



## The 65th ASH Annual Meeting Abstracts

## ORAL ABSTRACTS

## 901. HEALTH SERVICES AND QUALITY IMPROVEMENT - NON-MALIGNANT CONDITIONS

**The Impact of Socio-Economic Determinants of Health on PedsQL and Pain Outcomes Among Individuals with Sickle Cell Disease**

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**Background:** Pain in sickle cell disease (SCD) is the most visible symptom in patients. Many recent studies have shown that socio-economic status such as low income, educational achievement or even less affluent neighborhoods may contribute to the pain experience, with those of lower socioeconomic status (SES) reporting both acute and chronic pain more frequently. Furthermore, living in a less affluent area was associated with frequent use of analgesics after adjustment for pain intensity. The relationships between SES variables, pain-related anxiety, frequency of vaso-occlusive crises and/or acute care utilization have been explored; nevertheless, the relationship between SES and quality of life pain-related measures (pain hurt, pain interference, etc.) has yet to be reported.

**Methods:** The St. Jude Children's Research Hospital Sickle Cell Clinical Research and Intervention Program (SCCRIP) is an observation cohort study of clinical outcomes in patients with SCD. Patients enrolled in SCCRIP were retrospectively evaluated based on various SES measurements. Household SES was evaluated using the Barratt Simplified Measure of Social Status (BSMSS), a composite index of parent education and occupation. The Social Vulnerability Index (SVI) was used to classify individuals based on social vulnerabilities at the neighborhood level. The area deprivation index (ADI) ranks neighborhood in a region of interest based on social risk factors that may predispose individuals to worse clinical outcomes. Quality of life measures, Pain Hurt, Pain Impact, and Pain Management/Control, were extracted from the PedsQL SCD Module. High scores on the SVI and ADI are associated with low SES and high scores on the PedsQL indicate better SCD related quality of life (QoL) with lower burden and impact of pain on function. Multivariate linear regression models were used to evaluate the associations of SES with QoL pain-related outcomes, based on a stepwise model selection strategy, with potential covariates including age, gender, disease-modifying therapy (e.g., Hydroxyurea and chronic transfusions), hemoglobin, hemoglobin F (HbF)%, and each SES variable.

**Results:** 944 patients between the ages of 5-61 (Mean=13.75, Standard Deviation=7.57) years diagnosed with SCD completed PedsQL testing and were assessed for SVI and ADI. Multivariate models demonstrated that patients with lower SVI (i.e., higher neighborhood SES) at the neighborhood level displayed higher scores with regards to Pain Hurt (est=-7.44, standard error (SE)=2.84, p=0.01), Pain Impact (est=-9.56, SE=3.18, p=0.003) and Pain Management/Control (est=-9.35, SE=3.81, p=0.01). Similar relationships were observed for patients with lower ADI. Additionally, there was a significant association between pain impact and BSMSS (est=0.20, SE=0.10, p=0.04), suggesting that individuals with higher BSMSS (higher household SES) also had higher pain impact scores (better quality of life).

**Conclusions:** This study demonstrated that neighborhood and household SES have an impact on pain experience in youth with SCD. Patients with increased social vulnerability and area deprivation experienced lower health-related quality of life-related to SCD pain. Increased household SES was associated with greater SCD pain impact independent of the effects of patient age, gender, SCD therapy, and HbF. Our study suggests that social determinants of health, such as SES, play a role in pain experience and QOL related to SCD pain and should be explored further.

**Disclosures Heitzer:** Global Blood Therapeutics: Consultancy. **Darbari:** Global Blood Therapeutics (Pfizer): Membership on an entity's Board of Directors or advisory committees; Novo Nordisk: Membership on an entity's Board of Directors or ad-

visory committees; Agios: Membership on an entity's Board of Directors or advisory committees; Novartis Pharmaceuticals Corporation: Membership on an entity's Board of Directors or advisory committees.

