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Epistaxis health disparities in the United States pediatric population

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ABSTRACT

Objective: Despite epistaxis occurring in up to 60% of the population, few studies have investigated health status disparities in the pediatric epistaxis population. The aim of this study was to evaluate sociodemographic risk factors associated with epistaxis visits for pediatric patients.

Methods: Data were extracted from the National Ambulatory Medical Care Survey and National Hospital Ambulatory Medical Care Survey Outpatient Department from 2001 to 2010. Outpatient visits of children less than 18 years who received a primary, secondary, or tertiary diagnosis of epistaxis (ICD-9CM code 784.7X) were included. Bivariate and stepwise multivariate regressions were conducted to develop a final model for epistaxis visits described by sociodemographics.

Results: Epistaxis visits accounted for 5 ± 0.6 million visits in children less than 18 years. 51% and 33% of children presenting with epistaxis had private insurance and Medicaid, respectively ($p = 0.001$). 69% of epistaxis visits were evaluated at a pediatric clinic, 18% at an ENT/surgery clinic, and 13% at a general/family medicine clinic ($p < 0.0001$). After multivariate adjustment, epistaxis visits were associated with older age ($p = 0.006$). Black children were more likely to present with epistaxis (95% CI 1.3–4.1, $p = 0.005$) compared to white children. Allergic rhinitis, present in 11% of epistaxis visits, was a significant comorbidity associated with visits (95%CI 1.3–4.6, $p = 0.008$). Patients were also more likely to present to an ENT/surgery clinic (95% CI 4.5–16.5, $p < 0.0001$) compared to a general/family medicine clinic.

Conclusions: Epistaxis visits by children are associated with age, race, and specialty. Targeted interventions to help reduce this common presentation should be developed.

1. Introduction

Epistaxis is a very common condition among children. Though it is rare in children younger than two years old [1], at least one episode of epistaxis has occurred in 30% of children by the age of five and in over 50% of children greater than five years old [2].

Most cases in children and young adults are self-limited and due to dry nasal mucosa; some are anterior, originating from Little's area in the anterior portion of the nasal septum where Kiesselbach's plexus forms. However, if more severe, patients may present to an emergency care provider, primary care provider, or otolaryngologist. Children reported high stress scores for bleeds longer than the average time of 5–10 min, and caregivers' fear of excessive blood loss was a significant factor causing high distress [3].

Despite the frequency of epistaxis, few studies have investigated health status disparities in the pediatric population. While healthcare disparities focus on the differences in access to or availability of medical facilities and services, health status disparities refer to the variation in rates of disease occurrence and disabilities between socioeconomic and/or geographically defined population groups [4,5]. Some studies have examined health status disparities in presentation to the emergency department (ED) of certain states [3,6–9], but none have captured other sources of patient care or provided a national pediatric outlook. The aim of this study was to evaluate sociodemographic risk factors associated with epistaxis visits for pediatric patients in a nationally representative sample in the outpatient setting.

2. Methods

2.1. Data sources

Data were extracted from the National Ambulatory Medical Care

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Survey (NAMCS) and National Hospital Ambulatory Medical Care Survey (NHAMCS) Outpatient Department (OPD) from 2001 to 2010. The Centers for Disease Control and Prevention (CDC) and National Center for Health Sciences collect the NAMCS and NHAMCS annually to measure the utilization and provision of ambulatory care services, which is the predominant method of providing health care in the United States [10,11]. The NAMCS uses a 2-stage probability design that samples physicians who represent geographical regions and patient visits within these practices. Data were collected over a 1-week period randomized to the physician. The NHAMCS is intended to offer more complete ambulatory data than previously covered by the NAMCS. The NHAMCS uses a 4-stage probability design that samples approximately 500 nationally representative primary sampling units (PSUs) of the 50 states and the District of Columbia, hospitals within the PSUs, clinics within the hospitals, and patient visits within the clinics. Data was collected over a 4-week period randomized by facility and included patient, visit, and provider characteristics.

Both the NAMCS and NHAMCS are weighted to represent national usage, with visits adjusted for the provider specialty, visits to the provider, nonresponse, and smoothing. Both surveys have undergone changes since their inception. Within the 2001–2010 window, phrasing of questions and the availability of variables have changed. History of chronic disease and urban-rural classification of a patient's zip code were introduced in 2005 [10]. Practice specialty type is missing in the 2005 data tables.

The survey uses the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9CM) codes for recording diagnoses. Providers surveyed can complete up to 3 diagnoses.

2.2. Inclusion criteria

Outpatient visits of children less than 18 years who received a primary, secondary, or tertiary diagnosis of epistaxis (ICD-9CM code 784.7X) were included. Patients whose diagnosis was missing in all 3 instances were excluded.

The primary outcome measure was the weighted proportion of epistaxis visits. Sociodemographic variables were collected in addition to the type of clinic visited and type of provider seen. Clinic types were categorized as general/family medicine, pediatrics clinic, or ENT/surgery clinic. Provider types included a physician, nurse practitioner, or physician assistant. Results indicate variables that were not available during all years and the first available year.

