Implementation of a dermatoscopy curriculum during residency at Augsburg University Hospital in Germany

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Referenzen:

1. Aktuelle Fachinformation Opzelura®.
2. Rosmarin D, Passeron T, Pandya AG, et al. Two Phase 3, randomized, controlled trials of ruxolitinib cream for vitiligo. N Engl J Med. 2022;387(16):1445-1455.

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ORIGINAL ARTICLE

Implementation of a dermatoscopy curriculum during residency at Augsburg University Hospital in Germany

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Summary

Background and objectives: To date, there is no structured program for dermatoscopy training during residency in Germany. Whether and how much dermatoscopy training is acquired is left to the initiative of each resident, although dermatoscopy is one of the core competencies of dermatological training and daily practice. The aim of the study was to establish a structured dermatoscopy curriculum during residency at the University Hospital Augsburg.

Patients and methods: An online platform with dermatoscopy modules was created, accessible regardless of time and place. Practical skills were acquired under the personal guidance of a dermatoscopy expert. Participants were tested on their level of knowledge before and after completing the modules. Test scores on management decisions and correct dermatoscopic diagnosis were analyzed.

Results: Results of 28 participants showed improvements in management decisions from pre- to posttest (74.0% vs. 89.4%) and in dermatoscopic accuracy (65.0% vs. 85.6%). Pre- vs. posttest differences in test score (7.05/10 vs. 8.94/10 points) and correct diagnosis were significant ($p < 0.001$).

Conclusions: The dermatoscopy curriculum increases the number of correct management decisions and dermatoscopy diagnoses. This will result in more skin cancers being detected, and fewer benign lesions being excised. The curriculum can be offered to other dermatology training centers and medical professionals.

KEYWORDS
dermatoscopy, training, residency, education, skin cancer

INTRODUCTION

Dermatoscopy skills are a necessary prerequisite for qualification as a specialist in dermatology, in order to achieve a high diagnostic accuracy in the detection of skin cancer and to reduce unnecessary excisions of benign skin lesions.[1–4] The dermatoscope is indispensable in the daily routine of a dermatologist.[5] However, training and sustained use of dermatoscopy are required in order to benefit from skin examination. To date, a structured dermatoscopy training program during residency in Germany is noticeably lacking. This was confirmed in the Pan-Euro-Dermatoscopy-Study, which evaluated the status of dermatoscopy in Germany.[6] Only 56.6% of participating dermatologists had received dermatoscopy training during their residency, while 40.1% had not.[6] Nevertheless, the study showed that dermatologists who received training during residency were clearly of younger age than compared to those who did not.[6] This indicates that an integration of dermatoscopy training in residency programs has already started. Another factor highlighting the importance of dermatoscopy training during residency is the significant increase in sensitivity

for diagnosing melanoma found among dermatologists who received frequent dermatoscopy training during residency.[6] Nevertheless, a discrepancy was reported between the regular use of dermatoscopy (98.4%) and the perceived increase in sensitivity for melanoma diagnosis (86.5%).[6] One explanation for this may be that dermatoscopy was not taught intensively enough. Consequently, inadequate dermatoscopic skills are not beneficial to the patient and may even lead to a decrease in sensitivity.[7] Therefore, comprehensive dermatoscopy training programs are important to enhance diagnostic accuracy and to increase patients' confidence in their doctors.[3,8] Nevertheless, choosing the ideal training method for dermatoscopy has proven difficult. Boespflug et al. found that a phased online dermatoscopy module combined with in-class training led to better outcomes in dermatoscopy interpretation.[9] Previous research, where online courses were not an option, showed that formal didactic lectures, face-to-face mentoring by a dermatoscopy expert, or year-long courses were the most common dermatoscopy training methods.[9–12] Moreover, online learning is an effective method in dermatoscopy training.[13,14] Susong et al. compared the outcomes of a classroom dermoscopy lecture and an online course, proving that the online curriculum had a better baseline result, although sensitivity did not differ significantly.[15] Online modules make dermatoscopy training accessible to a broader audience, providing dermatoscopic images at increased resolution compared to projectors in live sessions.[15] Furthermore, 77% of the residents who received classroom or bedside teaching from a dermatoscopy expert were more satisfied with their dermatoscopy training than untrained residents.[16] Residents who were taught dermatoscopy face-to-face, were also more likely to be convinced that dermatoscopy can facilitate the diagnosis of melanoma, compared to those who were not trained by an expert (77% vs. 47%).[16] Chen et al. stated that in-person training by a dermatoscopy specialist was the most efficient teaching method.[10] With these findings in mind, the curriculum of a combined dermatoscopy module was chosen for this study.

