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Sickle Cell Legislative Report

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Executive Summary

Sickle cell disease (SCD) is a multisystem disorder that manifests a few months after birth. It is the most prevalent lifelong inherited blood disorder, affecting more than 100,000 people in the United States. SCD is a disease process with deep ramifications for health equity, and incidence estimates for sickle cell trait (based on information provided by 13 states) are 73.1 cases per 1,000 Black newborns, 3.0 cases per 1,000 white newborns, and 2.2 cases per 1,000 Asian or Pacific Islander newborns. The incidence estimates for Hispanic ethnicity (within 13 states) are 6.9 cases per 1,000 Hispanic newborns.

Healthy red blood cells (RBCs) are round and move through blood vessels to carry oxygen throughout the body. SCD manifests in mutations to the beta-globin gene causing the production of sickle hemoglobin, resulting in the body producing RBCs shaped like sickles rather than normal round discs. Sickle-shaped blood cells tend to adhere to vessel walls, leading to blockage and impeding blood flow. When this occurs, oxygen cannot be delivered to body tissues effectively. This subsequently leads to episodes of pain, more frequent infections, tissue damage, and anemia. Long-term effects from SCD can lead to permanent damage to the brain, liver, kidneys, bones, spleen, and other organs. Consequently, patients with SCD are at increased risk for infections, stroke, heart disease, renal failure, and other conditions.

This report is required by Section 151 of Chapter 126 of the Acts of 2022 and includes data on the prevalence of SCD, utilization of health care services related to its management, and recommendations to improve the care of patients with SCD in Massachusetts. To solicit and consider input from the public, a public hearing was held on March 3, 2023, with specific emphasis from persons or groups with knowledge and experience in SCD treatment.

This review includes a comprehensive review of the current healthcare service landscape and discusses available covered medications, treatments, and services accessible to MassHealth patients. This report reviews data from October 1, 2020, through September 30, 2022, and also discusses programs around SCD medication management, care access, and care coordination. This report explores specific opportunities and challenges identified for this population with input from the public, including via the public hearing held on March 3, 2023.

The team supporting this project includes MassHealth program staff in collaboration with UMass Chan Medical School's ForHealth Consulting unit.

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Introduction: SCD Background and Relevance

SCD is an inherited disorder of a protein called hemoglobin in RBCs. RBCs, and specifically hemoglobin, are responsible for carrying oxygen in the blood to the body's tissues. Normal RBCs are round shaped. A person with SCD receives two genes, one from each parent, that code for an abnormality in the beta-globin gene of hemoglobin. The resulting presence of this changed hemoglobin causes RBCs to become sickle-shaped, and this distortion can cause the RBCs to block off blood vessels and impede the delivery of oxygen. Another type of abnormal hemoglobin causes milder disease. These effects can physically cause small blood vessel occlusion resulting in downstream damage to cells, tissues, and organs due to lack of oxygen and blood flow. This process can be further complicated by the release of inflammatory mediators, which may result in further injury and pain.[1]

Clinical manifestations of SCD arise from several resulting effects from these processes. These can include damage to the spleen and sequestration of excess blood within the spleen, resulting in increased risk of infections after splenic loss or non-function. Loss of organ perfusion can also result in pain crises, blood clots, damage to bone tissues and cell lines, loss of ability to produce new blood cells, stroke, heart attack, and a phenomenon called acute chest syndrome. Long-term complications can include anemia; neurologic effects and seizures; heart, lung, kidney, and liver complications; retinal damage; growth defects; and more. Painful episodes and complications can occur without warning. Manifestations of SCD are heterogenous in nature and vary from person to person. The table below shows the prevalence of SCD in the MassHealth population, reflecting 1,544 persons amongst total membership of approximately 2 million individuals. Survival for people with SCD has improved with better treatments such as hydroxyurea (HU), antibiotics, immunizations, and earlier interventions. Whereas death rates in the developing world are extremely high in childhood, median survival for adults in developed settings with access to care is reaching median life expectancies in the 50-60s age range. Compared to the general population, however, despite advances, SCD still presents a higher risk of complications and death, and it still remains a significant cause of early mortality in the United States. Nonetheless, survival rates for those with access to treatment have been shown to be above 90% by age 18.[2] Recent data indicate that SCD-related deaths in developed settings occur more often at older ages and are more likely to be related to chronic complications of the disease than to acute complications. More research and solutions regarding prevention and treatment of chronic complications of SCD are needed as people with SCD are living longer.[3]

Participation from those who attended MassHealth's public hearing for this report echoed the heterogenous nature of this disease. The hearing was attended by parents, patients with SCD, medical staff who care for those with SCD, advocates, and others. One patient

attended the hearing remotely from their own hospital bed, and many spoke of the impact of this disease upon their lives and families. “(I) advocate hard for myself and the fellow sickle cellers. We are not textbook. So each and every one of us that deal with sickle cell, we are all different. We all have our own regimen or our own treatment plans.” Medical staff who attended the hearing also spoke to the inequities surrounding this disease. One attendee noted: “When we talk about comparing sickle cell disease to its chronic congenital cousins on the whole, there is an enormous discrepancy in the way that the disease is funded. It is outspent by other congenital chronic diseases from an industry-sponsored trial basis by two to one, it's outspent in terms of National Institutes of Health funding by four to one, and it's outspent in philanthropy by eighty to one. Most of what we are able to pull together for sickle cell disease resources is reliant on either the generosity of our hospitals or the generosity of outside donors and that's it. And that is shameful. It is shameful for a disease that affects more people than cystic fibrosis or hemophilia, and yet has far, far fewer resources.” One patient also noted: “For a long time, I felt like our care wasn’t up to par. I feel we come second to cancer patients, and I just think not only for me but for everyone with sickle cell, things really need to change. I will say that things have started to change over the past year, but it’s just been a long time coming where things haven’t been right.”

Table 1. Population of Medicaid and Children's Health Insurance Program (CHIP) Beneficiaries with SCD by Age Group (As per age as of September 30, 2022)

Age Group	Ages 0-5		Ages 6 to 12		Ages 13 to 20		Ages 21 to 45		Ages 46 to 64		Ages 65 and older		Total Population
	N	%	N	%	N	%	N	%	N	%	N	%	N
1: Total	195	12.63%	257	16.65%	271	17.55%	602	38.99%	175	11.33%	44	2.85%	1,544
2: Dually Eligible	0	0.00%	0	0.00%	1	0.41%	139	56.73%	68	27.76%	37	15.10%	245
3: Non–Dually Eligible	195	15.01%	257	19.78 %	270	20.79%	463	35.64%	107	8.24%	7	0.54%	1,299
4: Continuous 24 Months	121	9.63%	228	18.15%	235	18.71%	487	38.77%	148	11.78%	37	2.95%	1,256
5: No Continuous Enrollment Under 2 Years Old	58	100%									0		58
6: Continuous 12 Months Over 2 Years Old	8	5.41%	15	10.14%	26	17.57%	77	52.03%	18	12.16%	4	2.70%	148
7: Continuous <12 Months Over 2 Years Old	8	9.76%	14	17.07%	10	12.20%	38	46.34%	9	10.98%	3	3.66%	82

Notes:

1. Total - Exclude third-party liability (TPL), include both dual eligible for Medicare and non–dual eligible, no continuous enrollment requirement. N2+N3 = N1; N4+N5+N6 = N1
2. Dually Eligible - Exclude TPL, include dual eligible only, no continuous enrollment requirement.
3. Non–Dually Eligible - Exclude TPL, exclude dual eligible, no continuous enrollment requirement.
4. Continuous 24 Months - Exclude TPL, both dual eligible and non–dual eligible, 24 months continuous enrollment requirement.
5. No Continuous Enrollment Under 2 Years Old - Exclude TPL, both dual eligible and non–dual eligible.
6. Continuous 12 Months over 2 Years Old - Exclude TPL, both dual eligible and non–dual eligible, 12 months continuous enrollment requirement.
7. Continuous <12 Months over 2 Years Old - Exclude TPL, both dual eligible and non–dual eligible, <12 months continuous enrollment requirement.

