The 65th ASH Annual Meeting Abstracts

POSTER ABSTRACTS

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

Assessing Pain Severity in Sickle Cell Disease Using Animations and a Graphical Body Image

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Introduction: Adults living with sickle cell disease (SCD) most frequently seek medical care due to pain. To determine the most efficacious treatment plan for patients presenting with pain, providers must first accurately assess and diagnose the pain. Unfortunately, the current approaches for assessing pain are inadequate. Combined with medical provider biases, patients can often have their pain symptoms misinterpreted, ignored, or blatantly dismissed. To address this issue, we partnered with stakeholders, human-centered designers, and software engineers to design a novel pain assessment tool, called Painimation. Painimation allows patients to communicate their pain quality, intensity, and location using abstract animations and a paintable body image. Painimation has been validated in a general population with chronic pain, but there is limited data validating this approach in SCD. Preliminary data on the use of Painimation by adults with SCD (N = 67) found that those who described their pain using the "throbbing" animation had less severe pain symptoms than those endorsing the "shooting" animation. Objective: To replicate and extend prior findings by determining whether pain animations and body image data are associated with pain outcomes in a large cohort of adults with SCD. We hypothesized that the presence of shooting pain and greater body surface areas affected by pain would be associated with more severe pain outcomes and mental health symptoms. Methods: We performed a secondary analysis on baseline data from the "Cognitive Behavioral Therapy and Real-Time Pain Management Intervention for Sickle Cell via Mobile Application (CaRISMA)" Trial-a multisite randomized, controlled trial in adults with SCD and chronic pain. Eligible patients were randomized 1:1 to either digital cognitive behavioral therapy or digital

education; in addition, both arms received at least 12 weeks of health coach support. At baseline, participants completed a battery of questionnaires and tracked their pain intensity (0-10) by the Visual Analog Scale (VAS) and mood daily via a mobile app. The Painimation app presents a front and back 2-dimensional body image that is paintable to indicate areas affected by pain. Users choose from abstract animations intended to represent different pain qualities; the intensity of the animations can be adjusted, and up to three can be selected. For the purpose of the analyses, participants were categorized into "Shooting Pain" vs "No Shooting Pain" and "Throbbing with Shooting and Stabbing" vs "Throbbing Alone," based on our prior study. Participants were also split into groups based on whether the proportion of the body image painted was less than the median (<9.8% vs >=9.8%). Baseline characteristics and demographics were compared between groups, and multivariable regressions were used to estimate covariate-adjusted associations with the following outcomes at baseline: daily pain, Patient Reported Outcomes Measurement Information System (PROMIS) pain interference scale, Pain Catastrophizing Scale (PCS), Current Opioid Misuse Measure (COMM-9), and Adults Sickle Cell Quality of Life Measurement Information System (ASCQ-Me) pain severity and frequency.

Results: The trial enrolled 359 adults, mean age 36.3 (SD = 10.5), 66% female, 93% Black race. The "Shooting" painimation and greater body image scores were associated with all outcomes in univariate analyses (all $p<0.01$; Table 1) except for the proportion of "happy" mood days and anxiety scores. After controlling for age, depression, anxiety, % body image, and site, the shooting animations were independently associated with greater daily pain intensity (beta = 0.64; p = 0.046). After controlling for age, depression, and site, greater body image score was associated with daily pain intensity (beta = 1.18; p < 0.001), pain interference (beta = 2.87; p < 0.001), ASCQ-Me pain frequency (beta = 3.91; p =< 0.005), and ASCQ-Me pain severity (beta = 4.50; p = 0.002).

Conclusion: Both the "shooting" animation and body image measures were associated with more severe pain outcomes. This study demonstrates that animations and body image data can be used to assess pain severity in SCD, more objectively than the 0-10 numeric VAS scale. Future studies should explore whether pain location and specific animation selected are associated with pain etiology, and determine whether this approach can differentiate different types of pain in SCD.

vestigator or sub-investigator). **DeBaun:** *FORMA:* Consultancy; *Vertex/CRISPR:* Membership on an entity's Board of Directors or advisory committees; *Novartis Pharmaceuticals Corporation:* Other: Study steering committee member; *Global Blood Therapeutics:* Membership on an entity's Board of Directors or advisory committees, Research Funding. **Trimnell:** *Agios Pharmaceuticals:* Consultancy; *Novo Nordisk:* Consultancy; *Pfizer:* Consultancy, Honoraria; *Bluebird bio:* Honoraria; *Graphite Bio:* Consultancy; *Novartis:* Consultancy; *Vertex:* Honoraria. **Decastro:** *Forma Therapeutics:* Other: Advisory board; *Global Blood Therapeutics:* Other: Advisory board; *GlycoMimetics:* Other: Advisory board; *Novartis:* Other: Advisory board.