The objectives were *(1)* to implement a dermatoscopy curriculum at the Dermatology Clinic of the University Hospital Augsburg and *(2)* to determine whether or not an increased diagnostic accuracy of malignant and benign skin lesions could be achieved by the users after completion of the curriculum. If successful, this dermatoscopy curriculum could be established in residency programs of other German centers in the future.

PATIENTS AND METHODS

Dermatoscopy training program

To create additional capacity for training in imaging techniques such as dermatoscopy, it was essential to create a 6-month training rotation at the Department of Dermatology. After reviewing the literature, a combination of an online learning platform accessible throughout the residency and face-to-face teaching by a dermatoscopy expert was chosen for the curriculum. The structured weekly schedule of the rotation program provided time to study dermatoscopy using various teaching methods. After completion of the online course, participants discussed ambiguous cases with their mentor to enhance the learning curve.

Online dermatoscopy curriculum

For the dermatoscopy curriculum, a total of 2,337 dermatoscopic images were chosen from all clinical and dermatoscopic images taken between October 2019 and March 2022 at the Department of Dermatology at Augsburg University Hospital. Patients were informed about the routine hospital imaging documentation and written informed consent was obtained. In October 2021, a review of existing online dermatoscopy courses was performed to determine which subjects were considered as basic, advanced and/or additional. Two supervisors (AB and JW) gave their final vote on the topics that were included in the basic curriculum. The curriculum was set up in the German language. The online platform used for the curriculum needed to be easily accessible, but also secure regarding data protection of stored imaging material. Therefore, a separate course in the secluded Moodle platform of the University of Augsburg (https://moodle.uni-augsburg.de/course/view.php?id=3776) was created. To access Moodle the Department of Medical Education Augsburg (DEMEDA) issued unique logon credentials to University members only. A DEMEDA member subscribed each participant after a required double check. Each module was edited, reviewed, and approved by AB and JW. On Moodle the tools "book" and "text page" were used to create the chapters (Figure 1).

Participants of the online dermatoscopy curriculum

Twenty-eight individuals participated in the dermatoscopy curriculum, including dermatology residents (19/20), board-certified dermatologists of the faculty (5/6) and medical students (4/28).

Evaluation of the learning curve

The online dermatoscopy curriculum takes about 5–10 hours, depending on the participant's knowledge. The course material presented was identical for each participant. All participants took a 50-question pretest and the same posttest of dermatoscopic images to evaluate a possible improvement in dermatoscopy. The maximum score for each test was 10 points (0.2 points per question for

