Supplementary Appendix

Title

Disease burden and treatment patterns among US patients with hidradenitis suppurativa: a retrospective cohort study

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Supplementary Methods

Socio-demographic characteristics recorded were: age, sex, ethnicity, region of residence, index physician (dermatologist, surgeon, emergency room [ER], obstetrician and gynecologist [OBGYN], general practitioners [GP]), other specialists, other healthcare providers (HCPs; i.e., dentist, physical therapist), prescribing physician specialty, physician conducting procedures specialty, insurance type and calendar year of the index date.

Comorbidities that were selected based on their previously reported association with HS [1-3] were: acne conglobate, acne vulgaris, anemia, anxiety, arthritis, Crohn's disease, depression, diabetes, dissecting cellulitis of the scalp, dyslipidemia/hyperlipidemia, hyperglycemia, hypertension, inflammatory bowel disease, inflammatory uveitis, interstitial keratitis, metabolic syndrome, non-alcoholic fatty liver disease (NAFLD), obesity, pilonidal cysts, pyoderma gangrenosum, polycystic ovarian syndrome, sleep apnea, spondyloarthropathies, substance abuse, suicidal ideation and ulcerative colitis.

The HS-related procedures were laser treatment, surgical procedures (incision and drainage, deroofing, marsupialization, and excision) and intralesional injection. The HS-specific medications were topical treatments (antibiotic creams), intralesional corticosteroids, systemic drugs (systemic corticosteroids, spironolactone, biguanides [metformin], zinc gluconate, antibiotics, and biologics), and pain medications (nonsteroidal anti-inflammatory drugs [NSAIDS], opioids or other analgesics).

Supplementary Tables

Supplementary Table S1: Procedures and treatments of HS patients treated by biologics and non-biologics during the 1- and 2-years post-index periods

	1-year post-index		2-years post-index	
Treatment, n (%)	**Non-biologics (N=10,542)**	**Biologics (N=365)**	**Non-biologics (N=10,542)**	**Biologics (N=365)**
HS-related procedures				
Laser treatment	0 (0.0)	1 (0.3)	0 (0.0)	3 (0.8)
Surgical procedures				
Incision and drainage	682 (6.5)	42 (11.5)	753 (7.1)	61 (16.7)
Deroofing	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Marsupialization	34 (0.3)	4 (1.1)	37 (0.4)	4 (1.1)
Excision	425 (4.0)	25 (6.8)	468 (4.4)	32 (8.8)
Destruction	358 (3.4)	14 (3.8)	394 (3.7)	23 (6.3)
Silver nitrate	30 (0.3)	2 (0.5)	36 (0.3)	2 (0.5)
HS-specific medications				
Topical treatments				
Antibiotic creams	2490 (23.6)	131 (35.9)	2679 (25.4)	160 (43.8)
Topical corticosteroids	389 (3.7)	33 (9.0)	440 (4.2)	57 (15.6)
Intralesional				
Intralesional corticosteroid	690 (6.5)	86 (23.6)	782 (7.4)	109 (29.9)
Systemic drugs				
Systemic corticosteroids	544 (5.2)	61 (16.7)	631 (6.0)	84 (23.0)
Spironolactone	232 (2.2)	26 (7.1)	283 (2.7)	42 (11.5)
Biguanides (metformin)	294 (2.8)	21 (5.8)	321 (3.0)	32 (8.8)
Zinc gluconate	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Antibiotics	6691 (63.5)	275 (75.3)	6868 (65.1)	293 (80.3)
Pain medication				
NSAIDs	595 (5.6)	56 (15.3)	678 (6.4)	77 (21.1)
Opioids	973 (9.2)	55 (15.1)	1049 (10.0)	74 (20.3)
Other analgesics	369 (3.5)	30 (8.2)	416 (3.9)	41 (11.2)
Biologics vs. non-biologics				
Non-biologics	10,542 (100.0)	91 (24.9)	10,542 (100.0)	0 (0.0)

Biologics[a]	0 (0.0)	274 (75.1)	0 (0.0)	365 (100.0)

[a]Biologics included adalimumab and off-label use of other biologics (anakinra, brodalumab, certolizumab pegol, etanercept, golimumab, guselkumab, infliximab, ixekizumab, risankizumab, secukinumab, tildrakizumab and ustekinumab).