Caring for People with SCD

There are various and branching components to caring for people with SCD. Healthcare services for people with SCD can be considered in two broad categories: health maintenance and prevention, and the management of complications.[4]

The goal of health maintenance is to screen, identify risk factors, deploy preventative measures, and proactively manage the care of those with SCD while monitoring for early signs of complications. Where complications are found, early upstream interventions are merited. Early health screening is important in achieving positive outcomes in this population. The table below shows the total number of beneficiaries with SCD screened by age group under 21 years of age. The results of this analysis indicate a high degree of screening success for this population.

Table 2. Health Screenings among Medicaid and CHIP Beneficiaries with SCD Under Age 21 by Age Group

Age Group	Total number of beneficiaries with SCD	Number of beneficiaries with SCD with at least 1 health screening	Percentage of beneficiaries with SCD with at least 1 health screening
Ages 0 to 5	179	178	99.44%
Ages 6 to 12	228	227	99.56%
Ages 13 to 20	234	231	98.72%
Total (Ages 0-20)	641	636	99.22%

Notes:

Total Number of Beneficiaries - Exclude TPL, exclude dual eligible, 24 months (about 2 years) continuous enrollment except for beneficiaries less than 2 years old.

The course and physical manifestations of SCD patients range from being asymptomatic (often in the first few months of life as the body is still producing a fetal version of hemoglobin) to a subsequent broad range of presentations. In the United States, patients are diagnosed with SCD prior to manifestations of the disease, with newborn or prenatal screening. The diagnosis

is based on hemoglobin electrophoresis studies that quantify the types of hemoglobin and hemoglobinopathies present. Further lab evaluations can consist of complete blood count (CBC), reticulocyte counts and bilirubin levels (measures of blood cell production), complete metabolic panel (liver and kidney function), and blood type crossmatching.

Once a diagnosis is established, primary prevention is ideally initiated by establishing care with a hematologist or specialty center for SCD care. Mainstays of preventative care include early initiation of HU as a mainstay of therapy, appropriate immunizations, prophylactic antibiotics in the early years of life, screening for early complications, and education and lifestyle guidance.[1,4]

Transcranial Doppler Ultrasound

Transcranial Doppler ultrasound (TCD) screening can identify children and adolescents diagnosed with SCD who are at risk of stroke. TCD is recommended for patients with SCD ages 2 to 16 to assess intracranial vasculature. It offers a non-invasive, radiation-free way to monitor for risk of and incidence of stroke and, where risk is present, to offer intervening and preventative next steps.[1] As indicated in the table below, approximately 50% of MassHealth enrollees on average received TCD screening annually.

Table 3. TCD Screenings among Medicaid and CHIP Beneficiaries Ages 2 to 16 with SCD by Age Group

Age Group	1: Total number of beneficiaries with SCD	Number of beneficiaries with 0 TCD screenings and %		Number of beneficiaries with at least 1 TCD screening and %	
	N	N	%	N	%
Total (Ages 2-16)	482	240	50%	242	50%
Age 2 to 5	121	62	51%	59	49%
Age 6 to 12	228	109	48%	119	52%
Age 13 to 16	133	69	52%	64	48%

Notes:

Total Number of Beneficiaries - Exclude TPL, exclude dual eligible, 24 months (about 2 years) continuous enrollment except for beneficiaries less than 2 years old.

Further screening techniques beyond TCD are also done to look for neurocognitive dysfunction to prompt further evaluation for subtle or silent infarcts (strokes) during development. Children are also monitored for other manifestations of conditions that can arise from SCD or conditions that provide increased risk by being present alongside SCD. These

include retinopathy, pulmonary diseases including asthma, kidney and liver disease, hepatitis C, ulcers, anemia, bone and growth issues, and mental health conditions.

Loss of perfusion can manifest across many organs in the body, causing heterogenous effects in the SCD population. Pain crises are events where sickling in tissues in the bones, lungs, chest, and other areas can cause significant pain, inflammation, and need for early recognition and intervention for those involved. Such patients may require hydration, pain control with medications that can include opiates, and transfusions. Further perfusion defect events can include strokes, heart attack, and loss of bone marrow function.

Longer-term manifestations and complications can arise from both complications of acute events and those that build more over time. These can include anemia, seizures, heart manifestations such as arrhythmias and heart failure, lung manifestations including risk of pulmonary hypertension, liver damage, retinal damage, growth defects, priapism, pregnancy complications, and more.

Manifestations of SCD are heterogenous and vary from person to person with the disease's genetic profile. Signs and symptoms can vary from patient to patient. Management of SCD complications is tailored to each patient and the type of complication, leading to many branching management pathways that are individualized to each patient. Attendees of MassHealth's hearing noted the importance of multidisciplinary care in SCD and the need for both protocols to better standardize care for those living with the disease and also the personalization of those protocols for patients. One attendee noted that their clinic features primary care physicians; specialists in hematology, pulmonology, and nephrology; a behavioral health specialist; social workers; patient navigators; and research coordinators under their umbrella. Such a site also uses telehealth services to allow for SCD experts to consult on patients who are not physically able to come to such a Center of Excellence. They noted that access disparities do exist across patient groups and geographies of the state and that technologies such as telehealth provision help close such gaps. They continued to push for that same level of access to be available for all those with this disease. Of note, MassHealth has continued to cover telehealth visits at payment parity with in-person visits since the beginning of the Covid-19 pandemic.

Because SCD complications and acute events can occur without warning, SCD patients often rely on emergency settings for care more often than the general population. Table 4 describes emergency department (ED) utilization in the SCD population versus those without SCD. Table 5 describes inpatient hospital admission trends in those with SCD versus those without SCD.

Healthcare Services

SCD can feature many complications. These events can come on suddenly and without warning, both in an increased manner for those without optimal prevention measures taken and for those where all prevention measures have been deployed. These complications include pain crises, damage to organs from loss of blood flow including heart attack and stroke, and more.

The exact nature of ED visits and hospitalizations related to SCD can be difficult to ascertain. Multiple diagnosis codes may be put on a hospital presentation in data that can be collated by a payor like MassHealth. Without the ability to review individual medical records from these events, it is more difficult to determine at a population level, comprehensively and reliably, if SCD was a driving cause of a hospital presentation, an associated cause related to the primary issue affecting the member, or an unrelated cause that was managed while in the hospital but unrelated to the primary event.