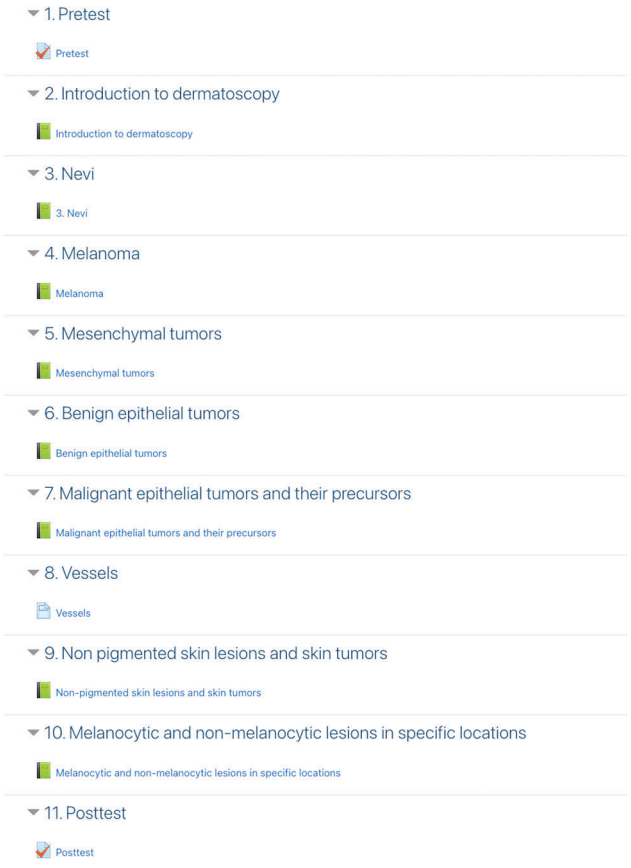

FIGURE 1 Start page with the overview of the ten basic dermatoscopy modules.

50 questions). For *Question 49* only, three correct answers were possible. All others were single choice. A total of 25 dermatoscopic images were provided. Two questions referred to one image respectively. At first, the participants were asked to classify the depicted lesion as either *melanoma, nevus, basal cell carcinoma (BCC), actinic keratosis (aK)/ Bowen's disease/squamous cell carcinoma (SCC), seborrheic keratosis (SK), dermatofibroma (DF), vascular tumors/ lesions (angioma, hemorrhage)* and *other*. It was possible to enlarge the images for better vision. Secondly, the participants had to choose between three management options: *histological examination (biopsy, excision), follow-up (3 months), no therapy and self-examination* (concerning changes of shape and color) by the patient. The reason for the second part of the question was that doctors are always better at management decision-making than at dermatoscopic diagnosis.[17,18] Some of the test images were part of the online dermatoscopy curriculum, the others were newly presented.

Statistics

Data collection and preparation of the figures was performed using Microsoft® Excel® and Microsoft® PowerPoint® for Mac® 2022. Statistical evaluation and creation of figures were conducted using R® version 4.2.1 (R Core Team 2022, R Foundation for Statistical Computing, Vienna, Austria) for Mac®.[19] A repeated-pairs pre-/posttest was used to assess the quiz performance before and after passing the dermatoscopy online curriculum. Pre- and post-assessment responses were compared using Wilcoxon matched pairs signed rank test for quiz questions. p values <0.05 were considered statistically significant.

TABLE 1 Demographic characteristics of the participants.

Gender, frequency n (%)	Overall collective	Subgroup specialists	Subgroup students	Subgroup residents
Female sex	24 (86%)	4 (80%)	3 (75%)	17 (89%)
Male sex	4 (14%)	1 (20%)	1 (25%)	2 (11%)
Age group (years), frequency n (%)				
21-30	14 (50%)		4 (100%)	10 (53%)
31-40	11 (39%)	2 (40%)		9 (47%)
41-50	2 (7.1%)	2 (40%)		
51-60	1 (3.6%)	1 (20%)		
Training level, frequency n (%)				
Resident*	19 (68%)			
Specialist	5 (18%)			
Medical student	4 (14%)			

*n = 2 in year 1, n = 4 in year 2, n = 5 in year 3, n = 4 in year 4, n = 2 in year 5, n = 2 in year 6.

RESULTS

Demographic analysis and practice characteristics of the participants

Table 1 provides an overview of the demographic and training level of the 28 participants. Participants were also asked about their experience and training in dermatoscopy (Table 2). Medical students were not asked these questions since they did not have previous practical experience in dermatoscopy at the time.

Overall pre- and posttest comparison and between training level

The mean scores of the participants' pre- and posttest (n = 28) are presented in Table 3 and Figure 2. Initially, the online dermatoscopy program was created for residents only, but as news of the course spread, specialists and medical students requested to participate. Where quantification was possible, a comparison of pre- and post-assessment results by level of training was added. There was a significant knowledge increase after completion of the dermatoscopy curriculum for residents, specialists, and medical students (Figure 3). In all groups combined, there was

TABLE 2 Practice characteristics of the participants.

