Dermoscopic Lotus of Learning: Implementation and Dissemination of a Multimodal Dermoscopy Curriculum for Primary Care

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ABSTRACT: Dermoscopy is a cost-effective tool for detection of skin cancers yet there is limited training available for primary care. The goal of this project was to develop, implement, and disseminate a multimodal curriculum for primary care across a health system based on a previously validated algorithm (Triage Amalgamated Dermoscopic Algorithm; TADA). This cross-sectional study analyzes the dermoscopy workshop intervention of a dermoscopy multimodal curriculum. Volunteers attended one 120-minute dermoscopy workshop on benign and malignant growths using a validated algorithm. Participants took a 30-image pre- and posttest. Survey questions on dermoscopy use, preferences for learning, and skin biopsy performance were included to enhance curriculum development. About 96 participants completed both pre- and postintervention tests. The mean preintervention score (out of 30) was 18.6 and increased to 24.4 on the postintervention evaluation. There was a statistically significant improvement in scores for both benign and malignant skin growths after the intervention (P<.05). Short dermoscopy workshops have a positive intervention effect when training primary care providers to identify images of benign and malignant dermoscopic skin lesions. A multimodal dermoscopy curriculum allows learners to build on initial training using spaced review and blended learning strategies. The “Dermoscopic Lotus of Learning” has the potential to be a model for other primary care residency programs. A healthy partnership between dermatologists and primary care is essential.

KEYWORDS: Dermoscopy, skin cancer, curriculum, medical education, primary care, resident education

Introduction

Skin cancer affects 1 in 5 Americans and melanoma accounts for 10,000 deaths annually in the United States.¹,² About 12% to 25% of primary care visits are due to a dermatologic concern.³,⁴ Dermoscopy is a useful, cost-effective tool for melanoma detection in primary care.⁵ Historically, training has been geared toward dermatologists, with only 8% of family physicians using a dermatoscope when evaluating a pigmented lesion.⁶ However, the American Academy of Family Physicians now requires dermoscopy training for all residents.⁷

To address this training gap, dermatologists need to partner with primary care to allow primary care trainees (and faculty) to obtain dermoscopy training. The Triage Amalgamated Dermoscopic Algorithm (TADA) is a well-established algorithm for novice dermatoscopists. TADA workshop participant results showed increased sensitivity for dermoscopic identification of malignant skin growths from 62.5% to 88.1%.⁸ The goal of this project was to build on initial training with TADA using a multimodal curriculum, called the “Dermoscopic Lotus of Learning” (Figure 1). Because Maine is the most rural state in the nation, attention was made to include a component of distance learning through the telehealth model Project ECHO (Extension for Community Health Outcomes). Project ECHO allows for monthly spaced review with didactic and cased-based learning opportunities. ECHO creates learning loops between primary care physicians and specialists (dermatologists) to allow for the transfer of knowledge not patients. This form of telementoring has been successful for many aspects of medicine.⁹,¹⁰

Methods

This cross-sectional study analyzes the dermoscopy workshop intervention of the multimodal curriculum. We also sought to evaluate barriers to use and preferred learning methods in relation to dermoscopy, as well as performance of skin biopsies. The research was considered exempt by the Maine Medical Center (MMC) institutional review board. Participation was voluntary and all employed primary care providers (PCPs), including residents, faculty, and advanced practice providers (APPs), from MMC and MaineHealth were invited via email. Continuing medical education was awarded and dermatoscopes were provided.

The educational intervention consisted of an in-person 120-minute dermoscopy workshop on the dermoscopic features of benign and malignant growths based on TADA. Each workshop was co-presented by a dermatologist who specializes in
skin oncology and dermoscopy, a family medicine faculty member with a special interest in skin disease, and a dermatology nurse practitioner. Participants attended one dermoscopy workshop. The workshop was offered eight times. Workshop content included: 30-minute training on benign growths of angioma, seborrheic keratosis, dermatofibroma; 30-minute training on dermoscopic features indicative of skin cancer; five-minute training on nevi; and the remainder on interactive cases and hands-on practice with dermatoscopes.

All participants took a timed 30-question pretest and posttest consisting of benign and malignant dermoscopic images. Participants also completed a survey that had demographic questions, as well as specific dermoscopy-related questions.

Statistical analyses were done in R studio by paired t-test. A P value <.05 was considered statistically significant. Individuals were excluded if they did not complete both pre- and posttests.

To build on the initial TADA workshop, seven dermatology ECHOs were subsequently offered over the course of eight months. Each ECHO was 60 minutes and consisted of a 20 to 30-minute lecture followed by case-based learning. The ECHO curriculum was not limited to dermoscopy but all sessions included either didactic training on dermoscopy or cases with dermoscopic images (Table 1). In addition to the workshop and ECHOs, the multimodal dermoscopy curriculum included the following: self-paced web-based case review (sites.psu.edu/dermoscopy); simulation lab sessions to optimize dermatoscope operation and biopsy skills; clinical dermatology rotations.

### Results

Approximately 101 participants attended the dermoscopy workshop and 96 completed the pre- and postintervention tests. Table 2 shows the majority of participants were female (61.4%), physicians (83.2%), and in family medicine (57.4%). The mean pre-intervention score (out of 30 correct responses) was 18.6 and increased to 24.4 on the postintervention evaluation (P<.05; Figure 2). Participants showed statistically significant improvement in test scores for both benign and malignant skin growth identification after this training (P<.05; Figure 3).

