HHS Public Access

Author manuscript

Pediatrics. Author manuscript; available in PMC 2024 April 02.

Published in final edited form as:

Pediatrics. 2022 December 01; 150(6): . doi:10.1542/peds.2022-059491.

Prioritizing Sickle Cell Disease

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Sickle cell disease (SCD), a group of inherited disorders, is a bellwether example of a chronic, disabling, life-threatening condition that is disproportionately underserved by the medical community. SCD is arguably associated with the most significant health inequities of both the 20th and 21st centuries. Although these inequities, which are linked to historical interpersonal and institutional racism, have been long recognized, there has been scant progress in closing the health care gaps.[1] SCD affects at least 100c000 individuals in the United States, the vast majority being Black or African American individuals.[1] Abnormal hemoglobin produced in SCD causes red blood cells (RBCs) to sickle, clogging blood flow and leading to vasoocclusive crises and potential impacts on every organ system. Persons with SCD experience numerous complications, including recurrent episodes of severe pain, pneumonia and acute chest syndrome, stroke, and organ damage. Estimated life expectancy of those with SCD in the United States is >20 years shorter than the average expected, and the deficit in quality-adjusted life expectancy is particularly stark (>30 years shorter).[2]

POOR GUIDELINE IMPLEMENTATION

The 2014 National Heart, Lung, and Blood Institute evidence-based guidelines[3] included several recommendations specific to children with sickle cell anemia (SCA), the most severe SCD subtypes. The panel recommended children aged 2 to 16 years with SCA have annual transcranial Doppler (TCD) ultrasound screenings to identify those at increased risk for stroke. They also recommended that children aged 9 months and older with SCA (including those who are asymptomatic) be offered hydroxyurea therapy, which prevents RBC sickling and, thus, prevents or reduces the severity of complications. In the current issue of Vital Signs *Morbidity and Mortality Weekly Report*, the Centers for Disease Control and Prevention (CDC) examines rates of TCD screening and hydroxyurea use among children with SCA who were continuously enrolled in Medicaid in 2019.[4] Despite modest improvements in uptake of both interventions since the National Heart, Lung, and Blood Institute panel's 2014 report, the findings highlight that health care for children with SCA remains suboptimal.

In 2019, only 47% and 38% of children aged 2 to 9 and 10 to 16 years, respectively, had TCD screening.[4] The findings from this CDC study align with a retrospective analysis of

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28 research sites in the Dissemination and Implementation of Stroke Prevention Looking at the Care Environment study that found the mean TCD screening rate was generally unsatisfactory at 49.9%, albeit with wide variation among institutions.[5]

The CDC study also reported that only 38% and 53% of children with SCA aged 2-9 and 10-16 years, respectively, used hydroxyurea.[4] These findings extend previous studies in private physician practice 2015 to 2017 that reported low hydroxyurea use among children (47%) with SCD.[6]

These findings from the CDC and other recent studies provide a blunt picture of continued lack of quality care for children with SCA and speak to the urgent need to address identified barriers to optimal care. A growing body of evidence shows how health systems could improve care, and decisions to not grasp these strategies have been criticized as missed opportunities. For example, Freed urged addition of TCD screening as a Centers for Medicare & Medicaid Services metric in the Pediatric Quality measures, as a motivator for health systems to increase annual TCD screening.[7] Singh et al provided empirical support that quality improvement initiatives can have a marked and sustained increase on TCD screening rates.[8] The Dissemination and Implementation of Stroke Prevention Looking at the Care Environment study identified 2 factors as predominant barriers to TCD screening (logistical difficulties among patients, uncoordinated scheduling among providers),[9] and TCD screening rates rose >75% when the health system reduced these barriers.[10] This underscores the importance of building a national health care infrastructure that allows for tracking of a national quality measure for TCD screening. Impediments to hydroxyurea use are similar in that both provider and patient barriers need to be overcome, and quality improvement initiatives are developing evidence-based solutions to those barriers.[11]

The low uptake of TCD screening and hydroxyurea use are illustrative of the larger problem of health care gaps and inequities for people with SCD. Addressing barriers to care cannot be done in isolation of concerted efforts to address racism. Numerous studies document that racism and other forms of stigma negatively impact health care for persons with SCD.[1,12] Addressing interpersonal racism will require providers to be open to learning how their own unconscious biases may negatively influence the health care they provide to people with SCD; to discuss with their colleagues and institutions the importance of continuing education on how racism is a barrier to better health; and to implement changes to their practices to ensure consideration of their patients' social challenges in accessing care.