Years evaluating skin lesions, mean ± SD, median			
Residents (n = 19)	3.29 ± 1.54, 3.00		
Specialists (n = 5)	16.40 ± 9.91, 16.00		
All (n = 24)	5.16 ± 6.78, 3.00		
Frequency of dermatoscopy use, n/n (%)	***Overall collective***	***Subgroup specialists***	***Subgroup residents***
Daily	6/24 (21%)	2/5 (40%)	4/19 (21%)
2–3 x/week	12/24 (43%)		12/19 (63%)
1 x/week	2/24 (7.1%)	1/5 (20%)	1/19 (5.3%)
2–3/month	2/24 (7.1%)	1/5 (20%)	1/19 (5.3%)
1 x/month	1/24 (3.6%)		1/19 (5.3%)
<1/month	1/24 (3.6%)	1/5 (20%)	

Abbr.: SD, standard deviation.

TABLE 3 Pre- and posttest results of the dermatoscopy curriculum.

	Pretest result*		Posttest result*		
Training level	***n***	***M* ± *SD*, *median***	***n***	***M* ± *SD*, *median***	**p-value**
Resident	19	7.05 ± 0.83, 7.27	19	8.94 ± 0.87, 9.07	$p < 0.001$
Specialist	5	7.59 ± 1.20, 6.87	5	8.87 ± 1.05, 9.27	$p = 0.063$
Medical student	4	5.70 ± 1.09, 5.34	4	7.72 ± 1.65, 7.57	$p = 0.125$
All	28	6.95 ± 1.06, 6.87	28	8.76 ± 1.08, 8.97	$p < 0.001$

*Maximum score for each test was 10 points (0.2 points/question, 50 questions, question 49 had three correct answer options). Data are displayed as mean (M) ± standard deviation (SD) and median.

a significant increase in pre- and posttest scores (Table 3, Figure 2). Using descriptive statistics, there was a difference in pretest scores among the three subgroups, with the highest scores among specialists and the lowest scores among medical students. For the posttest scores, there were no major differences among the three subgroups.

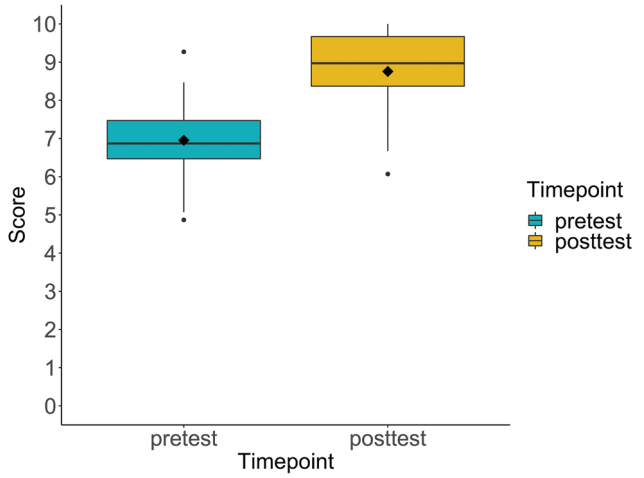

FIGURE 2 Pre- and posttest score results of the dermatoscopy curriculum.

Accuracy of the correct treatment management

On average, residents correctly chose histological examination for 79.4% of lesions in the pretest compared to 91.9% of lesions in the posttest (Table 4). Moreover, the average resident opted for no therapy and self-examination of the patient in 70.3% of lesions in the pretest versus 90.2% of lesions in the posttest. The possible answer *"follow-up in 3 months"* was the wrong decision for all questions. Therefore, no further evaluation for this answer was necessary. The residents' management decision for malignant lesions revealed a distinct improvement from the pretest to the posttest (92.8% vs. 96.7%, $p = 0.048$), and a significant improvement for benign lesions (65.6% vs. 88.2, $p > 0.001$). The average resident scored higher results regarding correct treatment management of the lesion than for the correct diagnosis (74.3% vs. 66.6%) in the pretest and in the posttest assessment (91.0% vs. 87.9%) (Figure 4).