Data on ED visits and hospitalizations are presented below in Table 4 and Table 5 for the MassHealth SCD population in comparison to the general population. With this condition and the limit of current prevention measures available, the SCD population requires a higher number of ED visits and hospitalizations than their general population counterparts at most ages. This is apparent especially at younger age cohorts. The number of ED visits and hospitalizations increases for the general population in later ages of adulthood, while the SCD population itself decreases due to earlier mortality at all ages, especially beyond 50 years of age.

In comparing these data to a national cohort, the Medicaid and CHIP Sickle Cell Disease Report, T-MSIS Analytic Files (TAF) 2017, published in 2021, provides data showing for the national cohort that 43.8% of those with SCD ages 0–5 have 2–5 ED visits, versus 16.5% of those without SCD. These are in comparison to 33.6% of those in the same-aged MassHealth cohort with SCD. At ages 21–45, nationally 33% of those with SCD ages 21–45 have 2–5 ED visits, versus 18% of those without SCD. These are in comparison to 40.4% of those in the same-aged MassHealth cohort with SCD. However, the same data limitations influence the state-level and nationwide data, making exact interpretations and comparisons difficult.

Table 4. MassHealth enrollees by age with & without SCD with 2 or more hospital ED visits with a vaso-occlusive episode or pain crisis

Age Group	1: Medicaid and CHIP beneficiaries with SCD with ED Visits			2: Medicaid and CHIP beneficiaries without SCD with ED Visits		
	2 ED %	3-5 ED %	>5 ED %	2 ED %	3-5 ED %	>5 ED %
Ages 0 to 5	14.0%	19.6%	8.9%	10.5%	9.8%	2.2%
Ages 6 to 12	16.7%	15.8%	5.3%	6.3%	3.8%	0.5%
Ages 13 to 20	13.3%	12.4%	6.4%	9.5%	7.0%	5.3%
Age 21 to 45	16.4%	24.0%	19.7%	9.5%	9.7%	4.2%
Ages 46 to 64	19.3%	17.1%	10.2%	6.3%	3.8%	0.5%
Ages 65 or older	20.0%	20.0%	0.0%	8.8%	8.5%	3.8%
Average	**16.6%**	**18.1%**	**8%**	**8.5%**	**7.1%**	**2.8%**

Notes:

1 & 2. Beneficiaries - Exclude TPL, exclude dual eligible, 24 months (about 2 years) continuous enrollment except for beneficiaries less than 2 years old.

Table 5. MassHealth enrollees by age with & without SCD with 2 or more Inpatient hospitalizations with a vaso-occlusive episode or pain crisis, including the average length of stay for such visits.

Age Group	3: Medicaid and CHIP beneficiaries with SCD Inpatient Stays						4: Medicaid and CHIP beneficiaries without SCD Inpatient Stays					
	2 IP %	3-5 IP %	> 5 IP %	2 IP LOS	3-5 IP LOS	>5 IP LOS	2 IP %	3-5 IP %	>5 IP %	2 IP LOS	3-5 IP LOS	>5 IP LOS**
Ages 0 to 5	1.2%	0.5%	0.0%	3.37	4.33	0	2.2%	0.8%	0.1%	6.42	10.63	14.06
Ages 6 to 12	0.9%	1.0%	0.3%	3.32	3.96	7.93	0.2%	0.1%	0.1%	6.08	8.73	15
Ages 13 to 20	1.6%	1.1%	1.1%	4.35	5.56	15.43	0.5%	0.3%	0.2%	7	9.05	12.14
Age 21 to 45	1.8%	3.5%	4.1%	5.12	7.41	11.87	1.7%	1.2%	1.0%	5.03	6.63	8.09
Ages 46 to 64	0.1%	0.3%	0.3%	7	18.6	13.17	2.2%	1.9%	1.2%	6.1	7.1	7.24
Ages 65 or older	0.0%	0.0%	0.0%	0	0	0	2.0%	1.5%	0.4%	7.45	8.49	9.7
Average	**0.9%**	**1.0%**	**1.0%**	**3.86**	**6.64**	**8.06**	**1.5%**	**0.9%**	**0.5%**	**6.34**	**6.43**	**11.03**

Notes:

3 & 4. Beneficiaries – Excludes third-party liability, excludes dual eligible (Medicare/Medicaid), 24 months continuous enrollment except for beneficiaries less than 2 years old.

5. **Data N less than 12 is insufficient data

Attendees at the public hearing spoke to the importance and frequent inequities related to emergency-related care. Such care is best deployed when the receiving site of the patient knows the patient's care plan and this patient population. Such sites can rapidly put these care plans into action to help treat the patient, prevent further consequences of the acute crisis, and potentially present hospitalization. However, when sites do not know a patient's pain plan, or are not familiar or comfortable with the disease state, the care can be delayed and insufficient. Similar effects can happen if an ED is too busy to provide close care to these patients in crisis. One patient noted: "A lot of times the ER waits are dangerously long and then even when you do get someone in the ER again, they're not familiar with sickle cell, so they don't how to work with you or then you're blatantly just mistreated because you're thought of as being a drug seeker and this is a disease that we have no control over, that we don't ask for." Another caregiver noted: "Timely and personalized management of vaso-occlusive crisis and other emergencies is important. Through use of standardization of protocols, institution of appropriate pain medications within the first hour of presentation to an emergency department is key to getting the pain crisis under control. The institution of pain medications within the first hour of presentation to an emergency department is key to actually getting the pain crisis under control and allowing the patient to go home. If a patient is waiting for four hours to receive treatment, the game is lost and the patient is going to be hospitalized." Of note, it is difficult for MassHealth's data to differentiate the hours between which medications were given, as these are reflected in individual patient charts, rather than claims data. Another family noted difficulty in getting transportation to clinics or acute settings when a pain crisis comes on, as these come on unexpectedly. MassHealth recognizes that there is indeed an addressable gap in ensuring EDs across Massachusetts are aware of emergency plans from established centers for individual patients, but addressing this issue will require action beyond the MassHealth program. Addressing such gaps could also serve other patients with rare diseases in the Commonwealth.

Also of note, many of those with SCD may reach Medicare-eligible age or become disabled due to their disease and become dually eligible for both Medicare and Medicaid. These populations may be in an integrated plan uniting the two benefit structures within MassHealth and Medicare. Senior Care Options (SCO) are dual eligible plans within MassHealth for those who are above the Medicare eligibility age of usually 65 and older and also qualify for Medicaid. OneCare plans are for those younger than 65 years of age who qualify for Medicare by disability and for MassHealth. Members may also qualify for both Medicare and Medicaid and not receive their coverage by a unified plan and have their coverage split across Medicaid and Medicaid baseline offerings. Due to this, data for these populations may be split across multiple insurance systems, adding difficulty to comprehensively reporting out data on this population.

One attendee of the public hearing noted the ongoing difficulty for them in aging with SCD. "When we were born we were told we are not going to reach past the age of 18 or 20… but now I'm 50 years old… I am a nurse, but because I'm sick all (of) the time, my job is tired of me. So what kind of resources can [we] have to help us live as normal human beings?... I don't know where to go. I apply for disability, I can't get disability… that's my concern, once you're an adult

and past the age that we're supposed to be dead by now, and now you don't know what to do with yourself."