HS, hidradenitis suppurativa; N, number of patients in group; n, number of patients with outcome; NSAID, nonsteroidal anti-inflammatory drug.

Supplementary Table S2: HS-related utilization of HS patients treated by biologics and non-biologics during the pre-index and post-index periods

	1-year pre-index		1-year post-index		2-year post-index	
HCRU	**Non-biologics (N=10,530)**	**Biologics (N=365)**	**Non- biologics (N=10,530)**	**Biologics (N=365)**	**Non-biologics (N=10,530)**	**Biologics (N=365)**
Mean (SD) HCRU visits per patient[a]						
All-cause						
Office visit (all)	10.2 (11.3)	11.7 (10.9)	11.8 (11.4)	16.6 (13.2)	22.4 (21.2)	30.3 (22.2)
Office visit (dermatology)	0.4 (1.4)	0.7 (1.8)	0.8 (1.7)	2.7 (3.0)	1.3 (2.9)	4.5 (4.2)
Office visit (surgeon)	0.6 (1.7)	0.7 (1.9)	0.8 (1.9)	0.8 (1.7)	1.3 (2.8)	1.5 (2.5)
Office visit (other)	9.2 (10.6)	10.2 (10.1)	10.2 (10.6)	13.1 (12.6)	19.8 (19.8)	24.4 (21.2)
Other outpatient	6.9 (14.0)	8.2 (11.3)	8.1 (16.8)	12.0 (17.9)	16.1 (32.9)	23.7 (38.6)
ER and hospitalization	0.9 (2.9)	1.1 (4.1)	1.0 (3.1)	1.3 (3.4)	2.0 (5.7)	2.2 (5.1)
HS-specific						
Office visit (all)	NA	NA	1.5 (1.4)	3.9 (3.8)	1.7 (1.9)	6.3 (5.7)
Office visit (dermatology)	NA	NA	0.4 (1.0)	2.0 (2.2)	0.6 (1.2)	3.3 (3.4)
Office visit (surgeon)	NA	NA	0.1 (0.6)	0.3 (0.8)	0.2 (0.7)	0.4 (1.0)
Office visit (other)	NA	NA	0.9 (1.0)	1.6 (3.2)	1.0 (1.4)	2.6 (4.4)
Other outpatient	NA	NA	0.4 (1.9)	1.9 (8.0)	0.5 (3.4)	3.6 (12.4)
ER and hospitalization	NA	NA	0.0 (0.2)	0.1 (0.4)	0.0 (0.2)	0.1 (0.5)

NA, calculation of HS-specific HCRU visits for the 1-year pre-index was not possible since a diagnosis of HS was needed to link the visit/cost to HS disease.

[a]Per patient per year HS-specific encounters were reported, if HS was the primary diagnosis for ER and inpatient encounters, or in diagnosis position from 1–5 for outpatient or prescription encounters.

All-cause encounters were calculated per patient per year using all encounters that occurred during the associated study periods for the population of interest. The descriptive statistics reported were calculated based on the total number of visits and not the unique patient ID, except for the N (%) which is the number of patients reporting at least one of the specified encounters. HS-specific encounters were reported, if HS was the primary diagnosis for ER and inpatient encounters, or in diagnosis position from 1–5 for outpatient or prescription encounters.

ER, emergency room; HCRU, healthcare resource utilization; HS, hidradenitis suppurativa; ID, identification; N, number of patients in group; n, number of patients with outcome; SD, standard deviation.

