Quality of Care in United States Children with Sickle Cell Anemia

2098

Julie Kanter, MD[1]; Carlton Dampier, MD[2]; Irene Agodoa, MD[3]; Robin Howard[3]; Sally Wade[4]; Virginia Noxon, PhD[5]; Samir K. Ballas, MD[6]

[1]Lifespan Comprehensive Sickle Cell Center, Medical University of South Carolina; [2]Emory University; [3]Global Blood Therapeutics, Inc.; [4]Wade Outcomes Research and Consulting; [5]Truven Health Analytics, an IBM company; [6]Medicine/Hematology, Thomas Jefferson University

BACKGROUND

- Sickle cell disease (SCD) is a genetic disorder in which hypoxia produces polymerization of sickle hemoglobin (HbS). This triggers multiple downstream effects of red cell distortion (sickling), hemolysis, occlusion of blood flow, and inflammation.
- Patients of all ages are at risk for infection (highest risk<2 years) and also at risk for stroke and retinopathy.
- HbSS and HbS0 patients experience the most severe effects of sickling.
- Clinical guidelines for pediatric SCD patients recommend[2]:
- All genotypes:
  - Prophylactic penicillin use (birth-5 years)
  - Anti-pneumococcal immunization with Prevnar and Pneumovax
  - Should receive annual anti-influenza vaccine
  - Annual ophthalmology exams to assess for retinopathy (age ≥10).
- HbSS and HbSB0: annual screening for stroke with trans-cranial doppler (TCD) imaging (age 2-16)
- There is limited real word evidence describing the implementation of these clinical guidelines in pediatric patients with sickle cell disease.

OBJECTIVE

- To describe the use of vaccines, penicillin, TCD screening, and ophthalmology care in a large cohort of children **with HbSS disease**

METHODS

Study Design and Data Sources

- This is a retrospective administrative claims database analysis among a sample of a Commercially and Medicaid insured populations in the US.
- These databases provide detailed outcomes measures including outpatient pharmacy claims, resource utilization and associated costs for healthcare services performed in both inpatient and outpatient settings for over 41 million individuals.
- De-identified US administrative claims data from January 1, 2009 through December 31, 2014 were extracted from the Truven Health MarketScan® Commercial Claims Database and Medicaid Database.
- Only regional geographic data is available for Commercial patients in this dataset.

Patient Selection

For each year (2009-2014), the following inclusion/exclusion criteria* were applied:

- Pediatric HbSS patients.
  - Either 1 inpatient or 2 outpatient (different days) non-diagnostic claims with HbSS [ICD-9 code 282.62 or 282.63 (HbSS with and without crisis)]
  - 1-16 years of age at identification of HbSS in dataset
  - 1 year of continuous enrollment in medical and pharmacy benefits prior to HbSS identification in dataset
  - Patients with chronic transfusions (defined as ≥ 9 transfusions during year; 10% of pediatric HbSS population) were excluded

  *Note that patients could qualify in multiple years if they met all criteria in each year (i.e., a patient could qualify in 2010, 2011, and 2012)

Outcomes

- The following utilization measures were captured by procedure codes during the year prior to HbSS identification:
  - Vaccines: flu, pneumococcal (Prevnar and Pneumovax)
  - Penicillin
  - Transcranial doppler (TCD) procedures (age 3-16)
  - Ophthalmologist visits (proxy for retinopathy screening)
- Averages of descriptive results across all years were reported to provide a comprehensive overview of prior year utilization among identified HbSS patients.
- All results were reported by payer (Commercial, Medicaid) and age group [TCD only (3-5, 6-11, 12-16, 3-16); all others (1-5, 6-11, 12-16, 1-16)]

RESULTS

Table 1. Annual Cohorts[1]

	2009	2010	2011	2012	2013	2014
Commercial	348	400	387	438	347	355
Medicaid	1,024	1,225	1,239	1,254	1,557	1,526

