Published in final edited form as:

Br J Dermatol. 2020 January ; 182(1): 240–242. doi:10.1111/bjd.18335.

Hidradenitis Suppurativa Area and Severity Index (HASI): a pilot study to develop a novel instrument to measure the physical signs of hidradenitis suppurativa

N. Goldfarb^{1,2}, J.R. Ingram³, G.B.E. Jemec^{4,5}, H.B. Naik⁶, V. Piguet⁷, M.J. Hyde⁸, R. Freese⁹, M.A. Lowes⁸, A. Alavi⁷

¹Departments of Medicine and Dermatology, University of Minnesota, Minneapolis, MN, U.S.A.

²Departments of Medicine and Dermatology, Minneapolis Veterans Affairs Health Care System, Minneapolis, MN, U.S.A.

³Welsh Institute of Dermatology, University Hospital of Wales, Cardiff, U.K

⁴Department of Dermatology, Zealand University Hospital, Roskilde, Denmark

⁵Department of Dermatology, University of Copenhagen, Copenhagen, Denmark

⁶Department of Dermatology, University of California San Francisco, San Francisco, CA, U.S.A.

⁷Department of Medicine, Division of Dermatology, Women's College Hospital, University of Toronto, Toronto, ON, ? Canada

⁸The Rockefeller University, New York, NY, ? U.S.A.

⁹Biostatistical Design and Analysis Center, Clinical and Translational Science Institute, University of Minnesota, Minneapolis, MN, ? U.S.A.

DEAR EDITOR, A valid and reliable disease severity assessment instrument for hidradenitis suppurativa (HS) is lacking. While validated tools exist, including Hidradenitis Suppurativa Clinical Response,¹ International Hidradenitis Suppurativa Severity Score System (IHS4)² and Severity Assessment of Hidradenitis Suppurativa Score,³ each has limitations. These include inability to measure cross-sectional severity, lack of inter-rater reliability (IHS4 intraclass correlation coefficient 0.47, 95% confidence interval 0.32–0.65)⁴ and issues inherent to composite physician- and patient-reported outcomes, respectively.

To address these limitations, in addition to the lack of body surface area (BSA) assessment in the current validated tools, a novel, preliminary instrument was created to measure disease severity, called the Hidradenitis Suppurativa Area and Severity Index (HASI). HASI was modelled after the Psoriasis Activity and Severity Index (PASI). Four classic signs of HS-related inflammation (erythema, thickness, drainage, tenderness) were selected. Methods to

gold0414@umn.edu.

M.A.L. and A.A. contributed equally.

Supporting Information

Additional Supporting Information may be found in the online version of this article at the publisher's website:

Appendix S1 Funding sources and conflicts of interest.

measure these variables were based on review of the available literature for these variables in other severity assessment instruments.

The primary objective of this pilot study was to determine the inter-rater reliability (IRR) of HASI using a small set of three patients with HS and seven raters with expertise in HS. Secondary objectives were to determine the IRRs of individual components of HASI and to determine convergent validity for HASI. Seven dermatologists (three from the U.S.A., two from Canada, two from Europe) rated three patients with HS, with varying clinical severity, in a single session in random order. Raters were blinded to other raters' scores. Patients were from a hospital-based ambulatory dermatology clinic in Toronto, Canada and were invited to participate based on their availability. All patients provided informed written consent. This study was approved by the Women's College Hospital ethics board (#2018-0137-E).

Each variable in HASI was scored on a Likert scale (0–3) for each predetermined body region. For BSA assessment, raters determined the number of palms (one palm indicated 1% of the patient's BSA) involved for each body region (head, right axilla, left axilla, anterior chest, back, anterior bathing trunk, posterior bathing trunk, other). This was converted to a percentage of that region. An area score was assigned to each region using the PASI approach (0 = none, 1 = 1–9%, 2 = 10–29%, 3 = 30–49%, 4 = 50–69%, 5 = 70–89%, 6 = 90–100%). To calculate the regional HASI score, the sum of the four clinical variable scores was multiplied by the area score of each involved region. This value was then multiplied by the proportion of the BSA of that region, to give a regional HASI score. Regional HASI scores were added together to give the cumulative total HASI score (range 0–72).

The median and range were calculated for each primary and secondary variable for each of the three patients. The IRR was determined using the intraclass correlation coefficient (ICC). A two-way ICC was calculated using R, version 3.5.1 (R Foundation for Statistical Computing, Vienna, Austria). An ICC > 0.90 was considered to indicate excellent reliability, 0.76–0.90 high, 0.50–0.75 moderate and < 0.50 poor.⁵ Spearman rho correlations were calculated between median total HASI score, HASI without drainage, HASI without drainage or erythema, individual components of the HASI score, total BSA, and previous outcome measurements including Hurley stage, IHS4, HS Physician's Global Assessment (PGA) and total lesion counts, to evaluate convergent validity. Correlation coefficients (ρ) > +0.8 or < -0.8 were considered strongly associated, while scores of ± 0.5 –0.79, ± 0.20 –0.49 and 0.00 to ± 0.20 were considered moderately, weakly and not associated, respectively.⁶

Table 1 lists the patient demographics and ICCs for each variable evaluated. The total HASI, HASI without drainage and HASI without drainage or tenderness all had high IRRs (ICC > 0.80). The ranges and 95% confidence intervals show wide ranges of possible values for all scores.

