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Accessing medical knowledge on hidradenitis suppurativa: the impact of continuing medical education on portuguese doctors

Avaliação do conhecimento médico em hidradenite supurativa: impacto da formação médica contínua nos médicos portugueses

Tomás Pessoa e Costa, Inês Aparício-Martins, and Joana Cabete*

Departmentof Dermatology and Venereology, Unidade Local de Saúde São José, Lisbon, Portugal

Abstract

Objective: This study aimed to assess Portuguese physicians' baseline knowledge of Hidradenitis suppurativa (HS) and evaluate the role of continuous medical education. **Methods:** A digital continuing education course was created, featuring a lecture and an 8-question assessment. From the 1503 physicians enrolled, a control group of 501 physicians was randomly selected to complete the questionnaire before the course. After the course, the questionnaire was sent to all physicians who attended the lecture and were not part of the control group (381 physicians). **Results:** We collected 131 responses from the control group and 38 from the intervention group. The educational intervention significantly improved physicians' knowledge, as evidenced by higher total scores in intervention group (mean: 90.00) compared to the control group (mean: 79.22; $p < 0.001$). The question regarding the importance of specialist referral showed the greatest improvement, with 89.5% correct responses in the intervention group versus 65.6% in control group ($p = 0.004$). **Conclusion:** This study demonstrates that continuing educational interventions can effectively contribute to improve medical knowledge about HS, particularly concerning appropriate patient referral.

Keywords: Hidradenitis suppurativa. Continuous medical education. Digital medical education.

Resumo

Objetivo: Este estudo teve como objetivo avaliar o conhecimento dos médicos portugueses sobre a HS e avaliar o papel da educação médica contínua na melhoria da compreensão da doença. **Métodos:** Foi desenvolvido um curso de educação médica contínua online, que incluiu uma sessão clínica e um questionário de 8 perguntas. Dos 1503 médicos inscritos, foi selecionado aleatoriamente um grupo controlo de 501 médicos para preencher o questionário previamente ao curso. Após a conclusão da formação, o questionário foi enviado aos médicos que assistiram à sessão clínica e não pertenciam ao grupo controlo (381 médicos). **Resultados:** Foram obtidas 131 respostas no grupo controlo e 38 no grupo de intervenção. A realização da formação melhorou significativamente o conhecimento dos médicos, como evidenciado pelas pontuações totais mais elevadas no grupo de intervenção (média: 90.00) em comparação com o grupo controlo (média: 79.22; $p < 0.001$).

***Correspondence:**
Inês Aparício-Martins
E-mail: inesapariciomartins@gmail.com

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A pergunta sobre a importância da referenciação para um especialista foi a que apresentou resultados mais expressivos, com 89.5% de respostas corretas no grupo de intervenção e 65.6% no grupo de controlo (p = 0.004). **Conclusão:** Este estudo demonstra que a formação médica contínua pode contribuir efetivamente para melhorar os conhecimentos médicos sobre HS, particularmente no que diz respeito à referenciação adequada dos doentes.

Palavras-chave: Hidradenitis suppurativa. Educação médica contínua. Fomação médica digital.

Introduction

Hidradenitis suppurativa (HS) is a chronic, recurrent, mutilating dermatosis with a significant impact on patients' quality of life[1,2]. It is characterized by follicular destruction in areas rich in apocrine glands, leading to the appearance of inflammatory nodules and abscesses that may progress to fistulas and scarring, particularly in untreated patients[1,3]. Indeed, beyond new discoveries in HS pathogenesis and subsequent therapeutic optimization[4,5], several authors have identified delayed diagnosis as a major challenge in managing HS patients, with many years often elapsing between the onset of initial lesions and clinical diagnosis[6-8].

The delay in the diagnosis of HS is largely due to the difficulty in recognizing the condition by clinicians who are not specialists in this area, and these clinicians are often the first healthcare professionals to observe these patients[6-8]. In Portugal, there has been an ongoing effort to optimize the diagnosis and treatment of HS patients, mainly through continuing medical education sessions and the publication in 2023 of national clinical guidelines to improve patient referrals to dermatology services, facilitating timely diagnosis and treatment[9]. However, it is important to determine whether these guidelines are known and understood by frontline physicians, particularly those in primary care or emergency departments, who are often the first to see HS patients.