Table 2 evaluated baseline demographics and practice components. Survey results found that 12.9% of participants were actively using dermoscopy. Only 7.9% of participants had prior formal training in dermoscopy. Approximately 33.7% did not have access to a dermatoscope. The preferred method for learning was a live/interactive format followed by attending a dermoscopy conference. About 41% of participants did not perform skin biopsies with the greatest barrier being insufficient training.

### Conclusion

Short dermoscopy workshops have a positive intervention effect when training PCPs to identify dermoscopic images of benign and malignant skin lesions. Specifically, the intervention presented supported gains in dermoscopic image interpretation accuracy among PCPs. We expanded this one-time training to incorporate spaced review and blended learning strategies using a multimodal curriculum to improve long term retention.

Based on the data from the educational needs assessment in the survey, the curriculum was adjusted to include training on skin biopsy technique in simulation lab sessions. The survey also revealed that a live/interactive method, akin to the dermoscopy workshop, was the preferred method of learning. In response, we offered three additional workshops to allow for more PCPs to obtain dermoscopy training. Prior literature has shown that residents also desire dermoscopy training in a clinical setting. Thus, one component of our curriculum is formal clinical rotations for primary care residents and faculty with an expert dermatoscopist.

The biggest obstacle to implementation was coordinating workshop timing. Thus, trainings were offered at the participants’ own clinics in the early morning, during already scheduled provider meetings or as part of continuing education sessions. Despite our attempts to work to...
Table 2. Demographics and survey answers of participants. Not all participants answered all questions on survey.

| VARIABLE                                              | CODING                      | N (%)  |
|-------------------------------------------------------|-----------------------------|--------|
| Overall                                               |                             | 101 (100.0) |
| Sex                                                   |                             |        |
| Male                                                  |                             | 38 (37.6) |
| Female                                                |                             | 62 (61.4) |
| Age                                                   |                             |        |
| 21-30                                                 |                             | 27 (26.7) |
| 31-40                                                 |                             | 36 (35.6) |
| 41-50                                                 |                             | 16 (15.8) |
| 51-60                                                 |                             | 15 (14.9) |
| 61-70                                                 |                             | 6 (6.0)  |
| 70+                                                   |                             | 1 (1.0)  |
| Training                                              |                             |        |
| MD/DO                                                 |                             | 84 (83.2) |
| Attending                                             |                             | 47 (56.0) |
| Fellow                                                |                             | 1 (1.2)  |
| Resident                                              |                             | 34 (40.5) |
| Nurse practitioner                                    |                             | 13 (12.9) |
| Physician assistant                                   |                             | 3 (3.0)  |
| Specialty                                             |                             |        |
| Family medicine                                       |                             | 58 (57.4) |
| Internal medicine                                     |                             | 31 (30.7) |
| Med/peds                                              |                             | 8 (7.9)  |
| Years evaluating skin lesions                         | ≤10                         | 59 (58.4) |
|                                                       | 10+                         | 34 (33.7) |
| Any formal training in dermoscopy?                    | No                          | 91 (90.1) |
|                                                       | Yes                         | 8 (7.9)  |
| Do you have access to a dermatoscope?                 | No                          | 34 (33.7) |
|                                                       | Yes                         | 64 (63.4) |
| Do you use a dermatoscope?                            | No                          | 85 (84.2) |
|                                                       | Yes                         | 13 (12.9) |
| Do you perform skin biopsies?                         | No                          | 42 (41.6) |
|                                                       | Yes                         | 57 (56.4) |
| If yes, which types (choose all that apply)?          | Shave                       | 50 (87.7) |
|                                                       | Punch                       | 50 (87.7) |
|                                                       | Excisional                  | 36 (63.2) |
| If no, why not (choose all that apply)?               | Inadequate supplies         | 6 (14.3)  |
|                                                       | Inadequate staffing         | 3 (7.1)   |
|                                                       | Lack of training            | 31 (73.8) |
|                                                       | Lack of time                | 18 (42.9) |
|                                                       | Uncertain how to manage results | 4 (9.5) |
| Preferred learning method (rated as a 5; could rate multiple methods as a 5) | E-learning/online video | 11 (10.1) |
|                                                       | Live/interactive            | 84 (83.2) |
|                                                       | Self-paced web-based        | 12 (11.9) |
|                                                       | Textbook                    | 1 (1.0)   |
|                                                       | Conference                  | 18 (17.8) |
obtain dermatoscopes prior to the workshops, over 30% of participants reported lack of access to a dermatoscope. For these sites, we were subsequently able to obtain funding through an education grant to purchase dermatoscopes for resident clinics in rural settings. We hope this curriculum will serve as a model for dermoscopy training at other institutions and is an example of how to address barriers of access to devices and lack of training.14

The success of our curriculum depends on respectful interdisciplinary educational collaboration between primary care and dermatology. Identifying a dermatologist willing to teach is critical. Furthermore, training primary care faculty, residents, and APPs, and identifying a site champion at each participating primary care clinic, allows for ongoing practice even when not at a dermatology clinic. The impact of these partnerships is powerful and has the potential to address cancer diagnostic disparities, especially in rural states such as Maine. Project ECHO serves as an effective platform for this partnership.

**Author Contributions**

ES designed the curriculum, ran the distance learning program, and aided with manuscript writing. HA and PC contributed to curriculum development, lecture content, and leveraging partnerships with primary care. KS contributed to distance learning implementation, data entry, and manuscript writing/editing. LA and TN contributed to data entry. GD contributed to data interpretation.

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