Digital Technology Enhances Dermatology Teaching in a Family Medicine Residency

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Background and Objectives: Exposure of family medicine residents to dermatology is inconsistent. We encourage residents to record skin lesions using digital photographs, which are made into posters displaying clinical information. Methods: Residents submit diagnoses for each poster, and correct diagnoses are then posted. A semiannual 10-case quiz compares the scores of participating residents with nonparticipants. Results: On the first three semiannual quizzes, participants and nonparticipants have scored, respectively, 68% and 48%, 73% and 55%, and 77% and 65%. Conclusions: Residents’ ability to make dermatologic diagnoses improved from participation in an inexpensive, easily administered program using digitally displayed skin problems.

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Learning to diagnose dermatologic conditions during family medicine residency training has largely been based on lecture/slide show didactics and individual clinical experience. The former may not be an effective learning format for all residents, while the latter is highly variable in content and often intimidating to those with little dermatologic experience. Dermatology has been identified as an area of curricular weakness by our own graduates as well as by graduates of other programs. More-experienced clinicians score better on standardized dermatology testing than less-experienced ones.

Our residency developed an additional method of learning to use digital photography. Its purpose is to broaden each resident’s exposure to dermatologic pathology while minimizing the time and expense required by conventional photography. This study evaluated the effectiveness of the program.

Methods

We implemented our program by asking our 24 residents to take pictures of any dermatologic finding encountered in our family medicine center. Resulting images were displayed for residents to view and submit diagnoses as outlined in Table 1.

Every 6 months, residents were required to complete a 10-question dermatology quiz prepared by the
faculties from the prior period’s postings. In each 6-month period, quiz scores of participants (those residents who photographed cases or submitted diagnoses for posters or both) were compared to scores for nonparticipants (who submitted neither).

Results

Fifty percent of residents voluntarily participated by taking photographs of dermatologic lesions in our family medicine center, by submitting diagnostic opinions on posted cases, or both. Nonparticipants did neither but were free to view both posters and posted answers. All residents took each 10-case semiannual quiz.

Quiz results for three consecutive 6-month periods are shown in Figure 1. Participating residents scored better than nonparticipants on each of the three quizzes, although in the third 6-month period, the margin narrowed and the mean score difference was not statistically significant (t test, P < .05). Overall, all residents showed improvement in the quizzes over the study period.

Discussion

Family medicine residents commonly learn dermatology through daily clinical experience augmented by didactic lectures and rotations in dermatology offices. However, each resident’s experience depends on what problems are encountered. We reviewed diagnosis codes in the family medicine center and found that only about 50% of diagnoses listed in core curriculum guidelines are seen frequently enough to enable each resident to see a single case during 3 years of residency.

The advantages of expanding a resident’s clinical exposure to dermatology problems are obvious, but accomplishing it is difficult in the face of other clinical and curricular demands. Other programs have used Internet-based dermatology cases for resident review. Our project was designed to maximize the breadth and regularity of resident exposure while minimizing time expenditure. Literature suggests that studying dermatology photos is an effective teaching method. We also know that historical information is important to include in the process. According to the work of Grabinger and Dunlap, residents are more likely to study dermatology problems that they or their colleagues have actually encountered than they are to be interested in pictures in texts. Because all posted problems come from our office, residents feel a greater sense of ownership, knowing that they might have seen the displayed condition during their own office hours. The fact that learners themselves are responsible for providing the posted cases is key, as Usatine has pointed out.

