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AGE-GENDER DISTRIBUTION, COMORBIDITIES, HEALTH CARE COSTS AND UTILIZATIONS OF HEALTH-INSURED SICKLE CELL DISEASE PATIENTS IN THE UNITED STATES – AN ACCORDANT WHITE PAPER

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Disclosures

All authors of this white paper are regular full-time employees of Accordant Health Services, a CVS Caremark Company, in Greensboro, NC. Dr. Sharma is Senior Research Analyst at Health Care Analytics, and Ms. Soucy is the Director of Health Care Analytics Department. Dr. Krueger is Medical Director of Accordant Health Services.

Acknowledgement

The Accordant authors thank Dr. Andrew Campbell, Director of Pediatric Comprehensive Sickle Cell Program at University of Michigan, for his contributions during the development of this paper. Dr. Campbell is a Medical Advisory Board (MAB) member for the Sickle Cell Disease care management program of Accordant Health Services.

EXECUTIVE SUMMARY

Recently published descriptive studies on sickle cell disease showing patient demography, comorbid conditions, and health care resources used by patients are not available. Health insurance claims data for year 2010 for 467 patients insured at eight different health plans engaged with Accordant Health Services (AHS) were analyzed. The analysis revealed the following: patient population consisted of 56% females, 44% males. The average age was 19 years for females and 14 years for males. Forty-one percent had comorbidities. Asthma, psychiatric diagnosis, urinary tract infection, headache and hypertension were the top five comorbidities. The health plan paid cost per member per month (PMPM) was $1,754. "Hb-SS disease with crisis" was the top diagnosis in claims from inpatient hospital and emergency room. "Blood count; complete CBC" was the most frequently performed procedure in the outpatient hospital setting. Five most frequently prescribed drug names were (1) folic acid, (2) penicillin V potassium, (3) ibuprofen, (4) hydroxyurea and (5) oxycodone/acetaminophen.

BACKGROUND

Sickle cell disease (SCD) is a debilitating blood disorder in which red blood cells (RBC) assume an abnormal sickle-like shape. These sickle-shaped RBCs often obstruct the circulation of blood (Hildreth et al. 2008) causing "sickle cell crisis," which is painful and often requires hospitalization of patients (Steiner and Miller 2006; Smith and Scherer 2010). The recurrent episodes of "sickle cell crisis" can cause organ damage over time (Raphael and Vichinsky 2005).

The most recent report by Institute of Medicine (IOM 2012) emphasizes "Best Care at Lower Cost," which requires better understanding of the disease, affected populations, co-existing or comorbid conditions, and health care resources utilized by the patients. However, we found no recently published descriptive studies showing such information for SCD patients. Boulet et al. (2010) stated that population-based data describing the health status and health care services used by children with SCD is scant. This study was undertaken to show (1) age-gender distribution of the SCD patient population, (2) percentage of SCD population having specific comorbidities, (3) health plan paid costs overall, by claim category, by gender and by age-group, and (4) most frequently used diagnosis codes, procedure codes, drug classes and drug names from health insurance claims.

METHODS

Data sources and study population. The membership and claims data for N=467 patients analyzed came from eight different health insurance plans having contracts with AHS for care management (CM) services for SCD. These data-contributing health plans provided authorization to AHS for the use of aggregated data for research and publication. Year 2010 data for all SCD patients who confirmed that they had SCD were used. The exception to this was that data from one high-cost outlier was excluded. This one high-cost outlier had total health plan paid amounts for five months of 2010 that were twice the amount of total paid amount for the next top-costing member from the remaining SCD study population.

The patients' member-months required for calculating costs PMPM were calculated using members' health insurance coverage data with the health plans. Data for members enrolled in commercial or Medicaid health plan products were considered for this study.

Characterization of patient age-gender distribution. Each patient's age was calculated as of June 30, 2010 (middle of the analysis year). Age-grouping was done by using deciles of age in years. Within female and male gender categories, members falling in different age-groups were counted and the percentage of members at each age-group was determined for showing the age-gender distribution.