Pharmaceutical Management

Infection Prevention

Individuals with SCD have an increased risk of severe bacterial infection resulting from reduced or absent splenic function. The result is an extremely elevated risk of septicemia and meningitis, primarily due to *Streptococcus pneumoniae*. The National Heart, Lung, and Blood Institute (NHLBI) recommends that all newborns identified with Hb-SS (which is one form of SCD) should promptly receive twice-daily prophylactic penicillin at least until the age of five years old, as well as pneumococcal vaccination and all other age-appropriate vaccinations.[4] The Centers for Disease Control and Prevention's (CDC's) Advisory Committee on Immunization Practices (ACIP) specifically recommends that children with SCD should receive four doses of the 13-valent conjugate pneumococcal vaccine (PCV13) before age 2.[6] On June 22, 2022, the ACIP recommended use of PCV15 as an option for pneumococcal conjugate vaccination of persons aged < 19 years according to currently recommended PCV13 dosing and schedules.[7] Refer to Table 6 for utilization information for pneumococcal vaccines for the above-mentioned group.

Antibiotic utilization is an important component of SCD care, but antibiotic data is not highlighted in this report for several reasons. First, without medical records, it would be difficult to discern the rationale for use of each antibiotic and would thus limit the interpretation. In addition, there are expected to be situations in which antibiotic resistance patterns, patient allergies, and provider choices would impact individual decisions for antibiotic prophylaxis. This would thus cause undue speculation and assumptions of appropriate or adequate utilization within the member population. Oral antibiotics and vaccines for use in the prevention of infection are currently available without prior approval.

Table 6. Pneumococcal Vaccinations among MassHealth Beneficiaries < 2 years old with SCD from 10/1/2020 through 9/30/2022

Age group[a]	*Total # of beneficiaries* with SCD[b]	Beneficiaries with at least 1 pneumococcal vaccination during 10/1/20 to 9/30/22	
		N	%
< age 2	58	24	41%

Notes:

a. Age group assigned using each beneficiary's age as of 9/30/22.
b. Results include beneficiaries who were enrolled between 10/1/20 and 9/30/22 and had at least two claims with a diagnosis of SCD during that period (see ICD-10 codes listed in Appendix I). Due to the short age span evaluated, the members were not required to have continuous enrollment for the full study period.
Pneumococcal vaccine use was identified through medical claims using specific Current Procedural Terminology (CPT) codes (see Appendix II).

A comparison of this current report of pneumococcal vaccinations versus that from the Medicaid and CHIP Sickle Cell Disease Report, T-MSIS Analytic Files (TAF) 2017 highlights a lower percentage of beneficiaries with at least one pneumococcal vaccination during the year. The national report from 2017 featured a 59.1% rate as compared to 41% for MassHealth beneficiaries.[8] Some of this discrepancy could be attributed to the period evaluated, as the vaccination rate fell during the Covid-19 pandemic when individuals may not have been visiting prescriber offices as frequently. Per the Morbidity and Mortality Weekly Report (2019–2021) put out by the CDC, "among children born during 2018 to 2019, coverage among those who were uninsured and those insured by Medicaid or other insurance was lower than that among privately insured children for all vaccines except the HepB birth dose, which was lower among uninsured children only. The proportion of children who were unvaccinated by age 24 months was eight times higher for uninsured compared with privately insured children."[9]

Disease-Modifying Agents

The first drug approved by the U.S. Food and Drug Administration (FDA) for SCD treatment was Droxia® (hydroxyurea) capsule in 1998.[10] It was only approved for individuals ≥18 years of age who have had at least three painful crises in the past year, though prescribers had generally been using HU off-label to treat children as young as 9 months of age, in accordance with the NHLBI guidelines.[4] The FDA officially approved the use of HU in pediatric SCD patients aged 2 to < 18 years of age in December 2017 with the approval of Siklos® (hydroxyurea) tablet. HU is the mainstay treatment of SCD and reduces pain and other vaso-occlusive complications, decreases hospitalization, and improves overall survival. HU is also thought to produce a cytotoxic and cytoreductive effect, which may contribute to beneficial effects including increasing fetal hemoglobin levels in RBCs, decreasing neutrophils, increasing deformability of sickled cells, and altering the adhesion of RBCs to the endothelium. Siklos® is the only form of HU that can be crushed for solubility.[11]

In 2017, Endari® (l-glutamine oral powder) was approved for individuals ≥ five years of age with SCD to reduce acute complications. This agent is the L-enantiomer of the amino acid glutamine and has been shown to be safe and effective as a maintenance treatment for SCD. The mechanism of action of l-glutamine in treating SCD is not fully understood, but it is thought that l-glutamine improves the nicotinamide adenine dinucleotide (NAD) redox potential in sickle RBCs, lessening the oxidative damage done to sickle RBCs. All RBCs are subject to oxidative damage, but sickle RBCs are more susceptible than normal RBCs, leading to the chronic hemolysis and vaso-occlusive events associated with SCD.[12]

Adakveo® (crizanlizumab-tmca) and Oxbryta® (voxelotor) were the latest agents to receive FDA approval, in November 2019. Adakveo® (crizanlizumab-tmca) was approved to reduce the frequency of vaso-occlusive crises (VOCs) in individuals ≥ 16 years of age with SCD.[13] Oxbryta® (voxelotor) was approved for the treatment of SCD in individuals ≥ 12 years of age with SCD. This expanded to those 4 to 11 years of age with SCD in December 2021.[14]

SCD is associated with chronic inflammation, which causes higher levels of cell adhesion proteins such as P-selectin. These proteins make both the blood vessels and certain blood cells stickier and prone to clusters in the bloodstream. Adakveo® (crizanlizumab-tmca) is the first humanized anti-P-selectin monoclonal antibody.[13] Oxbryta® (voxelotor) is an oral HbS (sickle hemoglobin) polymerization inhibitor. Nonclinical studies suggest that voxelotor may inhibit RBC sickling, improve RBC deformity, and improve anemia (as measured by an increase in hemoglobin).[14]

MassHealth covers Droxia® (hydroxyurea) capsules and HU 500 mg capsules available without prior authorization. The other disease-modifying agents, Adakveo® (crizanlizumab-tmca), Endari® (l-glutamine oral powder), Oxbryta® (voxelotor), and Siklos® (hydroxyurea) tablets, are available with prior authorization. Approval requires appropriate age; specialist involvement; use of HU (as appropriate); documentation of sickle cell crises in the previous 12 months; and, where appropriate, medical necessity of requested formulation such as Siklos® (hydroxyurea) tablets and Oxbryta® 300 mg tablets for oral suspension due to the higher cost associated with these agents.

The NHLBI guidelines were last updated in 2014. They strongly recommend the use of HU for adults with SCD who experienced ≥ three moderate to severe pain crises in a 12-month period, pain or chronic anemia interfering with daily activities, or severe or recurrent episodes of acute chest syndrome (ACS). In addition, they give a strong recommendation for use in children 9 to 42 months of age and a moderate recommendation for children and adolescents > 42 months of age regardless of disease severity.[4] Tables 7, 8, and 9 below highlight HU, Endari®, and Adakveo® use respectively among MassHealth beneficiaries with SCD over a two-year period from October 1, 2020, through September 30, 2022.