Posting of the pictures in an area where residents can discuss the cases is important, as is the residents’ ability to easily consult additional materials to better define

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**Table 1**

Steps in Digital Dermatology Instructional Program

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<thead>
<tr>
<th>Step</th>
<th>Description</th>
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<tbody>
<tr>
<td>1.</td>
<td>Residents photograph dermatologic findings in our family medicine center using a Sony Mavica MCV FD88. Images are stored on easily transportable 3.5-inch floppy discs.</td>
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<td>2.</td>
<td>Photographers file a brief patient history form with a written description of the lesion. The form and disc go to the staff assistant, who enters them into a Microsoft Access database.</td>
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<tr>
<td>3.</td>
<td>The assistant prints the image with description on plain paper in poster format using a Hewlett-Packard 900 series color inkjet printer. Posters are displayed for a 2-week period on a conspicuous wall bordering a high-traffic aisle in the resident work area.</td>
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<tr>
<td>4.</td>
<td>Residents are encouraged, but not required, to review each poster and submit a diagnostic opinion on forms available in the same area. Completed forms are deposited in a secure collecting box.</td>
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<tr>
<td>5.</td>
<td>After the 2-week display period, the faculty coordinator reviews residents’ diagnoses and posts correct diagnoses based on clinical experience, biopsy information, textual research, and, if necessary, consultation with a dermatologist.</td>
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<tr>
<td>6.</td>
<td>Correct and incorrect resident diagnoses are scored and entered into the database. Names of residents with the correct diagnosis are posted. Incorrect diagnoses are returned to residents in their mailboxes with constructive comments appended.</td>
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<tr>
<td>7.</td>
<td>Faculty diagnoses with didactic information are posted with the poster on the bulletin board for an additional 2 weeks for residents to review.Poster information and pictures remain available for use in future lectures, slides, articles, and quizzes.</td>
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<tr>
<td>8.</td>
<td>Every 6 months, the residents who took the most pictures and provided the most correct guesses receive recognition awards.</td>
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**Figure 1**

Score on 10-Case Quiz Given to All Residents in Three Consecutive 6-Month Periods

Note: Quiz 1 and quiz 2 show significant differences according to Student’s t test.
their diagnostic opinion. Recognition awards offered for the most pictures submitted and the most correct diagnostic opinions make the program feel like an extra benefit rather than an added responsibility in the residency experience.

The results of the required quizzes clearly demonstrate a benefit to participation. Participants scored better than nonparticipants in each of the three 6-month periods. Both groups scored better with each subsequent quiz, suggesting cumulative benefit as well. Benefit may accrue to nonparticipants as a consequence of their continuing, though undocumented, exposure to the posted cases. Our first graduate survey after the program’s inception suggested improved preparedness in dermatology by our residents, and this program was specifically mentioned as contributing.

The cost of this dermatology teaching program is minimal. A digital camera and printer for the project cost under $500. Time spent by assistants averages no more than 1 hour weekly to print the posters, collate resident diagnoses, and maintain the database. Faculty time also averages about 1 hour weekly—viewing posters and posting correct answers with a brief paragraph regarding differential diagnostic possibilities, treatment strategies, and prognosis. Arrival at the “correct” diagnosis can be derived from retrospective chart review, lab or biopsy results, consultation with texts and colleagues, or personal knowledge base. Images can be e-mailed to consulting dermatologists if necessary.

Shortcomings to our study include not validating the quizzes by giving them to a control group of residents who were totally unexposed to the program. Residents moved from nonparticipant to participant status and vice versa during subsequent 6-month periods, and new interns replaced eight graduating residents in the third period. Skin findings in some posted images were poorly shown, hampering diagnosis. It is impossible to control for other educational experiences in dermatology affecting resident quiz scores, though those image problems and experiences would apply equally to both groups. No other changes in dermatology education were made during the period of the study.

Conclusions
We established a program based on digital images to expose residents to a larger number of dermatology problems than they would have seen as individuals. The program was well accepted, with 50% of the residents voluntarily participating. Participants in the program performed consistently better than nonparticipants on required dermatology quizzes given at 6-month intervals. Residents showed cumulative improvement in quiz scores over time. The program is relatively inexpensive and simple to administer, making it easily integrated into a family medicine residency. Few areas of the curriculum have such clearly demonstrable objective benefits.


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REFERENCES