Determining the prevalence rate of comorbidities. The presence of comorbidity-specific diagnosis codes was examined in medical claims for defining 29 different comorbidities we considered relevant for the AHS patient population. Among these, the top 20 more prevalent comorbidities identified for SCD patient population are shown in Figure 3. Other nine conditions considered but not included in the top 20 list were chronic obstructive pulmonary disease (COPD), dementia, dysphagia, irritable bowel syndrome (IBS), lactose intolerance, osteoporosis, pulmonary fibrosis, skin infection and sleep disorder. The psychiatric diagnosis considered as one single comorbidity comprised diagnoses for numerous mental health-related conditions (e.g., affective psychosis, adjustment disorder, alcohol-dependence syndrome, anxiety disorder, attention deficit disorder, autistic disorder, bipolar disorder). The diagnosis codes shown in up to three diagnosis code fields of the health insurance claims were considered when tabulating comorbidities.

To be considered as having a specific comorbidity, patients were required to have a diagnosis for the specified comorbidity in claims in two or more claim lines during the one-year analysis period. The percentage of SCD patient population having a specific comorbidity was calculated to show the prevalence rate of comorbidity. A patient could have multiple comorbidities, and thus the total of percentages shown for different comorbidities could exceed 100%. The percentages of patients having zero or 1, 2, 3, 4, 5 or 6 or more comorbidties regardless of the comorbiditiy type and the relative prevalence rates of 20 of the 29 more prevalent comorbidities are shown.

Determining the health plan paid costs. For calculating the average monthly health plan paid costs ($, PMPM), the amount of health plan paid cost was summed by member and the resulting amount was divided by the sum of member-months. The mean and standard error of mean (SEM) for average paid PMPM amounts were calculated. Health plan paid costs were also calculated by claim category (i.e., medical and prescription pharmacy claims). The prescription pharmacy cost included health plan paid costs shown for prescription drugs billed using National Drug Code (NDC). The health plan paid amount that was not identified as being the prescription pharmacy cost was considered as the medical cost.

Identifying the most frequently used diagnosis codes, procedure codes and drugs. AHS assigns a cost-driver category to health insurance claims obtained from the health plans based on the place of service (POS) code found in claims or by POS mapping provided by the data-contributing health plans. These cost-drivers are inpatient hospital, outpatient hospital, physician's office, home health, long-term care facility, laboratory services, emergency department (ED), prescription pharmacy and other. The analysis shown by POS from this study is based on the assignment of the claims to these cost drivers.

The health insurance claims billed from the inpatient hospital setting and the ED setting were analyzed for identifying most frequently occurring diagnoses codes. The health insurance claims billed from the hospital outpatient setting (e.g., ambulatory surgery center) and ED setting which showed procedure codes performed during the patients' visits, were analyzed to show the most frequently performed procedures.

The procedure codes for patient evaluation and management were excluded while determining top procedures. Prescription pharmacy claims billed using NDC codes were analyzed to show the top drug classes and the most frequently prescribed drug names for treatment and/or management of patients with SCD. Based on the percentage of members having the specified code, top diagnoses, procedures, drug classes or drug names were determined. Only the top few codes/descriptions (based on percentage of patient population having those codes) are presented to characterize health care resource utilizations for SCD patients.

Statistical analysis. The age-gender distributions of the SCD patient population are shown as the percentages. The average age and median age were calculated using means procedures of SAS (Version 9.1, SAS Institute, Cary, NC). The relative prevalence rate of the specific comorbidity condition is reported as the percentage of total study population. The difference between PMPM ($) for male and female was tested using General Lear Model (GLM) procedures of SAS (uses f-test).

FINDINGS

Age-gender:

- The study population (N=467) consisted of 56% females and 44% males (Table 1).
- The average age was 17 years (19 years for females and 14 years for males).
- Eighty-three percent of patient population was of age ≤ 30 years. The patient distribution with increasing deciles of age in years declined sharply and more so for males than for females (Figure 1).

Comorbidities:

- Fifty-nine percent of SCD patients had none of the specified comorbidities, but the remaining 41% had one or more comorbidity (Figure 2).
- Asthma, psychiatric diagnosis, urinary tract infection, headache, and hypertension were the five most prevalent comorbidities (Figure 3). Relative prevalence rate of asthma was the highest at 17% of study population among all comorbidities examined.

Health plan costs:

- The overall average health plan cost PMPM was $1,754 (95% confidence intervals: $1,433 and $2,075).
- By claim category: $1,484 for medical and $270 for prescription pharmacy.
- By gender: $1,625 for females and $1,919 for males.
- By age-group: $938 ± 137 for 0 to 10 years; between $2,068 and $2,860 for other four higher age-groups with n per subgroup >=10.