Negative consequences of systemic racism must also be addressed. According to the National Academies of Science Engineering and Medicine, despite cystic fibrosis having about one-third of the prevalence of SCD, the funding for cystic fibrosis clinical research far surpasses that for SCD.[1] Both conditions are progressive with life-threatening complications and reduced life expectancy and, thus, have high-priority needs for further treatment development.

STRATEGIES TO ADDRESS INEQUITIES

The need of the hour is multilevel actions to address inequities in the delivery of care. Academic institutions can bolster strategies to recruit, train, and retain physicians specializing in the care of patients with SCD.[13] This training should address the recognition of complex psychosocial factors relevant to managing acute and chronic pain in racial and ethnic minority populations. Improvements in health care access are also needed, including better integration of behavioral and medical care to fully address patient needs. Additionally, it is necessary that health care providers and hospitals receive fair reimbursement to recoup the cost of providing comprehensive care.

IMPROVING DATABASES

Improvement to the critical data infrastructure to track the health and health care needs among persons with SCD is also needed. Even basic US prevalence estimates for SCD have been inadequate. The 100c000 estimate typically cited,[1] although a step forward in providing some sense of the population impact of SCD, is nonetheless likely an undercount. It is derived from newborn screening data applied to US Census counts for African American individuals; however, population-based data were not available to adjust for likely differential disease frequencies among immigrant populations. In 2015, CDC established the Sickle Cell Data Collection program in select states. The program links data from multiple sources, including but not limited to newborn screening, thus allowing for more complete SCD prevalence estimation and health care tracking in those states.

FUTURE BENCHMARKS

Hosting provider education workshops on diversity and health equity is an important step many health systems already take, but it is only a first step to address institutional racism. Additional steps could be adding SCD outcomes to hospital ranking and health care metrics, and incorporating alerts and other tools into electronic medical records; for example, for individualized pain plans and tracking RBC alloimmunization. Notably, electronic algorithms can highlight to novice clinicians that evidence-based guidelines for pain management of patients with SCD (as well as cancer and other complex pain) differ from guidelines for acute pain management in the general population. More work is also needed to ensure optimum patient feedback. Sampling algorithms for patient surveys should ensure adequate adjustment for case-mix and diverse populations. Survey instrument length and administration methods need to consider patient subgroups that may have limited ability to answer self-administered e-mail surveys,[14] such as those patients with a history of stroke. Poverty-related social risk factors, contributing logistical barriers to care, can be partially mitigated by employing community health workers and case management teams. Finally, novel health insurance strategies could be developed to meaningfully reward multidisciplinary sickle cell teams that work to reduce suffering and organ damage with empathetic care.

The pathway to quality care for people with SCD is not complicated nor torturous, but rather is achievable by utilizing things that we know, such as TCD screening and hydroxyurea

utilization, and working together as a community. We need to expand the use of population-based data to illuminate health care gaps and act on these findings to increase access to care and social resources. When adequate data are available, preventive and comprehensive care costs in SCD show a “return on investment” with medical or societal cost-effectiveness.[1] Additionally, improved care coordination and tracking within the health care system, implementation of health system accountability for evidence-based care, and redoubling efforts to establish culturally sensitive care for people with SCD can positively impact the health and well-being of the SCD community, save money, and ultimately save lives.

ACKNOWLEDGMENT

We thank the Sickle Cell Disease Association of America Medical and Research Advisory Committee for their advice, not all of which could be incorporated in this brief article.

Drs Hsu, Hooper, and Schieve conceptualized and designed the study, drafted the initial manuscript, and reviewed and revised the manuscript; and all authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention or US Department of Health and Human Services.