Table 7. HU Use among MassHealth Beneficiaries with SCD from 10/1/2020 through 9/30/2022

Age group[a]	Total # of beneficiaries with SCD[b]	Percentage of beneficiaries with any HU use	Number of Days of HU Use Among Beneficiaries with SCD							
			1 to 90 days		91 to 180 days		181 to 270 days		More than 270 days	
			N[d]	%[d]	N[d]	%[d]	N[d]	%[d]	N[d]	%[d]
Children (Ages 33 months to 5 years)	115	29.6%	-	-	-	-	-	-	26	22.6%
Ages 6 to 12	246	41.5%	-	-	-	-	14	5.7%	74	30.1%
Ages 13 to 20	262	44.3%	19	7.3%	14	5.3%	17	6.5%	66	25.2%
Total- Children[c] (Ages 33 months to <21 years)	623	40.4%	27	4.3%	25	4.0%	34	5.5%	166	26.6%
Ages 21 to 30	284	38.7%	27	9.5%	27	9.5%	14	4.9%	42	14.8%
Ages 31 to 45	273	22.3%	22	8.1%	11	4.0%	-	-	24	8.8%
Ages 46 to 54	87	14.9%	-	-	-	-	-	-	-	-
Ages 55 to 64	58	19.0%	-	-	-	-	-	-	-	-
Ages ≥ 65	16	0	-	-	-	-	-	-	-	-
Total- Adult (≥ 21 years)	718	27.2%	54	7.5%	41	5.7%	19	2.6%	81	11.3%
Total	**1,341**	**33.3%**	**81**	**6.0%**	**66**	**4.9%**	**53**	**4.0%**	**247**	**18.4%**

Notes:

a. Age group assigned using each beneficiary's age as of 9/30/22.

b. Results include beneficiaries who were enrolled with full or comprehensive benefits between 10/1/20 and 9/30/22 and had at least two claims with a diagnosis of SCD during that period (see ICD-10 codes listed in Appendix I).

c. Definition of children (< 21 years of age) based on the Early and Periodic Screening, Diagnostic, and Treatment (EPSDT) benefit assignment.

d. Some fields contain less than 11 members and have been omitted to protect confidentiality.

HU use was identified using the GSNs (see Appendix II) reported on pharmacy claims. For this analysis, the number of days of HU use reflects the number of calendar days from 10/1/20 through 9/30/22 that a beneficiary was covered with a prescription for HU.

To align with the NIH recommendation for HU use for people aged 9 months and older, this analysis includes people who were at least 9 months old for the entire study period.

The NHLBI guideline has not yet been updated to address the place in therapy for the other disease-modifying agents shown below.

Table 8. Endari® (l-glutamine) Use among MassHealth Beneficiaries with SCD from 10/1/2020 through 9/30/22

Age group[a]	Total # of beneficiaries with SCD[b]	Percentage of beneficiaries with any Endari use
Children (≥ 5 years and < 21 years)[c]	541	2.2%
Adults (≥ 21 years)	718	1.7%
Total	**1,259**	**1.9%**

Notes:
a. Age group assigned using each beneficiary's age as of 9/30/22. (Age range of ≥ 5 years of age based on current FDA labeling of Endari®.)
b. Results include beneficiaries who were enrolled with full or comprehensive benefits between 10/1/20 and 9/30/22 and had at least two claims with a diagnosis of SCD during that period (see ICD-10 codes listed in Appendix I).
c. Definition of children (< 21 years of age) based on the Early and Periodic Screening, Diagnostic, and Treatment (EPSDT) benefit assignment.
Endari® use was identified using the GSNs (see Appendix II) reported on pharmacy claims. For this analysis, the number of days of Endari® use reflects the number of calendar days from 10/1/20 through 9/30/22 that a beneficiary was covered with a prescription for Endari®.

Table 9. Adakveo® (crizanlizumab-tmca) Use among MassHealth Beneficiaries with SCD from 10/1/2020 through 9/30/2022

Age group[a]	Total # of beneficiaries with SCD[b]	Percentage of beneficiaries with any Adakveo use
Children (≥ 16 years and < 21 years)[c]	149	18.1%
Adults (≥ 21 years)	718	1.5%
Total	**867**	**4.4%**

Notes:
a. Age group assigned using each beneficiary's age as of 9/30/22. (Age range of ≥ 16 years of age based on current FDA labeling of Adakveo®.)
b. Results include beneficiaries who were enrolled with full or comprehensive benefits between 10/1/20 and 9/30/22 and had at least two claims with a diagnosis of SCD during that period (see ICD-10 codes listed in Appendix I).
c. Definition of children (< 21 years of age) based on the Early and Periodic Screening, Diagnostic, and Treatment (EPSDT) benefit assignment.
Adakveo® use was identified using the GSN codes for pharmacy claims and J-codes reported on medical claims (see Appendix II). For this analysis, the number of doses of Adakveo® use reflects the number of calendar days from 10/1/20 through 9/30/22 that a beneficiary had a pharmacy or medical claim for Adakveo®. Typical dosing is 5 mg/kg by intravenous infusion at Week 0, Week 2, and every 4 weeks thereafter.

Table 10. Oxbryta® (voxelotor) Use among MassHealth Beneficiaries with SCD from 10/1/2020 through 9/30/2022

Age group[a]	Total # of beneficiaries with SCD[b]	Percentage of beneficiaries with any Oxbryta use
Children (≥ 4 years and < 21 years)[c]	570	1.2%
Adults (≥ 21 years)	718	4.2%
Total	**1,288**	**2.9%**

Notes:
a. Age group assigned using each beneficiary's age as of 9/30/22. (Age range of ≥ 4 years of age based on current FDA labeling of Oxbryta®.)
b. Results include beneficiaries who were enrolled with full or comprehensive benefits between 10/1/20 and 9/30/22 and had at least two claims with a diagnosis of SCD during that period (see ICD-10 codes listed in Appendix I).
c. Definition of children (< 21 years of age) based on the Early and Periodic Screening, Diagnostic, and Treatment (EPSDT) benefit assignment.
Oxbryta® use was identified using the GSNs (see Appendix II) reported on pharmacy claims. For this analysis, the number of days of Oxbryta® use reflects the number of calendar days from 10/1/20 through 9/30/22 that a beneficiary was covered with a prescription for Oxbryta®.

Pain Management

Pain management is a vital component of SCD therapy, as acute pain episodes are the most common reason for SCD patients to seek medical attention. Individuals who continue to have acute pain episodes, despite the use of preventative therapy mentioned above, should have tailored home pain regimen plans. Nonpharmacologic therapies (e.g., relaxation/breathing exercises) and non-opioids (e.g., nonsteroidal anti-inflammatory drugs [NSAIDs] or acetaminophen) should be trialed for mild pain as appropriate. Short-acting opioids are administered for moderate to severe pain, with some individuals requiring continuous opioid therapy or chronic pain management involving long-acting opioids with as-needed short-acting opioids for breakthrough pain.[3]

This report will not evaluate the utilization of pain medications, as it is difficult to assess the nature of the event being treated without access to medical records. Isolating their use specifically in SCD pain crises is challenging, as there are many other acute and chronic conditions for which individuals may also be prescribed these medications. MassHealth currently has numerous non-opioids available without prior authorization. Opioids are managed with various restrictions, as highlighted on the MassHealth Drug List (MHDL) website.

