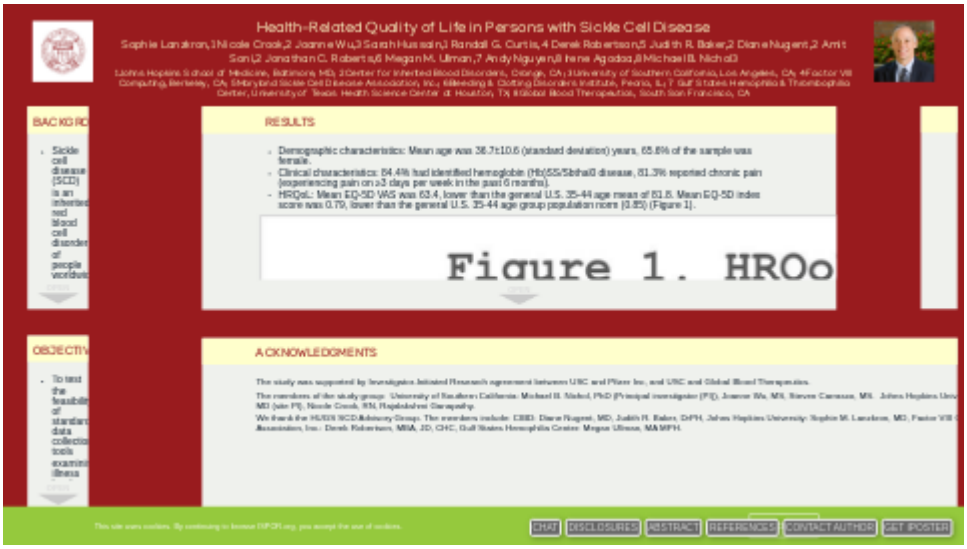
Health-Related Quality of Life in Persons with Sickle Cell Disease



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PRESENTED AT:

BACKGROUND

- Sickle cell disease (SCD) is an inherited red blood cell disorder affecting millions of people worldwide.[1]
- People with SCD typically suffer from periodic episodes of severe acute and chronic pain.
- Individuals with SCD also suffer from fatigue, acute complications, end-organ damage, and early mortality.
- Acute pain crises are associated with significantly impaired health-related quality of life (HRQoL).[2]
- Overall HRQoL for adults with SCD is poor and significantly worse in those with opioid use.[3]
- The 2020 consensus study report from the National Academies of Sciences, Engineering, Medicine, *Addressing Sickle Cell Disease: A Strategic Plan and Blueprint for Action,* had identified the need for research and longitudinal data to characterize the burden of disease, outcomes, and needs of those with SCD.[4]

OBJECTIVES

- To test the feasibility of standardized data collection tools examining SCD illness burden.
- To investigate factors associated with HRQoL and economic burden in persons with SCD.
- To present this pilot study's HRQoL data analyses.

METHODS

Design

- We conducted a pilot study to develop standardized SCD data collection tools from patient self-report and clinical chart review.
- Between July 2019 and August 2020, we recruited 32 adults aged ≥18 years who met the selection criteria:

1) A diagnosis of SCD based on medica chart document.

2) Received their SCD care at a SCD treatment center at least one year prior to the enrollment.

3) Spoke either English or Spanish.

4) Provided written informed consent.

5) Excluded were persons who were judged to be cognitively impaired as determined by the clinician or diagnosed with any other blood disorder.