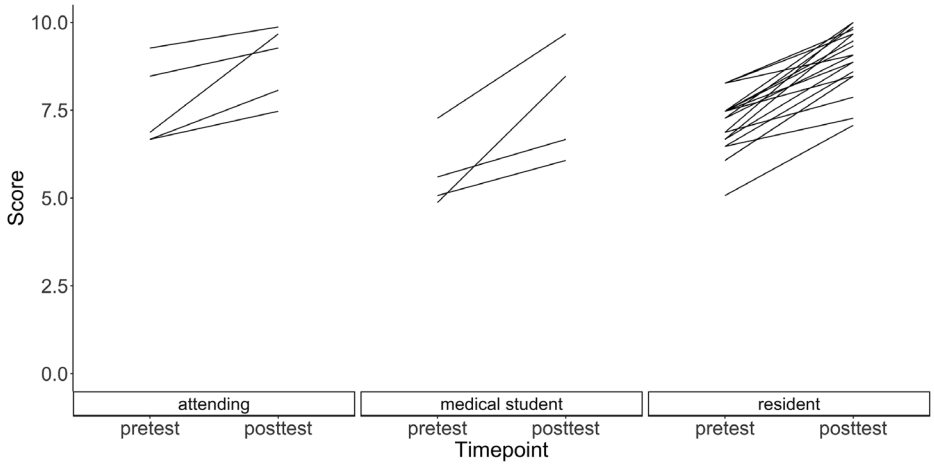

FIGURE 3 Development of the pre- and posttest score results of the participants depending on the training level.

TABLE 4 Percentage of lesions correctly managed by dermatoscopy curriculum participants.

Skin lesion subgroup	All (n = 28)		Residents (n = 19)		Specialists (n = 5)		Medical students (n = 4)	
	Pretest	*Posttest*	*Pretest*	*Posttest*	*Pretest*	*Posttest*	*Pretest*	*Posttest*
Overall management	74.0 ± 9.9, 76.0	89.4 ± 9.0, 90.0	74.3 ± 7.7, 76.0	91.0 ± 7.9, 92.0	79.2 ± 12.8, 76.0	90.4 ± 7.8, 88.0	66.0 ± 13.3, 62.0	81.0 ± 13.2, 80.0
Correct no therapy	69.1 ± 16.5, 71.4	88.8 ± 12.4, 92.9	70.3 ± 13.5, 71.4	90.2 ± 10.7, 92.9	77.1 ± 20.5, 78.6	91.4 ± 12.8, 100.0	53.6 ± 18.9, 50.0	78.6 ± 17.5, 75.0
Correct examination	80.2 ± 10.8, 81.8	90.3 ± 8.2, 90.9	79.4 ± 11.7, 81.8	91.9 ± 6.7, 90.9	81.8 ± 11.1, 81.8	89.1 ± 11.9, 90.9	81.8 ± 7.4, 81.8	84.1 ± 8.7, 86.4
Benign lesions management	65.8 ± 13.1, 64.7	86.8 ± 11.5, 88.2	65.6 ± 10.2, 64.7	88.2 ± 10.4, 88.2	72.9 ± 19.8, 70.6	87.1 ± 10.5, 88.2	57.4 ± 13.9, 52.9	79.4 ± 17.7, 76.5
Malignant lesions management	91.5 ± 9.7, 93.8	95.1 ± 7.1, 100.0	92.8 ± 8.7, 100.0	96.7 ± 5.7, 100.0	92.5 ± 11.2, 100.0	97.5 ± 5.6, 100.0	84.4 ± 12.0, 81.3	84.4 ± 6.3, 87.5

Note: Data are displayed as mean ± standard deviation and median.

Accuracy of the correct dermatoscopic diagnosis

The average participant correctly diagnosed 65.0% of lesions in the pretest in comparison with 85.6% in the posttest ($p < 0.001$) (Table 5). Residents correctly diagnosed 66.6% of lesions in the pretest compared with 87.9% in the posttest. A closer look revealed an improvement of the residents' performance for benign lesions (69.4% vs. 86.5%), malignant lesions (60.5% vs. 90.8%), melanomas (84.2% vs. 96.5%) and for non-melanoma skin cancer (NMSC) (46.3% vs. 87.4%) (Table 5). Residents also increased their knowledge on nevi, vascular lesions, and seborrheic keratosis. There was a distinct improvement for easier to diagnose lesions like dermatofibromas, too (79.0% vs. 84.2%). Other diagnoses were correctly identified at a ratio of 34.2% in the pretest compared to 76.3% in the posttest by the residents. Residents also improved the correct diagnosis of lesions with mixed diagnoses in the pre- and posttests.