Pipeline

The MHDL, like other drug formularies, is routinely updated based on new drug availability, indications, and route of administration, according to nationally recognized guidelines and established medical and pharmacy treatment standards. Routine updates safeguard access to critical medications for rare, chronic, and acute illnesses, including SCD. MassHealth continues to follow the emerging clinical pipeline around new treatment options, which are advancing rapidly. Many new treatment options, including gene therapy, are undergoing continued review by the FDA (refer to Table 11 below). Newer options may provide another potentially curative option for SCD, in addition to hematopoietic stem cell transplant (HSCT). MassHealth will continue to evaluate and facilitate addition to the MHDL for any medications that gain FDA approval for the management of SCD.

Table 11. Investigational Agents*[15]

Drug Name	Manufacturer	Investigational Indication	Mechanism of Action	Route	Clinical Trial Data (specific to SCD—only included for gene therapies)	Anticipated Launch/Phase
Exacel (exagamglogene autotemcel; CTX-001)	CRISPR Therapeutics; Vertex	SCD; Beta thalassemia	autologous, ex vivo CRISPR gene editing	IV Single dose	As of 2/2022 data cutoff from phase III trial (CLIMB-121), 31 individuals infused with Exacel (mean follow-up 9.6 months). Following Exacel infusion, all patients were VOC-free (follow-up range 2.0 to 32.3 months). Mean proportion of HbF > 20% by month 3, with mean total Hgb levels > 11 g/dL on or after month 3.	BLA submitted April 3, 2023[16]
Lovocel (lovotibeglogene autotemcel; formerly LentiGlobin)	bluebird bio	SCD	Gene therapy designed to add functional copies of a modified form of the β-globin gene (βA-T87Q-globin gene) into a patient's own HSCs using lentivirus vector	IV Single dose	Data through 8/2022 for 32 patients treated in Group C (Phase I/II trial: NCT02140554) highlighted that baseline median total Hgb increased from 8.5 g/dL to ≥ 11 g/dL at 6 months through last visit, with no transfusions. Of the 32 patients treated, 96% (31/32) had complete	BLA submission anticipated 1st half 2023[17]

Table 11. Investigational Agents*[15]

Drug Name	Manufacturer	Investigational Indication	Mechanism of Action	Route	Clinical Trial Data (specific to SCD—only included for gene therapies)	Anticipated Launch/Phase
					resolution of VOEs within the 24-month follow-up.	
Pyrukynd® (mitapivat)†	Agios	SCD	Pyruvate kinase activator	oral	N/A	Phase III
Inclacumab	Global Blood Therapeutics; Pfizer	SCD	P-Selectin inhibitor	IV	N/A	Phase III
GBT601	Global Blood Therapeutics; Pfizer	SCD	Hg-oxygen affinity enhancer	oral	N/A	Phase III
FT-4202 (etavopivat)	Forma Therapeutics, Novo Nordisk	SCD	Pyruvate kinase activator	oral	N/A	Phase III

Notes:

BLA=Biologics Licensing Application, HbF=fetal hemoglobin, Hgb=hemoglobin, HSC=hematopoietic stem cell, IV=intravenous, SCD=sickle cell disease, VOC=vaso-occlusive crises, VOE=vaso-occlusive events

* Not all-inclusive. Only listed those in phase III trials or those currently under review by the FDA.

† Currently approved for the treatment of hemolytic anemia in adults with pyruvate kinase deficiency.

Care Coordination and Transition of Care

Care coordination represents a valuable resource for many patients and families with SCD. The early childhood presentation of SCD combined with socioeconomic disparities often experienced by those diagnosed with the disease, alongside the heterogenous and changing nature of the disease's manifestations, puts a high degree of stress on patients and families for care engagement. Since the disease has so many preventative elements, including those that further branch depending on specific manifestations (for instance, those with higher risk of stroke on transcranial Doppler may merit chronic transfusions), patients and families can struggle to keep up with navigating the ideal care for the disease and its complications. Further, the nature of its manifestations can also interrupt activities of life and make further function in and outside of the medical system difficult. Thus, support for care navigation and coordination can play an important role for many of those dealing with this disease burden.

MassHealth provides various care coordination and transition of care programs through its programs. Effective July 5, 2023, MassHealth members under 21 with SCD will be eligible for a new targeted case management benefit, MassHealth Coordinating Aligned, Relationship-centered, Enhanced Support (CARES) for Kids Program.[19] CARES for Kids is designed to lighten the burden for families and better serve the needs of the top ~1-1.5% highest-risk children and youth with medical complexities. The CARES benefit service will provide comprehensive, high-touch care coordination for children and their families. This service will be embedded in primary care and pediatric specialized settings where medically complex individuals under age 21 receive medical care. CARES providers will serve as lead entities to coordinate prompt, family-centered, and individualized care across the health, educational, state agency, and social service systems.

MassHealth and the Department of Children and Families (DCF) also co-sponsor a medical program, Special Kids Special Care, for children in foster care who have special healthcare needs, including those with SCD.[20] Special Kids Special Care provides intensive medical case management for children with complex medical needs who are in foster care and DCF custody. Additional clinical support and care coordination for MassHealth members across the entire care continuum are available through health education and the promotion of healthy behaviors and disease self-management.

For MassHealth members who have needs but do not fit into these programs, they can receive care coordination services through case managers and teams who help patients access additional needed services. Such care managers and teams may be embedded directly into provider systems and clinics providing sickle cell treatment and guidance, particularly in pediatric programs.

Other care managers and teams may be deployed by accountable care organizations (ACOs) or managed care organizations (MCOs) serving MassHealth members. Since 2018, MassHealth has set up accountable care contracting models with its MCOs and ACOs giving

them responsibility and financial accountability for patient outcomes based on quality of care and prevention. These contracts shift the health care system from financial levers that previously supplied payment only based on healthcare visits and encounters towards those that maximize health. To engage those at risk for further care coordination and support, ACOs and MCOs will evaluate patients for clinical risk and rising clinical risk based on recommendations from care teams and predictive modeling algorithms.

Care coordination teams engage in holistic assessments of patients to support their overall health and outcomes. Such activities can include comprehensive assessments on medical needs, social determinants of health, and care needs to deploy further resources in the MassHealth program or other programs to support their care. A holistic vantage point also allows such programs to focus on the member's SCD, its sequelae, related conditions, other significant conditions and burdens, and the mental and social health needs of patients and families. For instance, for patients who need them, the MassHealth non-emergency medical transportation benefit or the Flexible Services food support can be deployed. These teams also engage with providers in the member's care team to help coordinate their efforts and help patients and families navigate the care system. They may also provide medication adherence support, appointment navigation support, identification of further gaps and needs, and support around building self-efficacy of care plans. Such programs may put patients into different risk categories with differential levels of support that shift as patients go through the programs. Care plans created by such teams can address contingency management including crisis management, recognition of red flag symptoms, the establishment of pain management plans, lessons on self-advocacy, genetic counseling, adherence goals, and more.