Data Collection

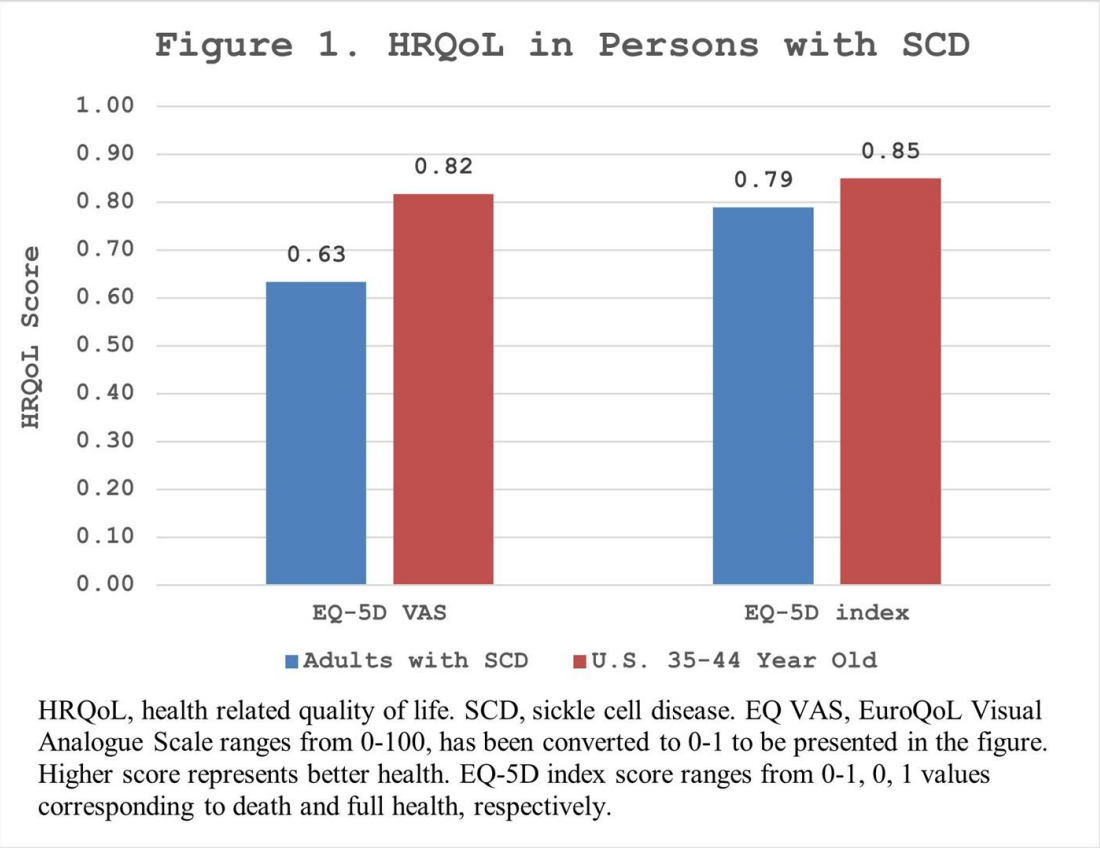
- We collected data on patient socio-demographics, fatigue, chronic pain, and HRQoL measured by the EQ-5D-3L and Adult Sickle Cell Quality of Life Measurement Information System (ASCQ-Me) via patient survey.
- ASCQ-Me assessed 7 different health topics; 6 of these topics are assessed through 5-item questionnaires (Emotional Impact, Pain Impact, Sleep Impact, Social Functioning Impact, Stiffness Impact, Pain Episode), while the seventh topic is assessed through a 9-item questionnaire (SCD Medical History Checklist (MHC)). MHC includes leg ulcers, lung damage, kidney damage, retinopathy, damage to hip or shoulder, stroke, spleen removed or seriously damaged, regular blood transfusions, and take pain medicine every day.[5]
- Number of hospitalizations from the prior 12 months were obtained from chart review.

Statistical Analysis

- The analysis included data from 32 adults recruited.
- Factors associated with HRQoL scores were assessed by Pearson correlation, or Wilcoxon nonparametric tests for two group differences.

RESULTS

- Demographic characteristics: Mean age was 36.7±10.6 (standard deviation) years, 65.6% of the sample was female.
- Clinical characteristics: 84.4% had identified hemoglobin (Hb)SS/Sbthal0 disease, 81.3% reported chronic pain (experiencing pain on ≥3 days per week in the past 6 months).
- HRQoL: Mean EQ-5D VAS was 63.4, lower than the general U.S. 35-44 age mean of 81.8. Mean EQ-5D index score was 0.79, lower than the general U.S. 35-44 age group population norm (0.85) (Figure 1).



HRQoL, health related quality of life. SCD, sickle cell disease. EQ VAS, EuroQoL Visual Analogue Scale ranges from 0-100, has been converted to 0-1 to be presented in the figure. Higher score represents better health. EQ-5D index score ranges from 0-1, 0, 1 values corresponding to death and full health, respectively.