In this context, and as part of a continuing education course in dermatology, a survey was conducted among participating physicians both to assess their baseline knowledge of these guidelines and to evaluate the impact of educational interventions on their knowledge. Therefore, the goal of this study was to determine whether targeted training sessions could effectively enhance physician knowledge and bridge the gaps identified in initial assessments. By evaluating the effects of these educational initiatives, we aim to understand their relevance in improving clinical practice, with the ultimate goal of facilitating timely and accurate diagnosis and treatment of HS patients.

Material and methods

To assess the baseline medical knowledge of physicians and the impact of medical e-learning in HS, we used a medical knowledge platform called Dioscope© to create and host our learning course. After course creation and physicians' registration, participants were divided into two groups. Of the 1,503 physicians enrolled in the course, 501 were randomly selected to receive the questionnaire before any educational activity took place (control group). From the remaining participants, all who had attended the training on HS were selected, excluding those who had already been chosen for the initial questionnaire, resulting in a total of 381 physicians to whom the questionnaire was sent (intervention group). This division aimed to minimize bias from physicians who had already answered the questions and, therefore, were familiar with the answers. The goal was to evaluate whether there was a genuine improvement in medical knowledge because of the training.

Physicians were asked to provide a registration record and were grouped according to their medical specialty. Those with incomplete registration records, preventing its correct characterization, were excluded.

The questionnaire included eight questions based on the national HS guidelines (Table 1). Data was analyzed with Statistical Package for the Social Sciences, version 29.0 (IBM Corp., 2023). Categorical variables were presented as frequencies and percentages. Continuous variables were presented as means (M) and standard deviations (SD). Normality was assessed with Kolmogorov–Smirnov ($n > 50$) or Shapiro–Wilks ($n \leq 50$) complemented with quantile-quantile-plots. Score comparison was assessed with independent t-test. Questions comparisons were performed with χ^2 test or Fisher exact test, when Cochran's rules were not met. The effect size for t-test was calculated as Cohen's d, having 0.2 (low), 0.5 (moderate), 0.8 (high) as thresholds and phi (Φ) for χ^2/fisher test, having 0.1 (low), 0.3 (moderate), and 0.5 (high). Thresholds followed Cohen's 1988 recommendations[10].

Table 1. Answer key

Questionnaire	Correct answer
1. HS is characterized by the presence of primary, recurrent, suppurative lesions in the axillae, inguinal folds, perineum, perianal area, buttocks, inframammary folds, and periumbilical region.	True
2. HS usually manifests in childhood, with higher incidence and prevalence in males.	False
3. Chronic inflammation in HS contributes to an increased risk of squamous cell carcinoma in the affected areas.	True
4. The diagnosis of HS should be considered in any paediatric or adult patient with at least two episodes within a 6-month period, or persistent lesions over the same period, involving painful and suppurative lesions in typical areas.	True
5. The diagnosis of HS must always be confirmed by skin biopsy.	False
6. Any individual with suspected HS should be referred to Dermatology or an HS specialist for diagnostic confirmation and treatment guidance.	True
7. Microbiological examination should be routinely requested in patients with suppurative lesions.	False
8. In mild to moderate HS, localized with few and superficial lesions, the use of topical clindamycin 1% twice daily for up to three consecutive months may be considered.	True

HS: hidradenitis suppurativa.