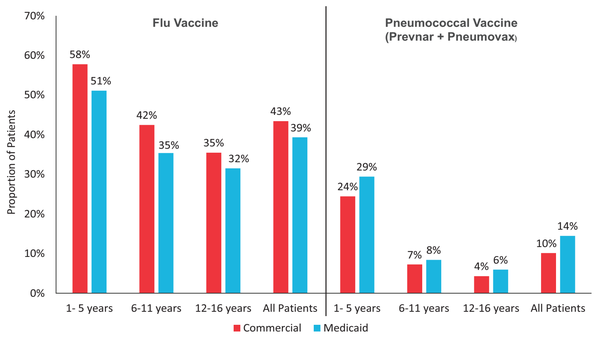
[1] MarketScan Medicaid Databases had an underlying increase in enrollees compared to Commercial Databases during this time frame; states contributing Medicaid data may vary over time.

Table 2. Average Patient Characteristics (all years)

	Commercial Patients	Medicaid Patients
Average Age, Mean (SD)	9.5 (4.4)	8.3 (4.3)
Age Groups, N (%)		
1-5 Years	89 (23%)	414 (32%)
6-11 Years	146 (38%)	530 (41%)
12-16 Years	145 (38%)	360 (28%)
Females, N (%)	195 (52%)	625 (48%)
Geographic Location, N (%)		
Northeast	48 (13%)	
North Central	62 (16%)	
South	242 (64%)	Unavailable
West	21 (6%)	
Unknown	6 (2%)	
Urban Status, N (%)		
Urban	351 (93%)	1,064 (82%)
Rural	22 (6%)	239 (18%)
Unknown	7 (2%)	1 (0%)
Top 2 Comorbid Conditions, N (%)		
Acute Chest Syndrome	30 (8%)	192 (15%)
Asthma	76 (20%)	396 (30%)

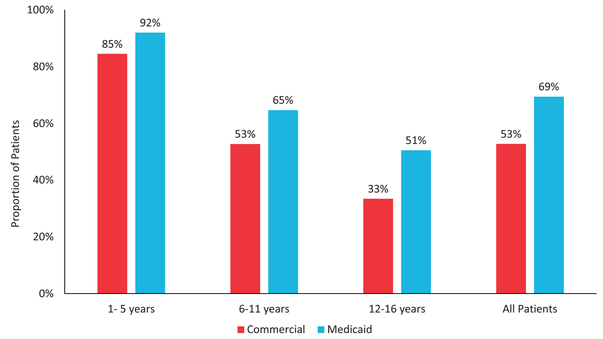
- Patients were slightly younger in the Medicaid population (age 8.3 years) compared to the Commercial population (age 9.5 years).
- Across payers and age groups:
  - Relatively balanced between male and female
  - Majority resided in urban area

Figure 1. Average Prior Year Vaccine Use



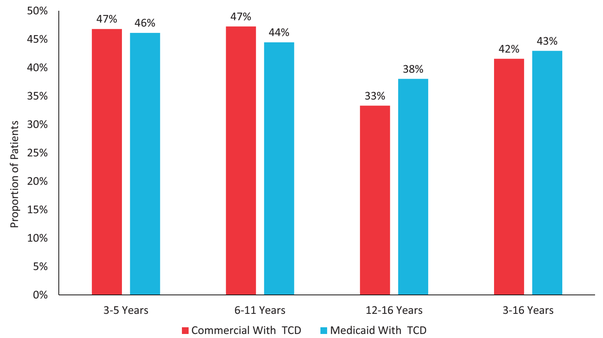
- Patients age 1-5 years old had the highest use of flu and pneumococcal vaccines in both payers.
- Across age groups, flu vaccines were more common among Commercial patients than Medicaid patients. This trend was reversed for use of pneumococcal vaccine.
- Across payers and age groups, no marked differences were observed when results were stratified by urban/rural status.

