.⁴ Maternal and infant demographic information was collected from birth certificates.

Infants were eligible for the cohort if they: had a diagnosis of sickle cell disease, were born between 1997-2006, and were enrolled in TennCare at birth. Infants born prior to 34 weeks gestational age were excluded. The final cohort included 407 infants.

The primary study endpoint was filling or not filling a recommended antibiotic prescription by 12 weeks of life, reflecting the language in the guidelines and clinical practice. Patients were classified according to potential confounders and effect modifiers, including infant

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factors, maternal factors, and geographic factors. We used Poisson regression with robust standard errors to investigate the association between risk factors and failure to fill an antibiotic prescription. Pearson's chi-squared test was used to assess the unadjusted association of categorical risk factors with guideline non-adherence.

Results

Among 407 infants in the cohort, 60% failed to fill an antibiotic prescription in the first 12 weeks of life. Individual maternal, infant, and demographic factors were not predictive of non-adherence with prophylactic antibiotic guidelines.

We generated a "risk score" for each infant, based on the presence of specific risk factors previously shown to predict non-adherence with pediatric preventive care (maternal age, maternal marital status, maternal education, income, and residence in an urban area).^{5,6} Among infants with 0 risk factors (n=19), 36.8% were non-adherent to guidelines, compared to 58.3% and 71.1% of those with 1-3 (n=312) or 4-5 risk factors (n=76), respectively. There was a significant difference in non-adherence to prophylactic antibiotic guidelines among infants in the three risk factor categories (p=0.02, Figure 1).

Comment

Despite the availability of published guidelines for preventive care for infants with sickle cell disease, 60% of infants covered by Medicaid in Tennessee failed to fill a prophylactic antibiotic prescription within the recommended time period. In addition, the presence of multiple sociodemographic risk factors was associated with failure to fill prophylactic antibiotic prescriptions in our population.

Because we estimated non-adherence to antibiotic recommendations using pharmacy claims (a surrogate for adherence to guidelines), it is not possible to determine the reasons for non-adherence. It is possible that either parents did not fill prescriptions or that providers did not prescribe prophylactic medications as recommended. While uncertainty regarding the reasons for non-adherence does not influence the ultimate outcome, a better understanding of reasons for non-adherence will facilitate targeted interventions to improve compliance.

This study highlights an important problem—many infants with sickle cell disease in Tennessee do not receive guideline-recommended antibiotic prophylaxis. This is likely to increase the risk for serious, sometimes fatal, pneumococcal infections. Future efforts should focus on understanding the sources of non-adherence and implementing targeted interventions to improve adherence to prophylactic antibiotic guidelines in this population.

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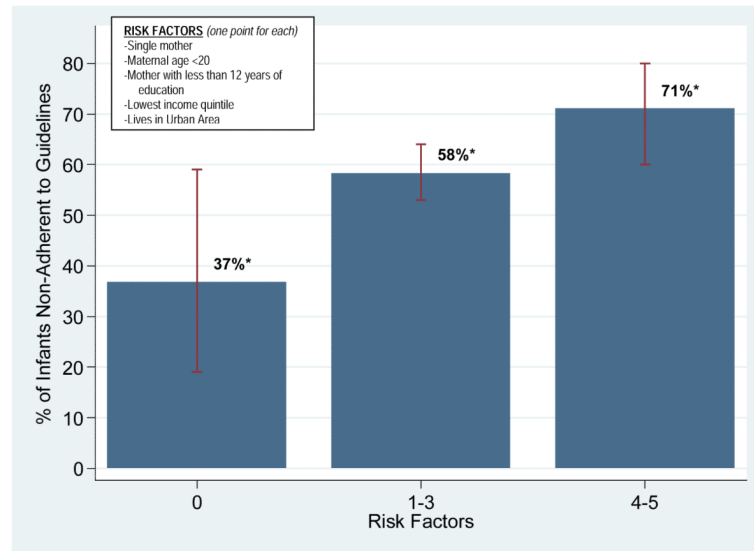


Figure 1. Association of Multiple Risk Factors with Non-Adherence to Prophylactic Antibiotic Guidelines Among a Cohort of Tennessee Medicaid Infants with Sickle Cell Disease Born from 1997-2006.