DISCUSSION

This study revealed that making management decisions and finding correct dermatoscopic diagnoses could be significantly improved by the dermatoscopy curriculum in all participants.

Since one of the most important treatment strategies for an increasing skin cancer incidence is early recognition, dermatoscopy is a useful, fast and non-invasive imaging tool for this purpose.[20–25] It has made skin cancer diagnosis more accurate with fewer excision of benign lesions.[1–5] In the US, the *Accreditation Council for Graduate Medical Education* called dermatoscopy a core competence of medical expertise; in Bavaria, Germany, it is a necessary qualification as a dermatologist.[26,27] American and German colleagues face the same alarming signals, with only 50% of residents receiving dermatoscopy training.[28] Hence, we assumed that establishing a dermatoscopy curriculum as a component of our residency program was a strategy to overcome this obstacle and provide optimal skin care service for our patients.[6,10,28]

One advantage of the online curriculum is that participants can access the program regardless of time and location. The latter became important during Covid-19 quarantine when the online training could still be completed, whereas face-to-face teaching was not permitted. This issue was also addressed by others.[29–31] Nevertheless, Hussain et al. warned of online- or teledermatoscopy-only courses because dynamic dermatoscopy examinations such as tape stripping can only be assessed in-person and would otherwise lead to less qualified dermatologists.[32–34] For this reason, we combined the online curriculum with supervision by a dermatoscopy specialist. Boespflug et al. confirmed this concept based on improvement of the participants in pre- and posttest scores.[9] Future studies are

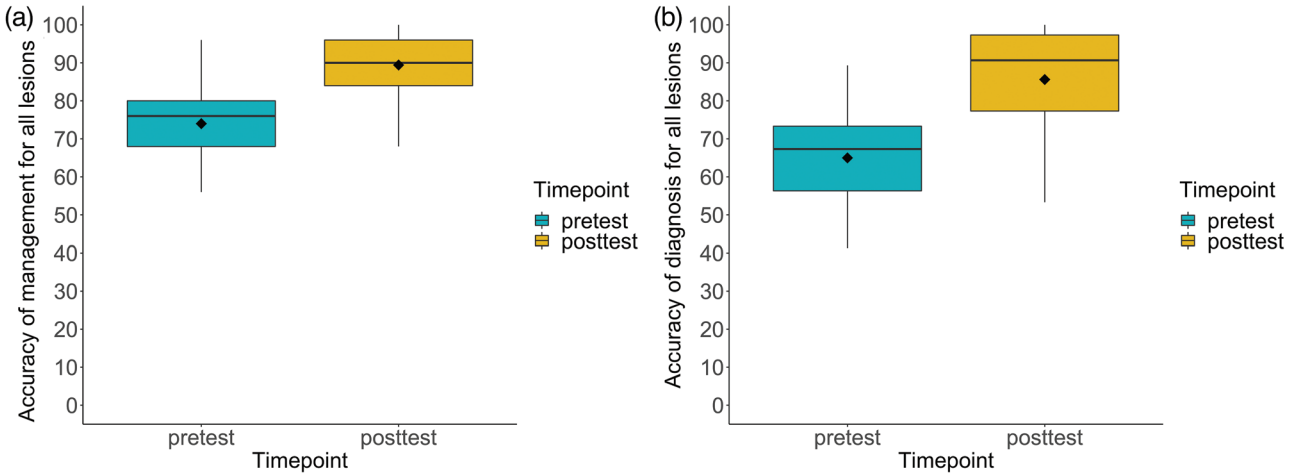

FIGURE 4 (a, b) Accuracy of correct management vs. correct diagnosis for all lesions in the pre- and post-assessment.

