ORIGINAL ARTICLE

# The effect of smoking and age on the response to first-line therapy of hidradenitis suppurativa: An institutional retrospective cohort study

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***Background:*** Treatment for hidradenitis suppurativa is often empiric and inadequate, and determining which patients will respond is difficult.

***Objective:*** We sought to determine which patient factors are associated with a positive response to first-line medical therapy.

***Methods:*** A single-center retrospective cohort study of all patients with hidradenitis suppurativa seen between January 1, 1992, and October 1, 2014, was conducted. Response to first-line medical therapy (oral/topical antibiotics, intralesional corticosteroids, and topical washes) was examined at follow-up within 6 months of initiating therapy. A multivariate binary logistic regression model was built examining response to treatment and the interplay of patient factors and treatment initiated.

***Results:*** In all, 198 patients were included in the final model. Nonsmokers (odds ratio 2.634, 95% confidence interval 1.301-5.332, $P = .007$) and older individuals (odds ratio 1.046 for each additional year, 95% confidence interval 1.020-1.072, $P < .001$) were more likely to have improvement at follow-up. In addition, current smokers differed significantly from nonsmokers in several regards.

***Limitations:*** The retrospective nature of this study is a limitation, as is relying on classification of disease severity from physical examination findings in some patients.

***Conclusions:*** The results of this study suggest that clinicians may be able to more accurately predict which patients with hidradenitis suppurativa will respond to first-line medical therapy, and which patients may require therapy escalation. (J Am Acad Dermatol http://dx.doi.org/10.1016/j.jaad.2016.07.041.)

***Key words:*** acne inversa; first-line treatment; hidradenitis suppurativa; increased age; medical therapy; patient response; smoking.

Hidradenitis suppurativa (HS) is a chronic cutaneous condition characterized by recurrent painful nodules, abscesses, scarring, and sinus tract formation.[1] HS is a prevalent but underrecognized health problem, affecting 0.006% to 4.1% of the general population.[2,3] Patients typically present in their second and third decades of life, with an average age of onset between 20 and 27 years.[4-6] More women than men are affected by HS, with a female-to-male ratio of approximately 4:1, and the diagnosis of HS is often delayed as a result of misdiagnosis.[5,7] The pathophysiology of HS is not

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completely understood, but disease development is most likely related to environmental factors driving disease development in genetically susceptible individuals.[8] Several factors—such as smoking, obesity, insulin resistance, family history, and several autoimmune/inflammatory diseases—were repeatedly demonstrated to be associated with HS development.[9,10]

Given that HS development is not fully understood and it is associated with a plethora of factors, any information about which patients with HS will respond to first-line medical therapy and which patients may require therapy escalation could prove highly valuable to clinicians. With this in mind, the goal of this study was to determine which patient factors were associated with a positive response to first-line medical therapy in patients with HS.

**CAPSULE SUMMARY**

- Determining which patients with hidradenitis suppurativa will respond to initial therapy is difficult, as treatment is often empiric and inadequate.
- Positive response to first-line medical therapy is associated with older age and being a nonsmoker.
- Patients should be advised to discontinue tobacco use because of its association with poorer treatment response.

## METHODS

### Study design

All portions of this study were conducted at Washington University School of Medicine as a part of an institutional review board—approved study. A retrospective cohort chart review was performed for all patients seen at Washington University School of Medicine affiliate hospitals, namely Barnes Jewish Hospital and St Louis Children's Hospital, between January 1, 1992, and October 1, 2014. Patients were identified through billing records, using the *International Classification of Diseases, Ninth Revision* code for HS, 705.83.

### Inclusion/exclusion criteria

Patients must have had: a dermatologist-confirmed diagnosis of HS, been prescribed only first-line medical therapy at their initial HS-specific dermatology visit, and had a follow-up visit within 6 months of the initial visit. First-line medical therapy was defined as any of the following alone or in any combination: oral antibiotics, topical antibiotics, intralesional corticosteroids, and antibacterial washes/creams/lotions (eg, benzoyl peroxide soap).[11] Patients were included in analysis regardless their compliance to their prescribed medication regime.

### Data collection

Patient records were identified in the electronic medical record (EMR), and study data were collected and managed using research electronic data capture tools hosted at Washington University in St Louis.[12] The first HS-specific dermatologist (initial) visit was defined as the earliest note in the EMR where HS symptoms were addressed or treated. Patient demographics were collected from the EMR at the closest possible dates within ±1 year of the patient's initial visit. The patient's weight and height were recorded at the closest possible date to the initial visit, and body mass index was calculated from this in the standard fashion. Patients were considered to have a positive family history of HS if stated explicitly, or to have a noted family history of recurrent boils or abscesses—or similar descriptor—in typical HS locations. Patient medical comorbidities were based on all available data recorded in the EMR before the initial visit. Patients were considered to have a positive history of any medical condition if it was noted in the EMR at any point before their initial visit. Any recorded diagnosis of an autoimmune condition, regardless of its association with HS, was noted (please see Fimmel and Zouboulis[13] for a complete listing of HS-associated autoimmune conditions and Hayter and Cook[14] for a comprehensive list of well-described autoimmune diseases). Disease severity was assigned at the initial visit, and was based on the stated physician assessment of disease. When there was no stated physician grading of the patients' disease, the authors assigned a grade based on the Hurley[1] criteria. Those with inactive disease were graded as mild disease, because of the intermittent nature of mild HS. Surgical scars from previous treatments were not included as scarring caused by HS when judging disease severity.

### Outcomes

At the first follow-up visit within 6 months of the initial visit patients were dichotomously assigned to either improved or no change/worsening disease. The response to treatment was hierarchically based on either stated improvement at follow-up, or an improvement in the grading of patient disease at the follow-up visit. If the physician recorded a response to treatment at the follow-up visit, it alone was used to judge response. However, if no response to treatment was noted in the follow-up note, then the response to treatment was based purely on