- HRQoL: ASCQ-Me scores were comparable to the referent population of adults with SCD.[5]
- Fatigue: Mean fatigue score was 57.9, ranged 33.7-75.9, and was negatively correlated with the EQ-5D index score (correlation coefficient r=-0.35, p=0.049), and ASCQ-Me scores, including pain (r=-0.47, p=0.006), sleep (r=-0.38, p=0.03), emotion (r=-0.79, p<0.0001), social (r=-0.61, p=0.0002. Fatigue score was significantly correlated with ASCQ-Me pain episode frequency (r=0.44,

p=0.01) (Table 1).

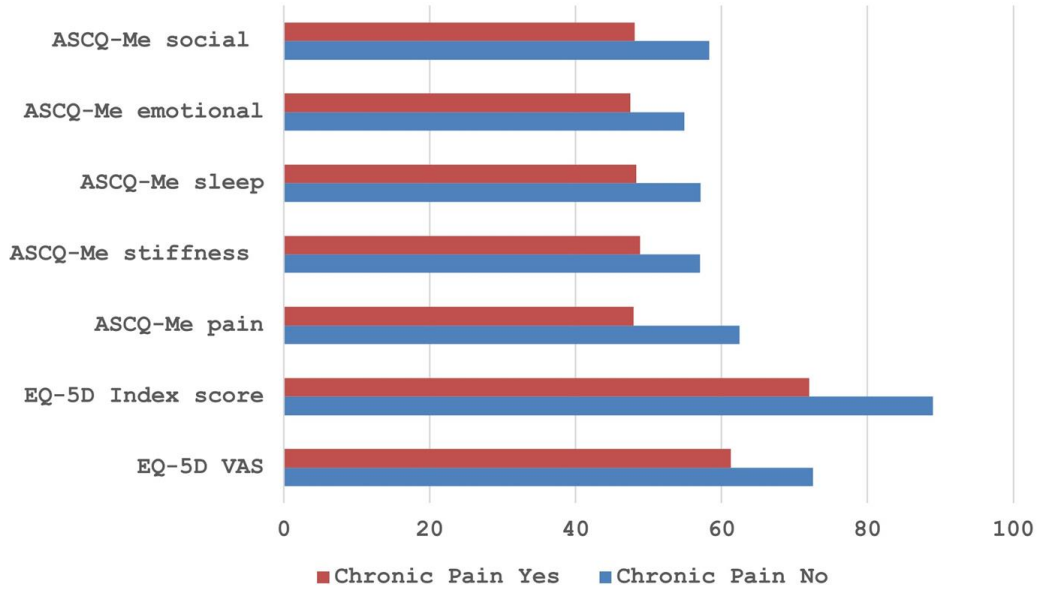
Table 1. Correlation health-related quality of life scores with hemoglobin, fatigue, medical history checklist, emergency room visits, and hospitalization

Pearson Correlation Coefficients, N = 32 Prob > |r| under H0: Rho=0					
	Hemoglobin	**Fatigue**	**ASCQ-Me MHC**	**ER visits**	**Hospitalization**
EQ-5D VAS	0.02551 0.8898	-0.32472 0.0698	-0.52922 0.0018	0.20783 0.2537	-0.05007 0.7855
EQ-5D index score	-0.06453 0.7257	-0.35086 0.0490	-0.49702 0.0038	-0.18009 0.3240	-0.55754 0.0009
ASCQ-Me pain	0.15679 0.3915	-0.47228 0.0063	-0.40769 0.0206	-0.12394 0.4991	-0.35295 0.0475
ASCQ-Me stiffness	-0.00157 0.9932	-0.21906 0.2284	-0.62535 0.0001	0.07296 0.6915	-0.36459 0.0402
ASCQ-Me sleep	0.05504 0.7648	-0.38823 0.0281	-0.30348 0.0913	-0.16738 0.3598	-0.63827 <.0001
ASCQ-Me emotion	0.18249 0.3175	-0.79033 <.0001	-0.28641 0.1120	-0.07712 0.6749	-0.38167 0.0311
ASCQ-Me social	0.00214 0.9907	-0.61118 0.0002	-0.31462 0.0795	-0.06649 0.7177	-0.32974 0.0653
ASCQ-Me pain episode frequency	0.24568 0.1753	0.44559 0.0106	0.30671 0.0877	0.24418 0.1780	0.31806 0.0761
ASCQ-Me pain episode severity	-0.33106 0.0642	0.31848 0.0757	0.18138 0.3205	0.12885 0.4821	0.23370 0.1980
Fatigue	-0.06981 0.7042	1.00000	0.21907 0.2283	-0.03918 0.8314	0.08420 0.6468

Abbreviations: N, number, represent sample size; ASCO-Me, Adult Sickle Cell Quality of Life Measurement Information System; MHC, medical history checklist; ER, emergency room; EQ-5D VAS, EuroQol visual analogue scale.