Top diagnosis and procedures by specific place of service:

- The most frequently found diagnosis code in the claims from inpatient hospital and ED settings was "Hb-SS disease with crisis" (ICD9 code=282.62).
- The most frequently performed procedure in an outpatient hospital setting was "blood count; complete CBC" (CPT code=85025).

Most frequently used prescription drugs:

- For drugs billed using NDC, the top three drug classes based on utilization were (1) hematopoietic agents, (2) analgesics – opioids, and (3) penicillins.
- The top five most frequently prescribed drug names were (1) folic acid, (2) penicillin V potassium, (3) ibuprofen, (4) hydroxyurea and (5) oxycodone/acetaminophen.

Table 1. Demographic characteristics of individuals (N=467) with sickle cell disease (SCD) health-insured at different health insurance plans in the U.S.

Item	Population	N	Characteristics*
N	All	467	100%
By gender	Female/Male	262/205	56%/44%
By product	Commercial/Medicaid	171/296	37%/63%
Mean/median age			
	All	467	17/14 yrs
	Female	262	19/16 yrs
	Male	205	14/12 yrs
By age group	0 to 10 yrs	183	39%
	11 to 20 yrs	134	29%
	21 to 30 yrs	69	15%
	31 to 40 yrs	42	9%
	41 to 50 yrs	32	7%
	51 to 60 yrs	6	1%
	61 to 70 yrs	1	0%
	>70 yrs	0	0%

*Age calculated as of June 30, 2010.

Figure 1. Patient distribution (%) of SCD patients health-insured by multiple health plans shown by age in deciles of years and by gender for N=467 SCD patients (262 females and 205 males).

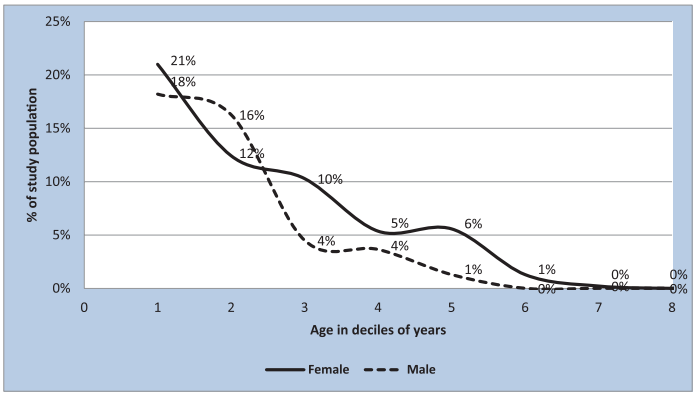


Figure 2. Percentage (%) distribution of sickle cell disease (SCD) patient population (N=467) by number of comorbidities. The comorbidity count of one or more could include any of the 29 comorbidities considered for this study.

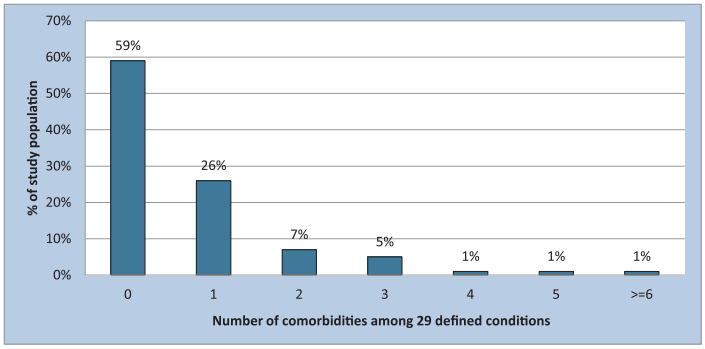
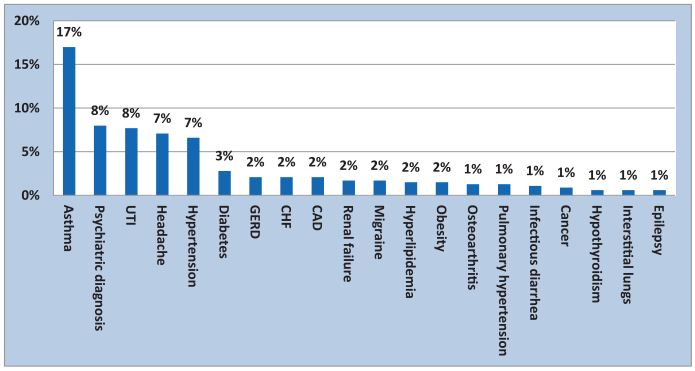


Figure 3. Relative prevalence of 20 comorbidities (among 29 specified conditions) in patient population consisting of N=467 individuals with sickle cell disease (SCD).