Figure 2. Average Prior Year Penicillin Use



- Proportion of patients with penicillin use was consistently greater among Medicaid patients than among Commercial patients.
- For both payer populations, over 80% of patients age 1-5 years used penicillin.
- No marked differences in results across payers and age groups observed when stratified by urban/rural status.

Figure 3. Average Prior Year TCD Use



- Each year only 33%-47% of patients had a TCD screen.
- TCD utilization was highest among patients age 3-11 years, and dropped at age 12-16 and was consistent across payers.
- No marked differences were observed when results were stratified by urban/rural status, regardless of payer or age group.

Figure 4. Average Prior Year Use Of Ophthalmologist Visits

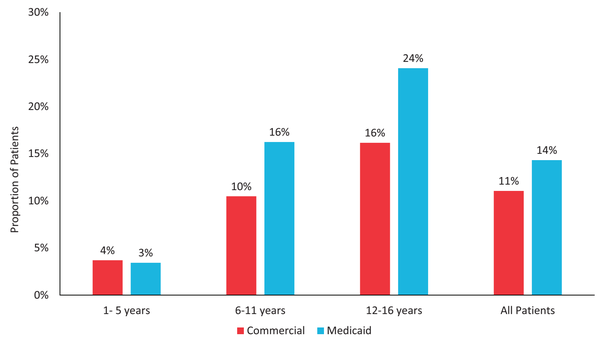


Figure 4. Average Prior Year Use Of Ophthalmologist Visits

- Less than 25% of patients had an ophthalmologist visit annually across payers.
- Compared with Commercial patients, Medicaid patients were more likely to have ophthalmologist visits.
- Patients age 12-16 had the highest proportion with an ophthalmologist visit across payers.
- No marked differences in results across payers and age groups observed when stratified by urban/rural status.

LIMITATIONS

- The MarketScan® Research Databases represent a sample of individuals with employer and Medicaid sponsored health insurance; thus, findings from this study may not be generalizable to populations with other forms of insurance or the uninsured.
- Data are limited to those captured in claims and identification of a diagnosis utilized ICD-9-CM diagnosis codes only reflect the claims submitted by the physicians for reimbursement.
- Potential for misclassification of SCD and HbSS was present as patients were identified through administrative claims data as opposed to medical records.
- The proportion of patients with a pneumococcal vaccine among children 1-5 might be underestimated as this age group includes patients for whom capture of booster vaccinations may be incomplete in the study period.
- Flu and pneumococcal vaccines may be under-reported as vaccines provided by state/local agencies are not captured in these databases.
- Medication data indicate drugs administered in a physician's office or filled through an outpatient pharmacy, but they do not represent if the patient used the medication as prescribed; in addition, over-the-counter medications and medications administered in the inpatient setting are not captured.
- Results limited in scope and generalizability to healthier HbSS pediatric patients due to the exclusion of patients with chronic transfusions.

SUMMARY

- The high penicillin utilization among patients age 1-5 years was consistent with guideline recommendations and offered a partial validation of the dataset.
- Immunization against pneumococcus was surprisingly poor in this cohort.
- Underutilization of guideline recommended TCD screening and retinopathy screening (ophthalmology visits) was observed.

CONCLUSIONS

- Appropriate use of TCD screening for stroke prevention is especially warranted as chronic transfusion therapy is a proven method of prevention against this potentially devastating complication.
- Additional evaluation is needed to validate the algorithm used for assessment of pneumococcal vaccination.
- Further research is needed to better understand potential barriers to proper screening in addition to evaluating strategies to improve awareness, adherence and implementation of recommended screening in children with SCD.

References

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2. NHLBI. Evidence-Based Management of Sickle Cell Disease: Expert Panel Report, 2014. accessed 2017. https://www.nhlbi.nih.gov/sites/www.nhlbi.nih.gov/files/sickle-cell-disease-report%20020816.pdf

Disclosures

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http://bit.ly/2nrsyYi

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