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Table 1. Pain and psychosocial outcomes by selection of "shooting" pain imation among adults with SCD and chronic pain

	No Shooting Pain (N=213)	Shooting Pain (N=146)	P-value
# of Diary Entries, 2 Weeks			
Mean (SD) [Min, Max]	8.88 (4.14) [1.00, 14.0]	8.41 (4.07) [1.00, 14.0]	0.34
Missing	37 (17.4%)	23 (15.8%)	
Avg Pain VAS (0-10), Daily Diary			
Mean (SD) [Min, Max]	3.94 (2.46) [0, 8.80]	4.99 (2.48) [0, 9.50]	<0.001
Missing	37 (17.4%)	23 (15.8%)	
Freq Happy Mood, Daily Diary			
Mean (SD) [Min, Max]	0.105 (0.162) [0, 0.769]	0.122 (0.197) [0, 1.00]	0.444
Missing	37 (17.4%)	23 (15.8%)	
PROMIS Pain Interference			
Mean (SD) [Min, Max]	61.2 (7.79) [40.7, 77.0]	64.5 (5.46) [51.2, 77.0]	<0.001
ASCQ-Me			
Pain Frequency			
Mean (SD) [Min, Max]	46.0 (13.2) [20.8, 63.5]	51.5 (10.1) [20.8, 63.5]	<0.001
Pain Severity			
Mean (SD) [Min, Max]	44.7 (14.4) [14.9, 66.3]	51.1 (10.4) [14.9, 66.3]	<0.001
Social Functioning			
Mean (SD) [Min, Max]	48.8 (7.84) [26.0, 69.8]	45.1 (7.44) [26.0, 69.8]	<0.001
Emotional Impact			
Mean (SD) [Min, Max]	49.3 (8.91) [26.8, 65.6]	46.2 (8.41) [26.8, 65.6]	0.0010
PHQ-9 Depressive Symptoms			
Mean (SD) [Min, Max]	9.45 (4.84) [1.00, 24.0]	11.3 (5.23) [2.00, 27.0]	0.0025
Missing	44 (20.7%)	23 (15.8%)	
GAD-7 Anxiety Symptoms			
Mean (SD) [Min, Max]	8.41 (4.48)	8.84 (4.67)	0.469
Median [Min, Max]	7.00 [2.00, 21.0]	8.00 [2.00, 21.0]	
Missing	78 (36.6%)	30 (20.5%)	
PCS Pain Catastrophizing			
Mean (SD) [Min, Max]	8.69 (4.20) [0, 16.0]	10.1 (3.86) [0, 16.0]	<0.001
COMM-9 Opioid Use Behaviors			
Mean (SD) [Min, Max]	8.18 (5.35) [0, 28.0]	9.84 (5.37) [0, 29.0]	0.0042
% Body Area in Pain			
Mean (SD) [Min, Max]	10.1 (12.4) [0, 84.0]	18.5 (17.0) [0.248, 93.3]	<0.001

Table 2. Pain and psychosocial outcomes by total body image (TBI) percentage among adults with SCD and chronic pain

	TBI < Median (9.8%) (N=191)	TBI >= Median (9.8%) (N=168)	P-value
# of Diary Entries, 2 Weeks			
Mean (SD) [Min, Max]	8.91 (4.04) [1.00, 14.0]	8.44 (4.19) [1.00, 14.0]	0.331
Missing	33 (17.3%)	27 (16.1%)	
Avg Pain VAS (0-10), Daily Diary			
Mean (SD) [Min, Max]	3.76 (2.54) [0, 9.43]	5.07 (2.32) [0, 9.50]	<0.001
Missing	33 (17.3%)	27 (16.1%)	
Freq Happy Mood, Daily Diary			
Mean (SD) [Min, Max]	0.133 (0.199) [0, 1.00]	0.0885 (0.146) [0, 0.889]	0.0267
Missing	33 (17.3%)	27 (16.1%)	
PROMIS Pain Interference			
Mean (SD) [Min, Max]	60.5 (7.41) [40.7, 77.0]	65.0 (5.93) [40.7, 77.0]	<0.001
ASCQ-Me			
Pain Frequency			
Mean (SD) [Min, Max]	45.8 (13.2) [20.8, 63.5]	51.1 (10.7) [20.8, 63.5]	<0.001
Pain Severity			
Mean (SD) [Min, Max]	44.4 (14.5) [14.9, 66.3]	50.5 (11.0) [14.9, 66.3]	<0.001
Social Functioning			
Mean (SD) [Min, Max]	49.3 (7.86) [29.8, 69.8]	45.0 (7.24) [26.0, 69.8]	<0.001
Emotional Impact			
Mean (SD) [Min, Max]	50.1 (8.76) [26.8, 65.6]	45.6 (8.29) [26.8, 65.6]	<0.001
PHQ-9 Depressive Symptoms			
Mean (SD) [Min, Max]	9.33 (4.84) [1.00, 23.0]	11.1 (5.18) [2.00, 27.0]	0.0028
Missing	47 (24.6%)	20 (11.9%)	
GAD-7 Anxiety Symptoms			
Mean (SD) [Min, Max]	7.78 (4.54) [2.00, 21.0]	9.41 (4.46) [2.00, 21.0]	0.0046
Missing	68 (35.6%)	40 (23.8%)	
PCS Pain Catastrophizing			
Mean (SD) [Min, Max]	8.53 (4.19) [0, 16.0]	10.1 (3.89) [0, 16.0]	<0.001
COMM-9 Opioid Use Behaviors			
Mean (SD) [Min, Max]	7.70 (4.98) [0, 25.0]	10.2 (5.60) [0, 29.0]	<0.001

Figure 1