UTI=urinary tract infection; GERD=gastro-esophageal reflux disease; CHF= congestive heart failure; CAD=coronary artery disease.

Table 2. Health plan paid PMPM ($) overall, by gender, and by age-group for individuals with sickle cell disease (SCD) who are health-insured at different commercial and Medicaid health insurance plans.

Item/Group	N	Mean PMPM (SEM), $
Overall mean	467	1,754 (SEM=164)
By claim category		
Medical	467	1,484 (SEM=151)
Pharmacy	467	270 (SEM=42)
By gender		
Female	262	1,625 (SEM=219)
Male	205	1,919 (SEM=248)
By product type		
Commercial	171	1,825 (SEM=238)
Medicaid	296	1,712 (SEM=220)
By age group		
0 to 10 yrs	183	938 (SEM=137)
11 to 20 yrs	134	2,068 (SEM=426)
21 to 30 yrs	69	2,729 (SEM=402)
31 to 40 yrs	42	2,088 (SEM=404)
41 to 50 yrs	32	2,860 (SEM=841)
51 yrs and older	<10	**

PMPM=per member per month; SEM=standard error of mean.
**PMPM not shown for age-groups where n per age-group was less than 10.

Table 3. Top diagnoses, procedures and drug names (based on frequency of occurrence) for specified place of service (POS) for sickle cell disease (SCD) patients during year 2010.

Item/Place of service	Rank	Code	Description	% Members with description*
Diagnosis code/ Inpatient	1	282.62	Hb-SS disease with crisis	61%
	2	282.60	Sickle cell disease, unspecified	43%
	3	282.61	Hb-SS disease without crisis	17%
Diagnosis code/ED	1	282.62	Hb-SS disease with crisis	54%
	2	282.60	Sickle cell disease, unspecified	23%
	3	786.50	Chest pain, unspecified	21%
Procedure code/ Outpatient	1	85025	Blood count; complete (CBC)	14%
	2	83020	Hemoglobin fractionation & quantitation	11%
	3	85045	Blood count; reticulocyte, automated	11%
Procedure code/ED	1	71020	Radiologic examination, chest 2 views	16%
	2	71010	Radiologic examination, chest 1 view	6%
	3	93010	Electrocardiogram routine ECG	6%
Drug class/NDC Rx	1	**	Hematopoietic agents	50%
	2	**	Analgesics - opioids	48%
	3	**	Penicillins	38%
	4	**	Analgesics - anti-inflammatory	32%
	5	**	Antineoplastic and adjunctives	24%
Drug name/NDC Rx	1	**	Folic acid	49%
	2	**	Penicillin V potassium	26%
	3	**	Ibuprofen	25%
	4	**	Hydroxyurea	24%
	5	**	Oxycodone/acetaminophen	16%
	6	**	Azithromycin	13%
	7	**	Amoxicillin	13%
	8	**	Acetaminophen/codeine #3	11%
	9	**	Vitamin D	11%
	10	**	Oxycodone HCl	10%

*Percentage of members having descriptions specified.
**Multiple codes exist for the same description. ED=emergency department.

CONCLUSION

The cohort of health-insured SCD patient population used for this study consisted of more females than males (56% vs. 44%). The average age was 17 years. Asthma, psychiatric diagnosis, urinary tract infection, headache and hypertension are the five most prevalent comorbidities. The cost PMPM for SCD patients in 2010 was $1,754. The most frequent diagnosis for hospital inpatient admits and ED visits was "Hb-SS disease with crisis." Besides hematopoietic agents, painkillers containing narcotic substances were the most frequently prescribed medications. The treatment of SCD in 2010 was centered toward controlling pain and treating underlying sickle cell anemia.

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