forHealth™ CONSULTING at UMass Chan Medical School

ForHealthConsulting.umassmed.edu

An Evaluation of Disease Modifying Agents for Sickle Cell Disease and Their Impact on the Utilization of Healthcare Services Including Emergency Department Visits and Inpatient Hospitalizations in a Medicaid Population

Anhar Eldesouky, PharmD
Edward Pudim III, PharmD, MPH
Mark Tesell, PharmD, BCPS
Thomas C. Pomfret, PharmD, MPH, BCPS
Karen Stevens, PharmD
Caroline J. Alper, MD
Scott Bacon, PharmD
Karen Clements, ScD
Mckenzie McVeigh, PharmD, MS
Natalie Rodenberg, PharmD, BCPS
Diala Nicolas, PharmD, BCPS
Kimberly Lenz, PharmD, MBA, FAMCP

INTRODUCTION

- Sickle cell disease (SCD), is a group of inherited red blood cell (RBC) disorders affecting more than 100,000 individuals in the United States.
- Sickle cell disease is caused by a mutation in the beta-globin gene causing the production of sickle hemoglobin, resulting in the abnormal shaping of RBCs. Sickled RBCs undergo hemolysis and can adhere to vessel walls, causing blockages, anemia, and tissue damage. More severe complications such as strokes, acute chest syndrome, infections, and pain crises often require acute care interventions, including emergency department (ED) visits and inpatient hospitalizations.
- Treatment of SCD focuses on managing symptoms and preventing complications. Hydroxyurea (HU), a disease modifying therapy, is the standard of care, while curative treatment includes bone marrow or stem cell transplants.
- Additional novel disease modifying therapies (nDMTs) have become available in recent years, including crizanlizumab (Adakveo®), L-glutamine (Endari®), and voxelotor (Oxbryta®), which can be used either alone or in conjunction with HU. In 2023, two gene therapies were approved for the treatment of SCD.
- There is limited real world evidence comparing therapeutic outcomes associated with HU (with or without the use of nDMTs) in the Medicaid population.

OBJECTIVE

To compare the average number of ED visits and inpatient hospitalizations among members with SCD receiving HU with or without a nDMT, or no treatment, and to assess the impact of adherence to SCD medications on these outcomes within a state Medicaid population

METHODS

- This retrospective analysis included continuously-enrolled Massachusetts Medicaid (MassHealth) members with pharmacy and medical claims from January 1, 2022 to August 30, 2023.
- Statistical comparisons between groups were conducted using the Mann-Whitney U test for nonparametric data.
- **Inclusion Criteria:**
  - Members with a SCD ICD-10 diagnosis code in the primary or secondary billing position documented in medical claims
  - Members were stratified into three groups based on paid pharmacy and/or medical claims during the study timeframe:
    - **Group 1:** No pharmacologic treatment
      - Members with <90 days supply of disease modifying pharmacologic treatments for SCD
    - **Group 2:** HU alone
      - Members with ≥90 days supply of HU and <90 days of nDMTs
    - **Group 3:** HU + nDMT
      - Members with ≥84 days supply of overlapping HU and nDMTs
- **Exclusion Criteria:**
  - Members with third-party liability (TPL) claims
  - Members with any break in MassHealth coverage (defined as ≥45 consecutive days) during the study timeframe
- **Primary Outcome:**
  - The average number of SCD-related ED visits and inpatient hospitalizations
- **Secondary Outcome:**
  - Adherence to pharmacologic treatment in each active treatment group, with adherence measured by medication possession ratio (MPR) and adherence defined as a MPR ≥80%

RESULTS

Table 1. Demographics

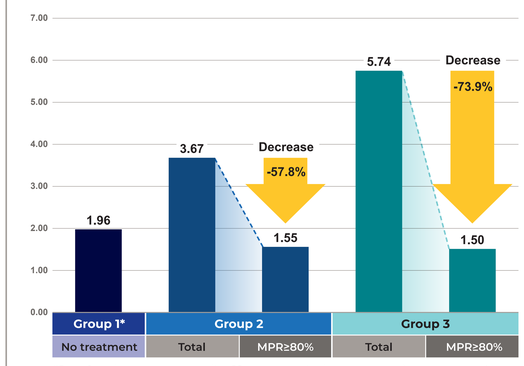
Characteristic	Group 1 (n=762)	Group 2 (n=307)	Group 3 (N=19)
Gender			
Female	37.7%	49.5%	NR*
Male	62.3%	50.5%	NR*
Age			
Mean age, years (SD)	23.3 (16.6)	19.6 (12.2)	23.2 (12.8)

*Percentages that indicate a numeric value <11 have been masked to protect confidentiality.