Supplementary Table S3: HS-related expenditures of HS patients treated by biologics and non-biologics during the pre-index and post-index periods

	1-year pre-index		1-year post-index		2-year post-index	
HCRU	**Non-biologics (N=10,530)**	**Biologics (N=365)**	**Non- biologics (N=10,530)**	**Biologics (N=365)**	**Non-biologics (N=10,530)**	**Biologics (N=365)**
Mean HCRU costs from the overall population[a] (USD), mean (SD)						
All-cause						
Total medical[b] costs	11,464.0 (30,231.0)	12,932.0 (23,347.0)	14,027.0 (36,605.0)	20,108.0 (33,412.0)	13,616.0 (39,974.0)	20,001.0 (36,179.0)
Inpatient costs	3261.9 (16,216.0)	2130.9 (9004.2)	4345.6 (22,428.0)	4344.8 (16,531.0)	4411.4 (22,849.0)	5258.4 (21,254.0)
Outpatient[c] costs	7489.3 (20,208.0)	10,233 (18,645.0)	8871.1 (22,116.0)	15,060.0 (23,833.0)	8394.7 (25,328.0)	14,024.0 (24,435.0)
ER costs	712.3 (3341.1)	568.3 (2613.5)	810.7 (3813.6)	703.6 (3481.0)	809.8 (4030.3)	719.2 (3421.4)
Prescription drug costs	3072.1 (12,199.0)	12,677.0 (25,423.0)	3439.4 (13,420.0)	44,243.0 (39,595.0)	3632.6 (15,877.0)	53,800.0 (47,774.0)
Total healthcare[d] costs	14,536.0 (34,058.0)	25,609.0 (35,976.0)	17,467.0 (40,500.0)	64,351.0 (48,830.0)	17,249.0 (44,899.0)	73,801.0 (55,769.0)
HS-specific						
Total medical[b] costs	NA	NA	650.4 (2638.6)	2586.4 (8934.5)	143.3 (1524.5)	2338.0 (10,234.0)
Inpatient costs	NA	NA	50.7 (1204.8)	270.2 (2620.3)	21.6 (856.3)	285.4 (3283.3)
Outpatient[c] costs	NA	NA	586.0 (2187.1)	2275.3 (8300.5)	120.7 (1113.7)	2042.7 (9258.0)
ER costs	NA	NA	13.7 (221.8)	40.9 (399.1)	1.1 (46.8)	9.9 (134.0)
Prescription drug costs	NA	NA	209.9 (934.9)	5216.5 (10,344.0)	55.3 (548.7)	4639.2 (9209.8)
Total healthcare[d] costs	NA	NA	860.3 (2896.3)	7802.9 (15,131.0)	198.6 (1810.2)	6977.2 (13,829.0)

All-cause encounters were calculated per patient per year using all encounters that occurred during the associated study periods for the population of interest. HS-specific encounters were reported, if HS was the primary diagnosis for ER and inpatient encounters, or in diagnosis position from 1–5 for outpatient or corresponding prescription encounters. Patients who did not report any encounters were recorded as 0 and approximately 39 patients reported a negative total cost, these patients were removed from HCRU and cost analysis.
NA, calculation of HS-specific HCRU costs for the 1-year pre-index was not possible since a diagnosis of HS was needed to link the visit/cost to HS disease.
[a]Costs were calculated based on the the overall population. [b]Total medical costs include inpatient, outpatient, and emergency room costs. [c]Outpatient costs also include office costs. [d]Total healthcare costs include total medical (inpatient, outpatient, and emergency room) plus prescription costs.

ER, emergency room; HCRU, healthcare resource utilization; HS, hidradenitis suppurativa; N, number of patients in group; SD, standard deviation; USD, United States Dollar.