These efforts can involve a diverse set of supporting team members, including nurse care managers, community health workers, social workers, dieticians, health educators, peer supports, education liaisons, behavioral health staff, on-call staff to reach out to for after-hours needs, and more.

Such support can also provide crucial assistance during transitions of care for patients and families. Such transitions may include a hospital discharge where a significant acute event has occurred and a patient is facing new functional limitations, a new medication list, new providers to follow up with, and a new care plan, all adding further complexity during a difficult period. A significant transition for many of those with SCD also occurs when they transition from the pediatric care realm to the adult realm. There, they may find that whereas the pediatric realm was more focused on their condition, the adult realm treats a diverse set of disorders with less awareness or attention to their own. This challenging period forces patients and families to further navigate new systems and advocate for themselves more than prior, and care coordination supports can be worthwhile for those who need them.

MassHealth supports a robust network of SCD providers and programs, as well as accountable care models, that provide such assistance. This heterogeneity of support can provide back-ups and additional support for patients and families where one model may not fit all needs. However, the existence of multiple supports that may add complexity can also provide

a challenge for those with SCD looking for a single, all-coordinated source of support in their care journey. In general, supports that are anchored closer to primary care provider teams and those that are more resourced for intensive support tend to take leading roles for patients who may be eligible for many programs.

Certainly, there remain continuing opportunities to improve the provision of these programs and their targeting to maximize the outcomes of those with SCD. In a health care system of heterogenous medical record systems and providers, SCD is a specialized condition with specialized care and contingency plans for individuals. Care will improve when these plans are consistently developed and communicated across the settings for all appropriate members and acted upon at point of care. As an example, a patient with an acute pain crisis may find themselves needing a pain regimen beyond what usual emergency patients receive. While centers familiar with the patients can document such personalized contingency plans in their charts, unfamiliar centers may lack the inability to cross-reference care plans, leading to care deficiencies and delays in these acute moments of need.

Attendees of the public hearing called out the difficulty in transition particularly for those with SCD going from specialized childhood centers that deploy resources for the population into the adult care world with more heterogeneity of care and higher likelihood for less personalized and in-depth care resources. Attendees noted that the transition period between pediatric and adult care is an especially high-risk period for those with SCD, and inequities can arise between those that can connect to adult providers with expertise in the care and management of adult patients living with SCD with multidisciplinary resources versus those that cannot.

Improvements in care will continue to be iterative efforts that must involve all aspects of those affected by SCD. Not only does this include healthcare payors and providers, but also voices of the holistic care teams involved and those of families, patients, and advocates. These diverse inputs can help further demystify a complex and branching path for those affected by SCD.

Over the next five years, MassHealth is engaging in an aggressive health equity initiative enabled by its recent CMS 1115 waiver approval. This effort will lead to better data gathering on race, ethnicity, language, disability, sexual orientation, gender identity, and other identifiers of patient groups. It will also deploy significant new funding to hospitals and health care provider systems to focus on closing equity gaps in care delivery. With time, these efforts will lead to further baselining of data by stratification of quality measures to define equity gaps and put financial accountability on provider systems to close these gaps through improvements in their care.

Summary of Comments from Public Hearing Held on March 3, 2023

The MassHealth public hearing was attended by parents, patients with SCD, medical staff who care for those with SCD, advocates, and others. These individuals provided thoughtful, carefully considered comments on care and challenges for those with SCD. These comments are summarized below.

1. Need for Inter- and Multi- Disciplinary, Coordinated Care

Interdisciplinary, coordinated care is needed across the continuum, including outpatient, emergency room, and inpatient care: It is important to proactively develop an individualized care plan based on evidence and set up a system to communicate the care plan across the continuum. For example, when a person needs emergent care, it is essential for emergency physicians to have access to such care plan to provide appropriate and personalized care.

Importance of providers with adequate training and skills to adequately treat and care for people with SCD and its complications (including specialized multidisciplinary clinics): There is a lack of providers who have the skills and the interest in taking care of SCD patients across the Commonwealth, especially in certain geographies. Appropriate use of telehealth may help expand the access to specialized interdisciplinary Centers of Excellence for patients who are not able to access such specialized clinics because they live far away.

Interdisciplinary care at the outpatient level is imperative: At one of the academic medical centers within the Center of Excellence, there is a multidisciplinary clinic that meets two afternoons a month where patients can be seen by a primary care doctor, a hematologist, a pulmonologist, a nephrologist, a behavioral health specialist, social workers, patient navigators, and research coordinators using telehealth services to allow for SCD experts to consult on patients who are not physically able to come to a Center of Excellence. Access to such models for all patients across the Commonwealth is imperative.

Importance of screening: It is imperative to appropriately screen for SCD to provide upstream guidance and treatment.

2. Need for Individualized Comprehensive Patient-Centered Care Plans and Institutional Protocols

It is critical to have care plans and institutional protocols with timely and personalized management, especially of VOCs and other emergencies. The institution of pain medications within the first hour of presentation to an ED is key to actually getting the pain crisis under control and allowing the patient to go home. If a patient is waiting for four hours to receive treatment, the game is lost and the patient is going to be hospitalized.

Simpler ways are needed to coordinate for timely transportation and access to clinicians during crisis: Because the person who suffers with SCD has no idea when a crisis is going to

occur, it is difficult and impractical to arrange transportation using the Provider Request for Transportation form (PT-1), which provides scheduled transportation to and from doctors' visits. If another source of immediate transportation can be coordinated for such urgent care, with timely care, additional exacerbation of crisis and emergency room visits might be avoided. Timely access to clinicians for such patients via innovative strategies (e.g., secure cell phones) is also important.

3. Focus on Newer and Integrative Therapies

Newer therapies: In addition to hematopoietic stem cell transplantation, which is curative but with significant risks, there are two new gene therapies developed by companies based in Massachusetts that are expected to go to the FDA for approval later this year. Due to higher proportions of people with SCD covered by MassHealth, advocates noted that it is imperative that MassHealth lead the charge to support the access to these therapies once approved by FDA.

Integrative health: Holistic and integrative approaches such as acupuncture and access to other modalities that have been proven to be beneficial for sickle cell in combination with the traditional medications like HU may help improve outcomes for people with SCD.

4. Transitions between Pediatric and Adult Care

Patients with SCD are at the highest risk of mortality in the period of transition between pediatric and adult care. This is the period of time in which they are more prone to begin to develop severe consequences of their disease that can occur in adulthood, and is a critical time when they should be cared for by a treatment center that is able and staffed to care for them.

Timely education processes around transition are critical, as are connections with an adult provider who has expertise in the care and management of patients living with SCD. Interdisciplinary teams with community health workers, patient navigators, and social work are worthwhile to help patients as they're navigating education and jobs as well as other aspects of their lives in concordance with their lifelong disease.

5. Educational Material

A standardized set of educational materials provided throughout the different hospitals in the Boston region and beyond may inform and help people with SCD better and more uniformly understand their disease. Translation of such materials is also important.

6. Health Equity

SCD is a disease of Black and brown people, and as a group, people with SCD experience worse health outcomes compared to other comparable diseases and have access to fewer health resources. It is imperative to tackle the disparities associated with this disease. Assessment of barriers to care experienced by people with SCD, taking into account social risk factors and other issues contributing to disparities, and identifying best practices for addressing the disparities is imperative.