- Medical History Checklist (MHC) Score: This sums 9 SCD complications and treatment history, was negatively correlated with EQ-VAS (r=-0.53, p=0.002), EQ-index score (r=-0.50, p=0.004), ASCQ-Me pain (r=-0.41, p=0.02), and stiffness (r=-0.63, p=0.0001) (Table 1).
- Healthcare Utilization: Number of hospitalizations was negatively correlated with HRQoL including EQ-5D index score (r=-0.56, p=0.0009), ASCQ-Me scores including pain (r=-0.35, p=0.048), stiffness (r=-0.36, p=0.04), sleep (r=-0.64, p<0.0001), emotion (r=-0.38, p=0.03) (Table 1).
- Chronic Pain: Patients who reported chronic pain had significantly lower mean ASCQ-Me sleep score (48.3±10.1 vs. 57.1±9.1, p=0.04) and EQ-5D index score (0.72±0.21 vs. 0.89±0.09, p=0.002) than those without chronic pain (Figure 2).

Figure 2. HRQoL Stratify by Chronic Pain



ASCQ-Me,adult sickle cell quality of life measurement information system. Five of the ASCQ-Me measures used standardized T-scores. EQ VAS, EuroQoL Visual Analogue Scale. EQ-5D index score ranges from 0-1, 0, 1 values corresponding to death and full health, respectively. The index score has been converted to 0-100 to be presented in the figure. A higher score represents a healthier status.

CONCLUSIONS

- The pilot standardized data collection tools appear feasible to conduct by study sites, and acceptable by patients, as judged by its completion for 32 adults with SCD.
- Fatigue, medical history checklist score, hospitalization and chronic pain negatively impact HRQoL.
- As with any pilot study, small sample size limits analyses, and therefore has insufficient power for group comparisons.
- As the pilot standardized data collection tools appear feasible for adult patients and healthcare providers, the tools' use should be expanded to the pediatric SCD population to better understand SCD burden throughout the lifespan.
- Next steps are to evaluate the economic burden of illness on people with SCD.

ACKNOWLEDGMENTS

The study was supported by Investigator-Initiated Research agreement between USC and Pfizer Inc, and USC and Global Blood Therapeutics.

The members of the study group: University of Southern California: Michael B. Nichol, PhD (Principal investigator (PI)), Joanne Wu, MS, Steven Carrasco, MS. Johns Hopkins University: Sophie Lanzkron, MD (site PI), Sarah Hussain, MS, Yetunde Olagbaju, MS. Center for Inherited Blood Disorders (CIBD): Amit Soni, MD (site PI), Nicole Crook, RN, Rajalakshmi Ganapathy.

We thank the HUGS SCD Advisory Group. The members include: CIBD: Diane Nugent, MD, Judith R. Baker, DrPH, Johns Hopkins University: Sophie M. Lanzkron, MD, Factor VIII Computing: Randall G. Curtis, MBA, Sickle Cell Disease Foundation of California: Mary Brown, The Maryland Sickle Cell Disease Association, Inc.: Derek Robertson, MBA, JD, CHC, Gulf States Hemophilia Center: Megan Ullman, MA MPH.

DISCLOSURES

The study was supported by Investigator-Initiated Research agreement between University of Southern California (USC) and Pfizer Inc, and USC and Global Blood Therapeutics. (GBT).

Sophie Lanzkron received research funds from GBT, Shire, and Novartis. She is also a consultant for ICON and Pfizer.

Joanne Wu received financial support through the project funding provided by Pfizer and GBT.

Randall G. Curtis received consultant fees from Bayer and Novo Nordisk.