Table 1. Participant characteristics by SCD genotype

	Overall	SS/SB <sup>a</sup>	SC/SB+/Other	p	q
Age at PedsQoL, Mean (SD)	13.75 (7.57)	13.98(7.82)	13.6(7.12)	0.98	0.98
Age at BSMSS, Mean (SD)	11.74 (4.24)	11.63 (4.25)	11.92 (4.24)	0.57	0.78
Race, n (%)					
Black	937 (99.26%)	589 (99.66%)	348 (98.58%)		
White	2 (0.21%)	1 (0.17%)	1 (0.28%)	0.12	0.27
Other	5 (0.53%)	1 (0.17%)	4 (1.13%)		
Gender, n(%)					
Male	477 (50.53%)	294 (49.75%)	183 (51.84%)	0.53	0.78
Female	467 (49.47%)	297 (50.25%)	170 (48.16%)		
SVI, n(%)					
Very High- High	645 (69.28%)	410 (70.45%)	235 (67.34%)		
Moderate	112 (12.03%)	63 (10.82%)	49 (14.04%)	0.34	0.62
Low - Very Low	174 (18.69%)	109 (18.73%)	65 (18.62%)		
ADI (State), mean (SD)	6.80 (2.96)	6.81 (2.95)	6.77 (2.98)	0.90	0.98
BSMSS, mean (SD)	30.42 (13.47)	30.16 (13.02)	30.82 (14.15)	0.65	0.80
HU Treatment, n(%)					
Yes	576 (61.02%)	482 (81.56%)	94 (26.63%)	<.001	<.001
No	368 (38.98%)	109 (18.44%)	259 (73.37%)		
Chronic Transfusion, n(%)					
Yes	61 (7.54%)	59 (12.72%)	2 (0.58%)	<.001	<.001
No	748 (92.46%)	405 (87.28%)	343 (99.42%)		
HbF%, mean (SD)	12.19 (10.87)	15.11 (10.14)	7.33 (10.31)	<.001	<.001
Hemoglobin (g/dl), mean (SD)	9.90 (1.81)	9.04 (1.40)	11.35 (1.45)	<.001	<.001

SS/SB<sup>a</sup> = HbSS/HbSB<sup>b</sup>; thalassaemia, SC/SB+/Other = HbSC/HbSB<sup>b</sup>; thalassaemia/Other, q= p-value adjusted for false discovery rate, SVI= Social Vulnerability Index, ADI= Area Deprivation Index, BSMSS= Barratt Simplified Measure of Social Status. q<0.05 considered significant

Table 1 shows the demographic characteristics of the population studied by disease subtype.

Table 2. Effect of SES on PedsQL pain-related measures adjusted for participant demographics, SCD modifying therapies, and clinical markers.

SES Level	SES Measure	Pain Hurt			Pain Impact			Pain Management & Control		
		Est	SE	p	Est	SE	p	Est	SE	p
Neighborhood	SVI	-7.44 <sup>a</sup>	2.84	<b>0.01</b>	-9.56 <sup>a</sup>	3.18	<b>0.003</b>	-9.35 <sup>c</sup>	3.81	<b>0.01</b>
	ADI	-0.90 <sup>a</sup>	0.25	<b>0.0003</b>	-0.92 <sup>a</sup>	0.28	<b>0.001</b>	-0.90 <sup>c</sup>	0.33	<b>0.007</b>
Household	BSMSS	0.08 <sup>a</sup>	0.08	0.36	0.20 <sup>b</sup>	0.10	<b>0.04</b>	0.09 <sup>d</sup>	0.11	0.41

SES=socioeconomic status, Est=estimate, SE=standard error, p=p-value, SVI= Social Vulnerability Index, ADI= Area Deprivation Index, BSMSS= Barratt Simplified Measure of Social Status. p<0.05 considered significant.

a. Model: Pain score~SES measure + Age at PedsQL + Gender + HU treatment + Hb + HbF

b. Model: Pain score ~ BSMSS + Age at PedsQL + Hb

c. Model: Pain score ~ SES measure + Age at PedsQL + Gender + Chronic transfusion therapy + HU treatment + HbF

d. Model: Pain score ~ BSMSS + HU Treatment + HbF + Hb

Table 2 shows the analysis of the association between SES and PedsQL Module Scales (Pain Hurt, Pain Impact and Pain Management & Control). A negative association between SVI and PedsQL outcomes indicates that as the SVI score increases, the PedsQL scores decreased. Similarly, a positive association between the BSMSS score and Pain Impact score indicates that as the BSMSS score increases, so did the pain impact score.

Figure 1

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