2.3. Statistical analysis

Bivariate and stepwise multivariate regressions were conducted to develop a final model for epistaxis visits described by sociodemographics. The number of epistaxis visits were first weighted based on the surveys' PSU, strata, and visit weights.

The weighted proportion of epistaxis visits were compared to patient and provider characteristics using Chi-square tests. Patient demographic included age (0–5, 6–11, 12–18 years old). These categories were selected to best capture an even distribution of frequency (1,795,057 weighted visits, 1,545,384 weighted visits, 1,656,646 weighted visits, respectively); moreover, these age ranges carry clinical significance in early childhood, middle childhood, and adolescence. Other demographic information included sex (female, male); race (White, Hispanic, Black, and other/unknown); payment source (private insurance, Medicare/Medicaid, other, unknown); history of chronic disease; history of asthma; diagnosis of anemia; or diagnosis of various anemic etiologies. The category of other/unknown race includes all patients who do not fall under White non-Hispanic, Black non-Hispanic, and Hispanic categories; patients may have identified as Asian, Native Hawaiian/Other Pacific Islander, American, or Indian/Alaska Native, or may have reported more than one race. Under payment source, other includes worker's compensation, self-pay, no charge/charity, or other identified on the survey; unknown category includes those surveys listed as unknown or uncompleted. Due to missing data for median household income, payment source was used as an alternative. Provider demographics included practice region (Northeast, Midwest, South, West); practice location (metropolitan statistical area, non-metropolitan statistical area); practice type (general/family medicine, pediatrics, ENT/surgery); new patient to practice; and number of visits in the last year (no visits, 1–5 visits, ≥6 visits).

A stepwise multivariate logistic regression was conducted to assess the percentage of epistaxis visits with a refined list of covariates. Variables statistically significant at the 5% level, that modified the association between provider and outcome by more than 10% (when included in the model), or were clinically meaningful were retained in the final model.

Epistaxis visits were also examined for their association with various comorbid conditions, including history of chronic disease, history of asthma, diagnosis of allergic rhinitis (ICD-9CM code 477.9X), diagnosis of anemia, and diagnosis of anemic etiologies. Anemic etiologies included iron deficiency anemias (ICD-9CM codes 280.8X, 280.9X), megaloblastic or nutritional deficiency anemias (ICD-9CM codes 281. XX), hereditary anemias (ICD-9CM code 282. XX), sickle cell anemias (ICD-9CM code 283. XX), aplastic anemias (ICD-9CM code 284. XX) and other chronic disease anemias (285. XX).

Lastly, procedures performed at epistaxis visits were analyzed to evaluate their relationship to race (ICD-9CM codes 210. XX for epistaxis control, 212. XX for diagnostic procedure on nose, 22X.XX for operations on nasal sinuses.

Statistical analyses were performed using the SURVEYFREQ, SURVEYREG, SURVEYLOGISTIC, and GENMOD procedures in SAS statistical software (version 9.4, SAS Institute Inc, Cary, North Carolina, USA).

3. Results

Epistaxis visits accounted for 5.0 ± 0.6 million visits by children less than 18 years from 2001 to 2010. The ages of patients with a diagnosis of epistaxis were similar across the 3 divisions 0–5, 6–11, and 12–18 years old (36%, 31%, and 33%, respectively), though this was significantly different from the age distribution across non-epistaxis visits, which had a greater predominance toward 0–5 year olds (49%) ($p = 0.022$) (Table 1). Males (61%) accounted for more epistaxis visits than females, but a similar pattern was true across visits overall (Table 1). The race of patients by frequency of epistaxis visits were Whites (37%), Blacks (17%), Other/unknown (24%), and Hispanics (22%) (Table 1). Blacks accounted for a significantly greater share of epistaxis visits than they do for non-epistaxis visits (11%) ($p = 0.005$) (Table 1). Payment source distribution was also significantly different between epistaxis and non-epistaxis visits, with a decreased share of private insurance visits (51% and 60%, respectively) ($p = 0.001$) (Table 1). A diagnosis of allergic rhinitis (11%) was also significantly associated with epistaxis visits ($p < 0.001$) (Table 1). There were no significant differences in other patient demographics, including history of chronic disease, history of asthma, diagnosis of anemia, or diagnosis of anemic etiologies between children with epistaxis versus those who did not have epistaxis.

Practice location is predominantly Metropolitan across all visits (88%), but even more so for epistaxis visits (95%) ($p = 0.005$). There was a greater percentage of epistaxis visits seen at an ENT/surgery clinic (18%) rather than general/family medicine clinic (13%), compared to non-epistaxis visits, but the majority of visits were still seen with pediatrics providers (69%) ($p < 0.001$) (Table 1). Practice region, first visit, and visit frequency were not significantly different based on bivariate comparison.

The final multivariate model included covariates age, race, payment source, history of chronic disease, diagnosis of allergic rhinitis, region, practice location, and practice type. After multivariate adjustment,