needed to compare the effectiveness of formal lectures vs. online curricula in each case with face-to-face mentoring. Only one analysis compared the performance of a formal lecture to the same pre-recorded online version, but without an in-person training.[15] Patel et al. also demonstrated that more than 10 hours of dermatoscopy training was not more effective than 1-10 hours.[28]

The questions in our pre- and post-test were identical for comparison of the answers, unknown to the participants. A significant improvement was found between the pre- and posttest scores for all participants and for the residents. These results are consistent with other studies, even though there were different educational methods or other subgroups investigated.[9,11,35–37] In the pretest the highest results were achieved by the specialists and the lowest by the medical students. Cyr et al. showed similar results.[35] In the posttest the residents were slightly better than the specialists. One reason may be that our specialists were not trained in dermatoscopy during their residency and did not use a dermatoscope as frequently as the residents. It should also be considered that there were only a few specialists in our clinic. Future larger studies are needed to confirm or refute these findings. For the posttest results, there were no major differences between the subgroups as noted by Cyr et al.[35] This is remarkable for medical students since they performed comparably to doctors. Moreover, it is known that it is easier to make a correct management decision than to correctly diagnose the lesion by dermatoscopy.[17,18] Therefore, the questions in the pre- and posttest were divided into two parts, and our study confirmed this hypothesis. Dermatoscopy use also facilitates treatment strategies. Sinz et al. confirmed that the correct management decision improved from 78.1% to 82.5% when a dermatoscope is used.[18]

However, it has been argued that there would be no further need for learning dermatoscopic skills when artificial intelligence (AI) guides the diagnostic procedure in the future. There are AI studies on dermatoscopic image datasets, which support these arguments since dermatologists were outperformed by the deep learning algorithm more than once.[38–44] Nevertheless, these algorithms also have limitations and disadvantages at present: *(1)* AI only performs management decision support, but not definitive dermatoscopic diagnosis; *(2)* AI only discriminates between benign and malignant, but does not suggest short term follow-up; *(3)* AI has only been tested and built in secluded data sets retrospectively but not prospectively in a real clinical setting; *(4)* no age and *(5)* no melanoma history in the family, or former skin cancer in the patients, and *(6)* no history of the lesions have been included in AI-algorithms.[44] Nonetheless, the accuracy of the dermatologists' management decision in malignant or benign skin lesions has been shown to improve with the use of AI-based devices.[46–48] Therefore, it is still necessary to acquire dermatoscopic skills to learn the basics and to manage complex cases.

A further limitation of the study is the small sample size and the fact that only one dermatological clinic participated. Other clinics, medical specialties and professions should be asked to participate, so that the concept can be evaluated by a larger audience. The platform can also cover all other dermatoscopic indications such as trichoscopy, inflammatory and infectious diseases. We have considered offering the curriculum to medical students as an elective. However, there may be a selection bias due to the voluntary participation of residents in the study, which is a common limitation in surveys and studies.[36]

CONCLUSIONS

Acquiring dermatoscopic skills is a precious and valuable gift, not just a necessary qualification for a dermatologist. The use of dermatoscopy and other imaging techniques provides a deeper insight into a lesion of interest that cannot be evaluated clinically. Although AI algorithms may show better results in the management decision-making process based on dermatoscopic images in retrospective studies, and although AI tools may support and guide

TABLE 5 Percentage of lesions correctly identified by dermatoscopy curriculum participants.