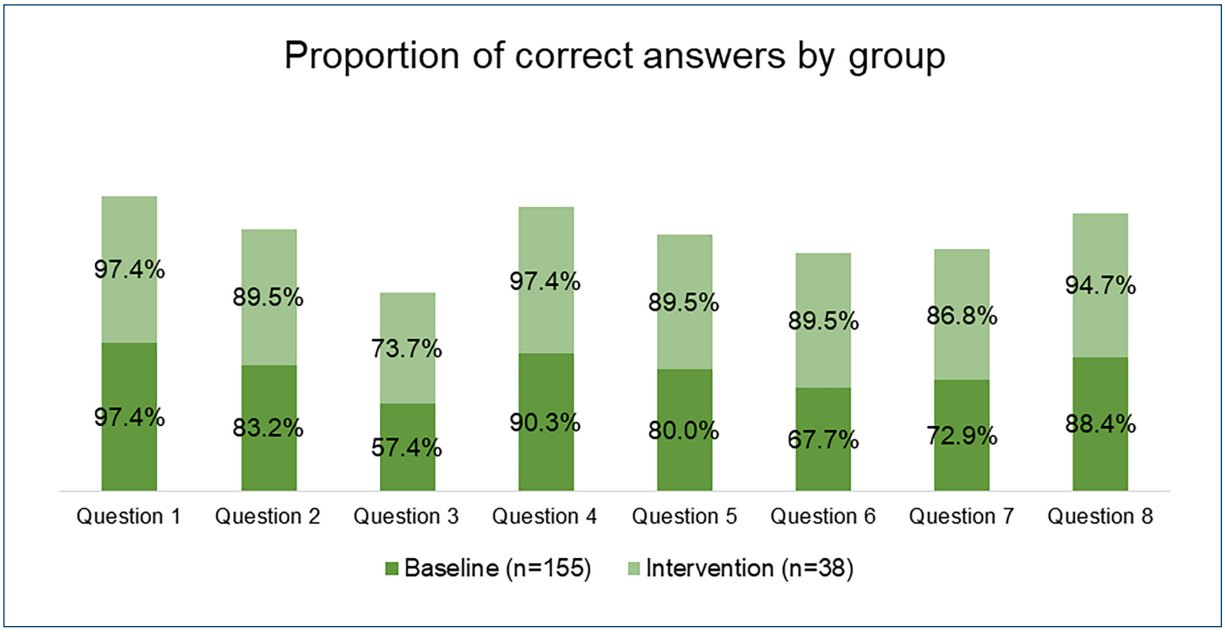

Figure 1. Distribution of the proportion of correct answers by group.

Results

We collected 131 responses from the control group and 38 from the intervention group. Figure 1 and table 2 shows the results for each question, presenting the percentage of correct answers and the corresponding p-values.

The results showed that, for Question 1, 98.5% of participants in the control group answered correctly (129 out of 131), closely followed by the intervention group, with 97.4% (37 out of 38), with no significant difference between groups (p = 0.537). For Question 2, the percentage of correct answers was 83.2% in the control group (109 out of 131) and 89.5% in the intervention group (34 out of 38), with no statistically significant difference (p = 0.449). For Question 3, 58.8% of participants in the control group (77 out of 131) and 73.7% in the intervention group (28 out of 38) answered correctly, with a marginally significant difference observed (p = 0.095). For Question 4, correct responses were provided by 88.5% of the control group (116 out of 131) and 97.4% of the intervention group (37 out of 38), with no significant difference detected (p = 0.125). For

Table 2. Question results of control and intervention groups

Questions	Correct answers of the control group (n = 131) (%)	Correct answers of the intervention group (n = 38) (%)	p	Effect size
Question 1	129 (98.5)	37 (97.4)	0.537†	0.04
Question 2	109 (83.2)	34 (89.5)	0.449*	0.07
Question 3	77 (58.8)	28 (73.7)	0.095*¶	0.13
Question 4	116 (88.5)	37 (97.4)	0.125†	0.13
Question 5	103 (78.6.0)	34 (89.5)	0.133*	0.12
Question 6	86 (65.6)	34 (89.5)	0.004*§	0.22
Question 7	93 (71.0)	33 (86.8)	0.048*‡	0.15
Question 8	115 (87.7)	36 (94.7)	0.369†	0.09

Results presented as n (%).
*χ^2 test.
†Fisher exact test.
‡p < 0.05.
§p < 0.01.
¶p < 0.10.

Question 5, 78.6% of participants in the control group (103 out of 131) and 89.5% in the intervention group (34 out of 38) answered correctly, with no significant difference (p = 0.133). For Question 6, 65.6% of the control group (86 out of 131) and 89.5% of the intervention group (34 out of 38) gave correct answers, with a significant difference favoring the intervention group (p = 0.004). For Question 7, 71.0% of participants in the control group (93 out of 131) and 86.8% in the intervention group (33 out of 38) provided correct responses, with a significant difference noted (p = 0.048). For Question 8, correct responses were observed in 87.7% of the control group (115 out of 131) and 94.7% of the intervention group (36 out of 38), with no significant difference between groups (p = 0.369). Effect sizes were mostly low. Table 3 shows results for score comparison between control and intervention groups.