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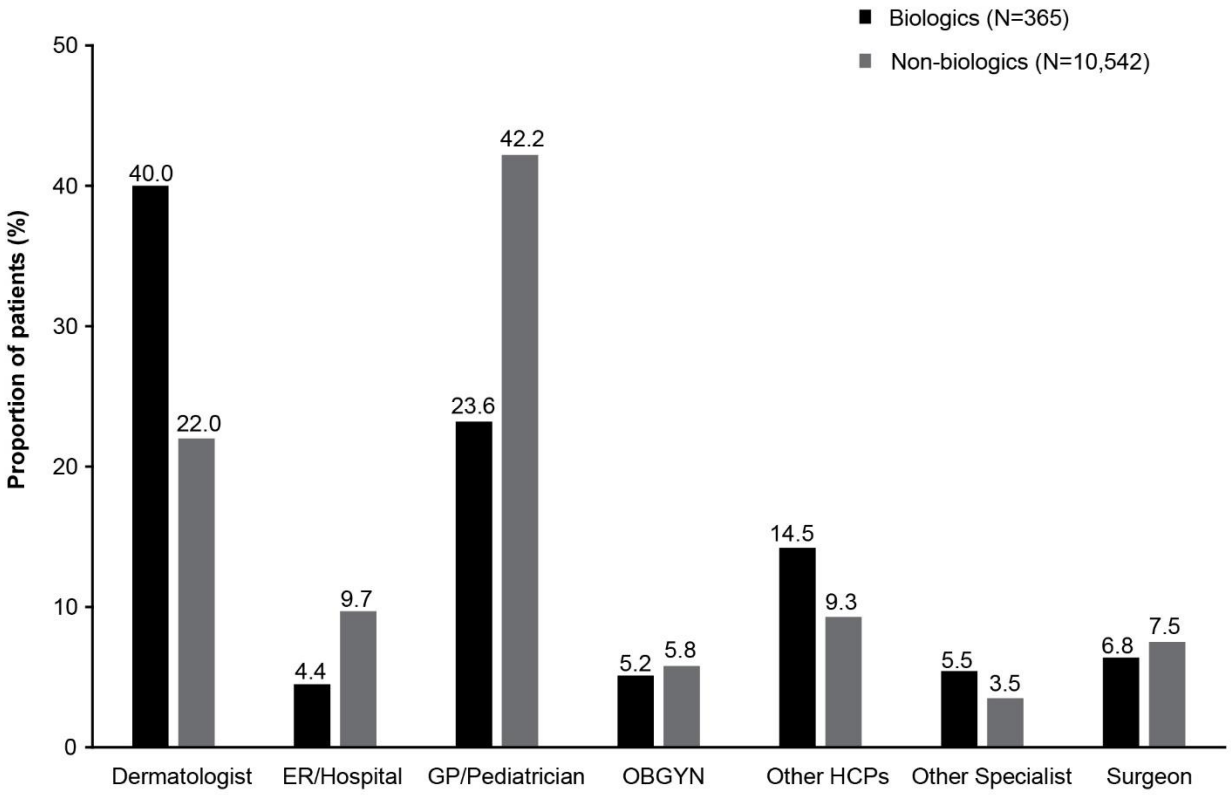
Supplementary Table S4: HS-related utilization of HS patients during the pre-biologics and post-biologics periods

Mean (SD) HCRU[a]	Pre-biologics (N=300)	Post-biologics (N=300)
All-cause (mean)		
Office visit (all)	16.5 (24.5)	46.9 (46.7)
Office visit (dermatology)	2.3 (4.3)	5.8 (7.5)
Office visit (surgeon)	0.8 (2.7)	1.7 (4.4)
Office visit (other)	13.4 (22.5)	39.4 (44.7)
Other outpatient	24.2 (46.4)	73.2 (85.8)
ER and hospitalization	4.6 (28.8)	12.0 (36.6)
HS-specific (mean)		
Office visit (all)	1.5 (1.7)	0.4 (1.0)
Office visit (dermatology)	0.5 (1.0)	0.3 (0.9)
Office visit (surgeon)	0.1 (0.4)	0.0 (0.0)
Office visit (other)	0.9 (1.6)	0.1 (0.6)
Other outpatient	1.4 (3.1)	0.3 (2.2)
ER and hospitalization	0.2 (2.5)	0.0 (0.1)

[a]The data were collected for 1 year pre-index period and any available time post-index period. For the pre-biologic and post-biologic periods, the number of visits/(first biologic use date – index HS diagnosis)/365.25 was used. If the data were less than a year, it was extrapolated for the fraction that does exist.

ER, emergency room; HCRU, healthcare resource utilization; HS, hidradenitis suppurativa; N, number of patients in group; SD, standard deviation.