Skin lesion subgroup	All (n = 28)		Residents (n = 19)		Specialists (n = 5)		Medical students (n = 4)	
	Pretest	*Posttest*	*Pretest*	*Posttest*	*Pretest*	*Posttest*	*Pretest*	*Posttest*
Overall diagnosis	65.0 ± 13.5, 67.3	85.6 ± 13.5, 90.7	66.6 ± 11.9, 69.3	87.9 ± 10.9, 92.0	72.5 ± 12.5, 69.3	86.9 ± 14.9, 97.3	48.0 ± 9.0, 44.7	73.3 ± 19.9, 71.3
Benign diagnosis	66.8 ± 16.0, 69.6	84.7 ± 14.1, 90.2	69.4 ± 13.6, 72.5	86.5 ± 12.40, 90.2	74.9 ± 12.2, 72.5	89.0 ± 10.5, 96.1	44.1 ± 11.6, 40.2	71.1 ± 20.6, 69.6
Malignant diagnosis	61.2 ± 17.1, 62.5	87.5 ± 16.3, 93.7	60.5 ± 19.2, 62.5	90.8 ± 13.1, 100.0	67.5 ± 14.3, 62.5	82.5 ± 24.4, 100.0	56.3 ± 7.2, 56.3	78.1 ± 18.8, 75.0
Nevus	83.9 ± 18.3, 87.5	92.9 ± 13.4, 100.0	86.8 ± 15.3, 100.0	93.4 ± 11.3, 100.0	95.0 ± 11.2, 100.0	100.0 ± 0.0, 100.0	56.3 ± 12.5, 50.0	81.3 ± 23.9, 87.5
Non-melanoma skin cancer	48.6 ± 22.1, 40.0	85.0 ± 20.8, 100.0	46.3 ± 23.1, 40.0	87.4 ± 20.2, 100.0	68.0 ± 11.0, 60.0	84.0 ± 21.9, 100.0	35.0 ± 10.0, 40.0	75.0 ± 25.2, 80.0
Others	35.7 ± 30.0, 50.0	80.4 ± 31.4, 100.0	34.2 ± 29.1, 50.0	76.3 ± 34.8, 100.0	60.0 ± 22.4, 50.0	90.0 ± 22.4, 100.0	12.5 ± 25.0, 0.0	87.5 ± 25.0, 100.0
Melanoma	82.1 ± 24.8, 100.0	91.7 ± 19.5, 100.0	84.1 ± 25.7, 100.0	96.5 ± 10.5, 100.0	66.7 ± 23.6, 66.7	80.0 ± 29.8, 100.0	91.7 ± 16.7, 100.0	83.3 ± 33.3, 100.0
Vascular	70.5 ± 18.1, 75.0	93.8 ± 11.0, 100.0	71.1 ± 19.1, 75.0	96.1 ± 9.4, 100.0	75.0 ± 17.7, 75.0	90.0 ± 13.7, 100.0	62.5 ± 14.4, 62.5	87.5 ± 14.4, 87.5
Seborrheic keratosis	63.4 ± 31.5, 75.0	80.4 ± 28.4, 100.0	72.4 ± 23.4, 75.0	85.5 ± 22.5, 100.0	65.0 ± 28.5, 75.0	90.0 ± 13.7, 100.0	18.8 ± 37.5, 0.0	43.8 ± 42.7, 37.5
Dermatofibroma	80.4 ± 31.4, 100.0	83.9 ± 33.5, 100.0	79.0 ± 34.6, 100.0	84.2 ± 33.6, 100.0	90.0 ± 22.4, 100.0	90.0 ± 22.4, 100.0	75.0 ± 28.9, 75.0	75.0 ± 50.0, 100.0
Mixed diagnosis	31.8 ± 6.2, 33.0	43.8 ± 24.2, 33.0	33.0 ± 0.0, 33.0	48.9 ± 28.2, 33.0	33.0 ± 0.0, 33.0	33.0 ± 0.0, 33.0	24.8 ± 16.5, 33.0	33.0 ± 0.0, 33.0

Data are displayed as mean ± standard deviation and median.

the doctor's decision, they will not replace personal dermatoscopy knowledge and experience, as well as patient interaction and trust in their doctors.[38,39] In summary, the use of dermatoscopy may facilitate: *(1)* detection of more skin cancers at an early and curable stage, *(2)* excision of fewer benign lesions, providing a *(3)* long-term benefit for the patients and *(4)* the health system. Therefore, the overarching goal of establishing a dermatoscopy curriculum is to educate residents, specialists, and other health care professionals who will then assist in the diagnosis of skin cancer and provide optimal individualized treatment for their patients.

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CONFLICT OF INTEREST

This study was the master thesis of Sandra Schuh at the University of Graz for the certification as Master of Dermoscopy and Preventive Dermatooncology. The other authors have no conflicts of interest to declare.

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