CONFLICT OF INTEREST DISCLAIMER:

Dr Hsu reports institutional support from the Health Resources and Services Administration, the National Institutes of Health, the European Commission, the Illinois Department of Public Health, the Joy in Childhood Foundation, Global Blood Therapeutics, Forma Therapeutics, Imara, Baxalta, Cyclerion, and Eli Lilly; consulting fees from DuPont Nemours Children’s Hospital, Hoffman-LaRoche, DisperSol, Guidepoint, Magellan, Deerfield, and Kuwait University; speaker honoraria from the Foundation for Sickle Cell Disease Research, Bridgeport Hospital, and Tova Health Center; participation on an Aruvant Data Safety Monitoring Board and service as a scientific advisor or member of an expert advisory board for the National Institutes of Health Sickle Cell Disease Advisory Committee, Hilton Publishing/HPC, and the Illinois Universal Newborn Screening Advisory Committee; and unpaid membership in the Sickle Cell Disease Association of America, the Sickle Cell Disease Association of Illinois, and the National Alliance of Sickle Cell Centers. All other authors have indicated they have no conflicts of interest relevant to this article to disclose.

ABBREVIATIONS

CDC	Centers for Disease Control and Prevention
RBC	red blood cells
SCA	sickle cell anemia
SCD	sickle cell disease
TCD	transcranial Doppler

REFERENCES

1. National Academies of Sciences, Engineering, and Medicine. Addressing Sickle Cell Disease: A Strategic Plan and Blueprint for Action. Washington, DC: The National Academies Press;2022
2. Lubeck D, Agodoa I, Bhakta N, et al. Estimated life expectancy and income of patients with sickle cell disease compared with those without sickle cell disease. JAMA Netw Open. 2019;2(11):e1915374 [PubMed: 31730182]

3. National Heart Lung and Blood Institute, National Institutes of Health. Evidence-based management of sickle cell disease: expert panel report, 2014. Available at: https://www.nhlbi.nih.gov/health-topics/evidence-based-management-sickle-cell-disease. Accessed September 9, 2022
4. Schieve LA, Simmons GM, Payne AB, et al. Use of recommended health care measures to prevent selected complications in children with sickle cell anemia–selected States, 2019. MMWR Morb Mortal Wkly Rep. 2022;71(39):1241–1246 [PubMed: 36173745]
5. Kanter J, Phillips S, Schlenz AM, et al. Transcranial Doppler screening in a current cohort of children with sickle cell anemia: Results from the DISPLACE Study. J Pediatr Hematol Oncol. 2021;43(8):e1062–e1068 [PubMed: 33625093]
6. Su ZT, Segal JB, Lanzkron S, Ogunsile FJ. National trends in hydroxyurea and opioid prescribing for sickle cell disease by office-based physicians in the United States, 1997—2017. Pharmacoepidemiol Drug Saf 2019;28(9):1246–1250 [PubMed: 31328369]
7. Freed GL. A missed opportunity to address a national shame: the case of sickle cell disease in the United States. JAMA Pediatr. 2019;173(8):715–716 [PubMed: 31206154]
8. Singh A, Danda V, Van Swol L, Scott JP, Brandow AM, Panepinto JA. Recommendation to reality: Closing the transcranial Doppler screening gap for children with sickle cell anemia. Pediatr Blood Cancer. 2021;68(2):e28831 [PubMed: 33283465]
9. Phillips SM, Schlenz AM, Mueller M, Melvin CL, Adams RJ, Kanter J. Identified barriers and facilitators to stroke risk screening in children with sickle cell anemia: results from the DISPLACE consortium. Implement Sci Commun. 2021;2(1):87 [PubMed: 34376249]
10. Kanter J. DISPLACE study team. DISPLACE: Dissemination and Implementation of Stroke Prevention Looking at the Care Environment. Study findings from Parts 1–3, presented at NHLBI Annual Sickle Cell Disease meeting, Bethesda, MD, Aug 8–10, 2022. Day 1 videocast. Available at: https://videocast.nih.gov/watch=45824. Accessed September 9, 2022
11. Shih S, Cohen LL. A systematic review of medication adherence interventions in pediatric sickle cell disease. J Pediatr Psychol. 2020;45(6):593–606 [PubMed: 32417887]
12. Bulgin D, Tanabe P, Jenerette C. Stigma of sickle cell disease: a systematic review. Issues Ment Health Nurs. 2018;39(8):675–686 [PubMed: 29652215]
13. Lee L, Smith-Whitley K, Banks S, Puckrein G. Reducing health care disparities in sickle cell disease: a review. Public Health Rep. 2019;134(6):599–607 [PubMed: 31600481]
14. Tyser AR, Abtahi AM, McFadden M, Presson AP. Evidence of non-response bias in the Press-Ganey patient satisfaction survey. BMC Health Serv Res. 2016;16(a):350 [PubMed: 26772389]