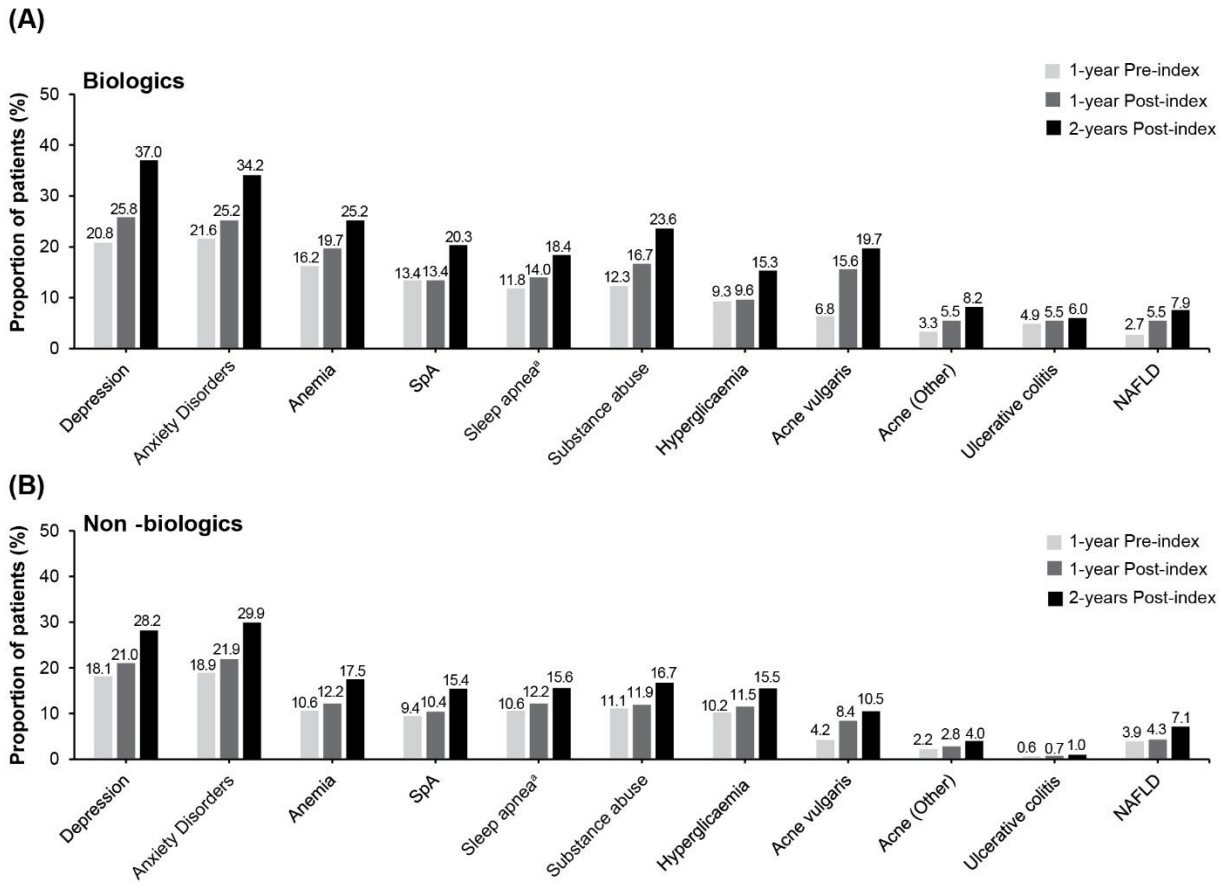
Supplementary Figures



Supplementary Figure S1: Proportion of physician specialty types at index of incident HS patients treated with biologics and non-biologics

Biologics (N=365) included adalimumab (N=332) and off-label use of other biologics (anakinra, brodalumab, certolizumab pegol, etanercept, golimumab, guselkumab, infliximab, ixekizumab, risankizumab, secukinumab, tildrakizumab and ustekinumab).

ER, emergency room; GP, general practitioner; HCP, healthcare provider; HS, hidradenitis suppurativa; N, number of patients in group; OBGYN, obstetrician and gynecology.



Supplementary Figure S2: Selected comorbidities in patients with HS treated with biologics and non-biologics during the pre-index and post-index periods

[a]Obstructive sleep apnea
Bar graphs demonstrating most frequent (>3% in any group) selected comorbidities associated with biologic treatment (a) (N=365) and non-biologic treatment (b) (N=10,542) in HS patients.

HS, hidradenitis suppurativa; N, number of patients in group; NAFLD, nonalcoholic fatty liver disease; SpA, spondyloarthropathies.

Supplementary References

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