Table 2. Average MPR to Treatment Regimens

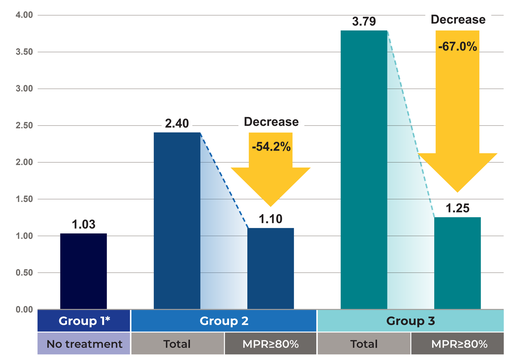
Group	Overall MPR HU	Overall MPR nDMT
2 (N=307)	55%	N/A
3 (N=19)	81%	58%

Figure 1. Average Number of ED Visits per Member



*Group 1 also included members with <90 days supply of paid pharmacy and/or medical claims for disease modifying therapies.

Figure 2. Average Number of Inpatient Hospitalizations per Member



*Group 1 also included members with <90 days supply of paid pharmacy and/or medical claims for disease modifying therapies.

Table 3. Average Number of ED Visits Per Member Stratified by MPR

Group	MPR <80%	MPR ≥80%	P-value
2 (N=307)	4.09	1.55	0.001
3* (N=19)	6.87	1.50	NR

*MPR for Group 3 was based on adherence to regimen (HU + nDMT), not the individual treatments.
NR=not reportable

Table 4. Average Number of Inpatient Hospitalizations Per Member Stratified by MPR

Group	MPR <80%	MPR ≥80%	P-value
2 (N=307)	2.66	1.10	0.018
3* (N=19)	4.47	1.25	NR

*MPR for Group 3 was based on adherence to regimen (HU + nDMT), not the individual treatments.
NR=not reportable

DISCLOSURES/ACKNOWLEDGMENTS

The authors have no financial disclosures.
Special thanks to Pelin Fitzpatrick, MBA and Jeffrey Chan for their assistance in data collection.

Poster Download Available

DISCUSSION

- Members who were adherent to treatment had fewer ED visits and inpatient hospitalizations on average when compared to those who were non-adherent to treatment across treatment groups (Tables 3 and 4).
  - For Group 2, the differences in the average number of ED visits (P=0.001) and inpatient hospitalizations (P=0.018) between adherent and non-adherent members were statistically significant.
- The average MPR for the groups where members were on pharmacologic treatment was generally <80%, with the exception of HU use in Group 3 (81%), which had a small baseline sample size and was impacted by outliers (MPR >100%). This low MPR across treatment groups may indicate potential barriers to adherence for patients receiving pharmacologic treatment (Table 2).
- Among the 1,088 participants in this evaluation, 68.9% either received no pharmacologic intervention or had <90 days of pharmacologic treatment in their claims history. This observation suggests significant under-utilization of SCD medications in the study population.

LIMITATIONS

- There were significant differences in the group sizes, and the small size of Group 3 does not provide adequate power for statistical comparison.
- Members being treated with nDMTs in the absence of HU were not included due to a small sample size.
- Only medical claims with SCD-related ICD-10 codes in the first two billing positions were included.
- Electronic health record data was not available; therefore, disease severity could not be evaluated across groups beyond the prescribed treatment.
- The use of MPR to assess adherence has limitations, including the inability to account for overlapping days supply, or paid claims with days supply that extend beyond the end of the study period. These calculations may not reflect accurate measures of adherence during the study period.
- Timing of acute care interventions relative to pharmacy and/or medical claims for pharmacologic treatment was not evaluated in this study. It is not clear if duration of therapy had any impact on outcomes in this study.

CONCLUSIONS

- This study observed that the majority of members with SCD were not receiving pharmacologic treatment; and among those receiving treatment, many did not appear to be adherent to the prescribed regimen. Among the members that were adherent to treatment in Groups 2 and 3, there was an overall percent decrease in ED visits and inpatient hospitalizations compared to nonadherent members.
- The importance of initiation and adherence to SCD therapies presents an opportunity for collaboration between healthcare providers and payers to address underutilization of SCD therapies and barriers to treatment adherence.

REFERENCES

1. Centers for Disease Control and Prevention. Sickle Cell Disorder. [webpage on the internet] Atlanta (GA): CDC; 2023 [cited 2023 Feb 22]. Sickle Cell Data & Statistics. Available from: https://www.cdc.gov/ncbddd/sicklecell/data.html.
2. Chennapragada S, Thevuthasan S, Savani S, Goyal S, Singh V, Ramphul K, et al. Characteristics and Trends of Hospitalizations for Sickle-Cell Related Complications. Blood 2023; 142 (Supplement 1): 2305.
3. Hydroxyurea [Package Insert]. Columbus, OH: American Health Packaging, Inc; 2023 Oct.
4. Brandow A, Carroll P, Creary S, Edwards-Elliott R, Glassberg J, Hurley R, et al. American Society of Hematology 2020 guidelines for sickle cell disease: management of acute and chronic pain. Blood Adv 2020; 4 (12): 2656–2701.
5. Centers for Disease Control and Prevention Recommendations & Guidelines. [webpage on the internet] Atlanta (GA): CDC; 2023 [cited 2023 Feb 22]. Available from: https://www.cdc.gov/ncbddd/sicklecell/recommendations.html.