The total score, obtained by computing the average percentage of correct answers, was higher in the intervention group, with a mean of 90.00 (SD = 10.35), compared to the control group, which had a mean of 79.22 (SD = 14.22). The difference between groups was statistically significant (p < 0.001). The effect size, calculated as Cohen's d, was 0.79, indicating a moderate to high magnitude effect.

The results of the physicians were also analyzed based on the specialty they reported in the login form. In the control group (n = 131), the most represented specialties were Family Medicine (n = 78; 59,5%); Internal Medicine (14; 10,7%); Dermatology (5; 3,8%); Occupational Medicine (4; 3,1%); Pediatrics (4; 3,1%); and General Residency interns (4; 3,1%). Detailed results by specialty are presented in table 4.

Regarding the intervention group, the most represented specialties were Family Medicine (n = 20; 52,6%); Pediatrics (3; 7,9%); Occupational Medicine (3; 7,9%); Internal Medicine (2; 5,2%); and Public Health (2; 5,2%).

Table 3. Score results of control and intervention groups

	Correct answers of the control group (n = 131)	Correct answers of the intervention group (n = 38)	p	Effect size
Total score	79.22 (14.22)	90.00 (10.35)	< 0.001*	d = 0.79

Results presented as M (SD), p value calculated with t-test.
*p < 0.001, effect size calculated as Cohen's d.

Table 4. Control group performance by medical specialty

Specialty	Percentage of correct answers
Dermatology	92.6
Endocrinology	92.0
Pediatrics	87.75
Family medicine	81.46
Internal medicine	77.0
General resident	69.0
Occupational medicine	69.0

Table 5. Question results of control vs. intervention groups in family doctors

Questions	Control (n = 78)		Intervention (n = 20)		p	Effect size
	Incorrect (%)	Correct (%)	Incorrect (%)	Correct (%)		
Question 1	1 (1.3)	77 (98.7)	0 (0.0)	20 (100.0)	> 0.990†	0.05
Question 2	12 (15.4)	66 (84.6)	4 (20.0)	16 (80.0)	0.735†	0.05
Question 3	33 (42.3)	45 (57.7)	6 (30.0)	14 (70.0)	0.316*	0.10
Question 4	8 (10.3)	70 (89.7)	0 (0.0)	20 (100.0)	0.201†	0.15
Question 5	15 (19.2)	63 (80.8)	2 (10.0)	18 (90.0)	0.511†	0.10
Question 6	23 (29.5)	55 (70.5)	4 (20.0)	16 (80.0)	0.397*	0.09
Question 7	17 (21.8)	61 (78.2)	4 (20.0)	16 (80.0)	> 0.990†	0.02
Question 8	8 (10.3)	70 (89.7)	1 (5.0)	19 (95.0)	0.681†	0.07

Results presented as n (%).
*$\chi 2$ test.
†Fisher exact test.

Tables 5 and 6 compare GPs in the control group (n = 78) with those in the intervention group (n = 20), both in individual questions and total scores. In Question 1, both groups scored very highly (98.7% vs. 100.0%; p > 0.990; Φ = 0.05). In Question 2, 84.6% of control group GPs and 80.0% of intervention group GPs answered correctly (p = 0.735; Φ = 0.05). In Question 3, intervention group GPs performed better (70.0% vs. 57.7%), though the difference was not statistically significant (p = 0.316; Φ = 0.10). In Question 4, intervention group GPs answered correctly in all cases (100.0%) compared to 89.7% in the control group (p = 0.201; Φ = 0.15). In Question 5, 90.0% of intervention group GPs answered correctly vs. 80.8% of the control group (p = 0.511; Φ = 0.10), and in Question 6, 80.0% vs. 70.5% (p = 0.397; Φ = 0.09). Question 7 showed nearly identical results (80.0% vs. 78.2%; p > 0.990; Φ = 0.02), and in Question 8, intervention GPs scored 95.0% compared to 89.7% in the control group (p = 0.681; Φ = 0.07). Regarding total score, intervention group GPs had a higher mean of 87.05 (SD = 11.76) compared to 81.25 (SD = 14.35) in the control group. This difference was not statistically significant (p = 0.099), though it approached marginal significance, with a small-to-moderate effect size (Cohen's d = 0.42), indicating a tendency toward better overall performance among GPs in the intervention group, albeit without strong statistical evidence.