Total HASI, HASI without drainage, HASI without drainage or tenderness, and the erythema, thickness and tenderness subscores were all strongly positively correlated with Hurley staging, IHS4, HS-PGA, and total nodule, nodule and/or abscess, and tunnel counts (ρ > 0.86). Drainage was only strongly positively correlated with Hurley staging (ρ = 0.87) and strongly negatively correlated with abscess count (ρ = -0.87). BSA estimation had a

strong positive relationship with Hurley staging, IHS4, HS-PGA and total lesion counts ($p > 0.86$). P-values are not presented due to the small sample size.

Major limitations of our pilot study are the small sample size and lack of intrarater reliability testing. HASI will be modified based on feedback from experts and retested with additional patients and raters. Future plans also include further assessment of convergent validity with patient-reported outcome measures, intrarater reliability and sensitivity to change with treatment. HASI appears to be a promising physician-reported instrument for capturing HS severity.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

Funding statements and conflicts of interest and can be found in Appendix S1 (see Supporting Information).

References

1. Kimball AB, Jemec GB, Yang M et al. Assessing the validity, responsiveness and meaningfulness of the Hidradenitis Suppurativa Clinical Response (HiSCR) as the clinical endpoint for hidradenitis suppurativa treatment. *Br J Dermatol* 2014; 171:1434–42. [PubMed: 25040429]
2. Zouboulis CC, Tzellos T, Kyrgidis A et al. Development and validation of the International Hidradenitis Suppurativa Severity Score System (IHS4), a novel dynamic scoring system to assess HS severity. *Br J Dermatol* 2017; 177:1401–9. [PubMed: 28636793]
3. Hessam S, Scholl L, Sand M et al. A novel severity assessment scoring system for hidradenitis suppurativa. *JAMA Dermatol* 2018; 154:330–5. [PubMed: 29417136]
4. Thorlacius L, Garg A, Riis PT et al. Inter-rater agreement and reliability of outcome measurement instruments and staging systems used in hidradenitis suppurativa. *Br J Dermatol* 2019; 181:483–91. [PubMed: 30724351]
5. Koo TK, Li MY. A guideline of selecting and reporting intraclass correlation coefficients for reliability research. *J Chiropr Med* 2016; 15:155–63. [PubMed: 27330520]
6. Zou KH, Tuncali K, Silverman SG. Correlation and simple linear regression. *Radiology* 2003; 227:617–22. [PubMed: 12773666]

Table 1

Patient demographics and intraclass correlation coefficients (ICCs) of severity scoring

	Patient A		Patient B		Patient C		
Age (years), sex, Fitzpatrick skin type	27, female, II		52, female, II		24, male, IV		
Severity scoring instruments	Median (range)		Median (range)		Median (range)		ICC (95% CI)
Total HASI	1.5 (1.1–1.6)		1.6 (0.9–2.9)		4.6 (3.6–6.7)		0.86 (0.49–0.99)
HASI (without drainage)	1.1 (0.9–1.3)		1.4 (0.7–2.2)		3.1 (2.6–5)		0.81 (0.39–0.99)
HASI (without drainage or tenderness)	0.7 (0.5–0.9)		1.1 (0.5–1.4)		2.5 (1.7–3.7)		0.82 (0.45–0.99)
Total erythema	0.4 (0.4–0.5)		0.5 (0.4–1.1)		1.2 (0.9–1.7)		0.78 (0.37–0.99)
Total thickness	0.4 (0.2–0.5)		0.4 (0.2–0.7)		1.2 (0.7–2)		0.81 (0.41–0.99)
Total tenderness	0.4 (0.2–0.4)		0.4 (0.0–0.7)		1.2 (0.5–1.8)		0.77 (0.32–0.99)
Total drainage	0.4 (0.2–0.4)		0.3 (0.2–0.7)		0.8 (0.3–1.3)		0.50 (0.05–0.98)
Hurley stage	2 (1–2)		2 (1–3)		3 (2–3)		0.51 (0.09–0.98)
IHS4	5 (0–8)		14 (2–22)		38 (23–46)		0.89 (0.60–0.99)
HS-PGA	2 (1–3)		3 (2–3)		4 (4–5)		0.80 (0.41–0.99)
Total nodule count	1 (0–1)		2 (0–3)		11 (0–18)		0.59 (0.14–0.98)
Total abscess count	0 (0–0)		1 (0–2)		0 (0–9)		0.07 (–0.11–0.90)
Total nodule and/or abscess count	0 (0–1)		2 (1–5)		13 (4–18)		0.78 (0.37–0.99)
Total tunnel count	1 (0–2)		3 (0–5)		6 (2–9)		0.73 (0.23–0.99)
Total BSA	1 (1–1)		1 (1–2)		5 (3–9)		0.82 (0.44–0.99)

BSA, body surface area; CI, confidence interval; HASI, Hidradenitis Suppurativa Area and Severity Index; HS-PGA, Hidradenitis Suppurativa Physician's Global Assessment; IHS4, International Hidradenitis Suppurativa Severity Score System.