Nicole Crook, Sarah Hussain, Derek Robertson, Judith Baker, Amit Soni, Diane Nugent, Jonathan C. Roberts, Megan Ullman have no significant conflicts of interest to declare for this project.

Andy Nguyen and Irene Agodoa are employees of GBT.

Michael B. Nichol is a principle investigator for the HUGS studies and received grant funding from multiple sources including Genentech Inc., Sanofi (formerly Biogen Idec), Pfizer, Shire (formerly Takeda/Baxter), Octapharma, CSL Behring, and Global Blood Therapeutics.

ABSTRACT

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OBJECTIVES: Investigate factors associated with health-related quality of life (HRQoL) and economic burden in persons with sickle cell disease (SCD). Here we present HRQoL data. **METHODS:** Between July 2019 and August 2020, we recruited 32 adults aged ≥18 years with a diagnosis of SCD. We collected data on patient socio-demographics, fatigue, and HRQoL measured by the EQ-5D-3L and Adult Sickle Cell Quality of Life Measurement Information System (ASCQ-Me) via patient survey. Number of hospitalizations from the prior 12 months was obtained from chart review. Factors associated with HRQoL scores were assessed by Pearson correlation. **RESULTS:** Mean age was 36.7±10.6 (standard deviation) years, 65.6% of the sample was female, 84.4% had identified hemoglobin (Hb)SS/Sbthal0 disease, 81.3% reported chronic pain (experiencing pain on ≥3 days per week in the past 6 months). Mean EQ-5D VAS was 63.4, lower than the U.S. 35-44 age mean of 81.8. Mean EQ-5D index score was 0.79, lower than the U.S. 35-44 age group population norm (0.85). ASCQ-Me scores are comparable to the referent population of adults with SCD. Mean fatigue score was 57.9, ranged 33.7-75.9, and was negatively correlated with the EQ-5D index score (correlation coefficient r=-0.35, p=0.049), and ASCQ-Me scores, including pain (r=-0.47, p=0.006), sleep (r=-0.38, p=0.03), and emotion (r=-0.79, p<0.0001). Medical history checklist (MHC) score (sums 9 SCD complications and treatment history) was negatively correlated with EQ-VAS (r=-0.53, p=0.002), EQ-index score (r=-0.50, p=0.004), ASCQ-Me pain (r=-0.41, p=0.02), and stiffness (r=-0.63, p=0.0001). Number of hospitalizations was negatively correlated with HRQoL (all p<0.05). Patients who reported chronic pain had significantly lower mean ASCQ-Me sleep score (48.3±10.1 vs. 57.1±9.1, p=0.04) and EQ-5D index score (0.72±0.21 vs. 0.89±0.09, p=0.002) than those without chronic pain. **CONCLUSIONS:** Fatigue, MHC, hospitalization and chronic pain negatively impact HRQoL. Next steps are to evaluate the economic burden of illness on people with SCD.

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REFERENCES

1. https://www.cdc.gov/ncbddd/sicklecell/index.html

2. Dampier C1, Lieff S, LeBeau P, Rhee S, McMurray M, Rogers Z, et al. Health-related quality of life in children with sickle cell disease: a report from the Comprehensive Sickle Cell Centers Clinical Trial Consortium. Pediatr Blood Cancer. 2010 Sep;55(3):485-94. doi: 10.1002/pbc.22497.

3. Lee S, Vania DK, Bhor M, Revicki D, Abogunrin S, Sarri G. Patient-Reported Outcomes and Economic Burden of Adults with Sickle Cell Disease in the United States: A Systematic Review. Int J Gen Med. 2020 Jul 7;13:361-377. doi: 10.2147/IJGM.S257340. PMID: 32753936; PMCID: PMC7354084.

4. National Academies of Sciences, Engineering, and Medicine. 2020. Addressing Sickle Cell Disease: A Strategic Plan and Blueprint for Action. Washington, DC: The National Academies Press. doi: 10.17226/25632.

5. Keller SD, Yang M, Treadwell MJ, Werner EM, Hassell KL. Patient reports of health outcome for adults living with sickle cell disease: development and testing of the ASCQ-Me item banks. Health Qual Life Outcomes. 2014 Aug 22;12:125. doi: 10.1186/s12955-014-0125-0.