Table 6. Score results of control versus intervention groups in family doctors

	Control (n = 78)	Intervention (n = 20)	p	Effect size
Total score	81.25 (14.35)	87.05 (11.76)	0.099*	d = 0.42

Results presented as M (SD), p value calculated with t-test.
*p < 0.10.

Discussion

The results of this study demonstrate a trend toward improved medical knowledge among physicians regarding HS after targeted educational intervention. The educational session, based on national HS guidelines, appeared to effectively enhance participants' understanding, as evidenced by the statistically significant improvement in the overall scores of the intervention group compared to the control group.

The results indicate that the control and intervention groups had comparable compositions, each being predominantly comprised of Family Medicine physicians. When Family Medicine physicians from both cohorts were analyzed separately-after standardizing their baseline characteristics–the intervention-group GPs exhibited a trend toward superior overall performance, although this did not reach statistical significance, thus supporting the study's overall findings.

It is also noteworthy that, by random assignment, the control group included a higher proportion of physicians from specialties with superior baseline performance (e.g., Dermatology), which makes the observed knowledge gains more meaningful.

Upon examining individual question results, Question 6 emerged as a significant indicator of knowledge

improvement. The intervention group showed a higher rate of correct answers (89.5%) compared to the control group (78.6%), with p = 0.004, indicating that participants benefited from the educational session, particularly regarding the importance of referring patients with suspected HS to specialists. These findings are consistent with another study involving Portuguese general practitioners and family medicine physicians[11], which reported a correct referral rate to dermatologists of 75.5%, significantly lower than the correct diagnosis rate of 90%, highlighting a general lack of knowledge regarding appropriate referral for HS[12]. Our data show that targeted medical education can effectively address this gap, improving physicians' referral practices and enabling timely initiation of appropriate therapies, which, in severe cases, may include biotechnological drugs only available in hospital settings.

Additionally, questions addressing the association between chronic inflammation and squamous cell carcinoma (Question 3) and the use of microbiological examination (Question 7) demonstrated marginal improvements, suggesting areas where participants benefited but where gains did not reach statistical significance. The improvement regarding the development of squamous cell carcinoma is particularly relevant due to its significant impact on patient prognosis[13], especially in high-risk individuals, where screening for such tumors in HS-affected areas should be incorporated into their clinical management[14]. Similarly, it is important to acknowledge that HS patients are often overtreated with antibiotics, and differentiation between wound colonization and infection is mandatory to prevent antimicrobial resistance, a major threat in HS patients[15].

Despite improvements in specific knowledge areas, several questions showed no significant differences between the control and intervention groups. This suggests that the theoretical knowledge of HS diagnosis is already well established among Portuguese doctors, as noted by other authors[11], with the main knowledge gap residing in the practical aspects of patient referral and management.

The total score comparison between the control and intervention groups highlights the overall effectiveness of the educational program. The mean score for the intervention group was 90.00 (SD = 10.35), significantly higher than the control group's mean score of 79.22 = 14.22), with a $p < 0.001$. The effect size (Cohen's d = 0.79) suggests that the training had a moderate-to-high impact on overall knowledge improvement. These results underscore the potential value of structured, guideline-based educational interventions in improving the clinical knowledge of healthcare professionals.

Despite these promising findings, the study has several limitations that should be addressed in future research. The relatively small sample size, especially in the intervention group, may restrict the generalizability of the results. In addition, the possibility that participants consulted external resources while completing the questionnaire introduces a potential bias. To enhance future research, larger sample sizes and more objective assessments-such as case-based evaluations or patient management simulations-should be incorporated to provide a more comprehensive evaluation of the educational intervention's impact.

Conclusion

In conclusion, this study demonstrates that targeted educational interventions can effectively enhance physicians' knowledge of HS. Particularly by improving their understanding of proper patient referral.

The marginal knowledge improvement regarding the risk of squamous cell carcinoma in these patients and the rational use of microbiological testing-due to their clinical significance-should particularly be emphasized.

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Conflicts of interest

None.

Ethical considerations

Protection of humans and animals. The authors declare that no experiments involving humans or animals were conducted for this research.

Confidentiality, informed consent, and ethical approval. The authors have obtained approval from the Ethics Committee for the analysis of routinely obtained and anonymized clinical data, so informed consent was not necessary. Relevant guidelines were followed.

Declaration on the use of artificial intelligence. The authors declare that artificial intelligence was used in the writing of this manuscript.

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