Recommendations

MassHealth will continue to solicit input from multiple stakeholders and incorporate this feedback in subsequent reports every two years. MassHealth remains committed to receiving, and acting on, ongoing feedback from the legislature, providers, pharmacy industry, patient advocates, and members specifically in reaction to this report or regarding any additional feedback related to SCD. Many of the opportunities highlighted in this report already have targeted initiatives underway or can continue to be accomplished through partnerships with the provider community.

MassHealth is eager to focus its continued efforts to address improvement areas identified by enrollees and sickle cell providers. The program's structure will allow MassHealth to continue making significant strides to accomplish these efforts with its enrollees and providers.

Pharmacy Initiatives

From a pharmacy standpoint, MassHealth will seek to encourage adherence to standard of care medications like HU. When comparing this current report to the Medicaid and CHIP Sickle Cell Disease Report, T-MSIS Analytic Files (TAF) 2017, the overall percentage of beneficiaries with any HU use across all age groups is slightly lower at 33.3% as compared to 36.2%. However, the percentage of beneficiaries with any HU use for children (<21 years of age) is higher at 40.4% compared to 37.1%.[8] In addition, the percentage of beneficiaries with any utilization of the newer disease-modifying agents, Endari® (l-glutamine oral powder), Adakveo® (crizanlizumab-tmca), and Oxbryta® (voxelotor), has been very low since their market arrival. As the benefit from the available disease-modifying agents is dependent on initiation and continued adherence, it is important to target individuals who would be considered appropriate candidates for these therapies as soon as possible after diagnosis. Seeing a potential gap in the percentage of SCD patients currently receiving HU, considered the mainstay of therapy, MassHealth is considering a pharmacy medication therapy management (MTM) service that would provide outreach to members or providers as determined by MassHealth. This could include telephonic counseling and educational outreach to members as well as collaboration with providers to promote medication adherence, optimal dosing, and suggestions for additional medical interventions when appropriate. The goal would be to focus on ways to improve the overall management of these SCD members and their medication adherence.

Hospital Initiatives

Patients with SCD often have multiple chronic medical conditions that increase the clinical risk and complexity of their medical journey. Ongoing educational efforts for patients and their families on how best to manage their SCD holistically across all their chronic conditions can also support improved outcomes.

From a medical utilization standpoint, emergency room visits and hospital admissions for VOCs remain a challenge for individuals with SCD. Consistent utilization of preventive services

and consistent connections between the enrollee and their primary care physicians and hematologists are critical to reducing these acute events. Education efforts must be focused on emergency settings to make sure they adequately respond to the needs of those with SCD and do not underestimate pain control needs during VOCs. Patients who visit a health system known to them may have an established pain plan and health equity programs and initiatives with accessible emergency providers. Such programs may be lacking if patients present to a site where they are not already known. Furthermore, implicit biases around socioeconomic factors or race can further contribute to inadequate care of those experiencing SCD VOCs.

As noted above, it is likely that care of those with SCD (as well as other rare conditions) would improve across emergency settings if there were methods to disseminate and make easily available their personalized care plans, in a way that crosses the barriers of specific health systems and electronic medical records. Making such bridges, though, will require more resourcing than what MassHealth can effectuate on its own.

Additionally, a critical transition point occurs as an enrollee ages and progresses from childhood to adulthood. Such transitions can take patients out of pediatric and known care settings and introduce them to more heterogenous adult settings where less familiarity or expertise is available at first presentation of acute events or chronic needs. Supporting providers and specialists through warm handoffs and strong care coordination at these key inflection points is a continued opportunity for programs that target enrollees with SCD.

Care Coordination

Nearly 70% of the MassHealth population, and 80% of the children, are in managed care plans within MassHealth. These plans deliver the MassHealth benefits to their members with the ability to further deploy programs and innovations to their choosing beyond the MassHealth benefit. In 2018, MassHealth also transitioned much of its population to ACO provider-system contracts, where healthcare dollars are used for quality measurement, preventative care, and overall outcomes of the population, rather than just based on payment for healthcare visits and encounters.

With deployment of its ACO program, MassHealth put a greater onus on its MCO plans and ACO provider organizations to be responsible for healthcare outcomes of its patients and to prevent ED use and inpatient admissions with upstream interventions. The program provider systems use patient risk stratification, careful assessment based on risk, care planning, and care coordination teams to assist MassHealth members with chronic conditions and challenging social determinants of health. By design, these programs capture heterogenous populations of patients with many different disease types. However, MassHealth can further work with its partners to ensure that SCD patients are accurately reflected within programs and algorithms, especially where early interventions can be targeted and deployed. This could include more tailored care coordination and nuanced staffing to meet the unique needs of patients with SCD.

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Appendices

Appendix I. ICD-10 Codes for SCD

ICD-10 code	ICD-10 Description
D57.00	Hb-SS disease with crisis, unspecified
D57.01	Hb-SS disease with acute chest syndrome
D57.02	Hb-SS disease with splenic sequestration
D57.1	Sickle cell disease w/o crisis
D57.20	Sickle-cell/Hb-C disease without crisis
D57.21	Sickle-cell/Hb-C disease with crisis
D57.211	Sickle-cell/Hb-C disease with acute chest syndrome
D57.212	Sickle-cell/Hb-C disease with splenic sequestration
D57.219	Sickle-cell/Hb-C disease with crisis, unspecified
D57.40	Sickle-cell thalassemia without crisis
D57.411	Sickle-cell thalassemia with acute chest syndrome
D57.412	Sickle-cell thalassemia with splenic sequestration
D57.419	Sickle-cell thalassemia with crisis, unspecified
D57.80	Other sickle-cell disorders without crisis
D57.811	Other sickle-cell disorders with acute chest syndrome
D57.812	Other sickle-cell disorders with splenic sequestration
D57.819	Other sickle-cell disorders with crisis, unspecified

Appendix II: GSN, J, and CPT Codes for SCD Agents

GSN Code	Description
HU products	
040162	Droxia® (hydroxyurea) 200 mg capsule
040163	Droxia® (hydroxyurea) 300 mg capsule
040164	Droxia® (hydroxyurea) 400 mg capsule
008775	Hydrea® (hydroxyurea) 500 mg capsule
067584	Siklos® (hydroxyurea) 100 mg tablet
078316	Siklos® (hydroxyurea) 1,000 mg tablet
060202	HU powder
Oxbryta Products	
084244	Oxbryta® (voxelotor) 300 mg tablet
082925	Oxbryta® (voxelotor) 300 mg tablet for suspension
080506	Oxbryta® (voxelotor) 500 mg tablet
Endari	
078050	Endari® (L-glutamine) 5 gm powder packet
Adakveo GSN Code	
080477	Adakveo® (crizanlizumab-tmca)
Adakveo J-Codes	
J0791 (Unspecified codes: J3490, J3590, J9999)	Adakveo® (crizanlizumab-tmca)
Pneumococcal Vaccines CPT Codes	
90670	Prevnar 13® (pneumococcal 13-valent conjugate vaccine)
90671	Vaxneuvance® (pneumococcal 15-valent conjugate vaccine crm197 protein adsorbed injection, suspension)