

# Developing and Measuring Effectiveness of a Distance Learning Dermatology Course: A Prospective Observational Study

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## PRACTICE POINTS

- An e-learning distance learning (DL) dermatology course can substantially improve clinically relevant skills and knowledge in dermatology.
- A DL dermatology course may serve as an alternative to clinical rotations for those who wish to learn dermatology more broadly and are not interested in performing skin procedures or direct patient exposure.

As a response to the COVID-19 pandemic, many institutions transitioned to online learning or participation in telehealth as a substitute for clinical rotations. The Uniformed Services University of the Health Sciences (Bethesda, Maryland) relied heavily on e-learning during this time as an alternative means for meeting educational objectives. We report the positive results of a prospective study evaluating short-term information recall and comprehension as well as students' confidence in their ability to apply course objectives over 3 months of an online distance learning (DL) dermatology course.

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Medical education has seen major changes over the last decade. The allotted time for preclinical education has decreased from 24 months to 18 months or less at most institutions, with an increased

focus on content associated with health care delivery and health system science.<sup>1,2</sup> Many schools now include at least some blended learning with online delivery of pre-clinical education.<sup>3</sup> On the other hand, the clinical portion of medical education has remained largely unchanged prior to the COVID-19 pandemic, with the apprenticeship framework allowing the experienced physician to observe, mentor, and pass on practical knowledge so that the apprentice can one day gain independence after demonstrating adequate proficiency.<sup>4</sup>

With respect to dermatology education, skin disorders are in the top 5 reported reasons for visits to primary care<sup>5</sup>; however, a 2009 survey found that only 0.24% to 0.30% of medical schools' curricula are spent on dermatology.<sup>6</sup> Moreover, one institution found that fourth-year medical students received an average of 46.6% on a 15-item quiz designed to assess the ability to diagnose and treat common dermatologic conditions, and within that same cohort, 87.6% of students felt that they received inadequate training in dermatology during medical school.<sup>7</sup>

COVID-19 caused an unprecedented paradigm shift when medical schools throughout the country, including our own, canceled clinical rotations at the end of March 2020 to protect students and control the spread of infection. To enable clinical and preclinical learning to continue, institutions around the globe turned to either

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online learning or participation in telehealth as a substitute for clinical rotations.<sup>8-10</sup> At the Uniformed Services University of the Health Sciences (Bethesda, Maryland), one of the many online clinical courses offered included a distance learning (DL) dermatology course. Herein, we describe the results of a prospective study evaluating short-term information recall and comprehension as well as students' confidence in their ability to apply course objectives over 3 months of an online DL dermatology course.

## Methods

Between April and July 2020, 14 students at the Uniformed Services University of the Health Sciences (Table 1) enrolled in 1 of 3 four-week DL dermatology classes. The students independently completed the Basic Dermatology Curriculum, a set of online modules with demonstrated efficacy from the American Academy of Dermatology, over 4 weeks.<sup>11</sup> Additionally, students were instructed to review an hour of clinical dermatology images daily from online dermatology atlases and e-books accessed through our medical school's virtual library. Optional Free Open Access Meducation resources also were provided. The course syllabus provided the students with clear expectations, links to the resources, and a recommended daily schedule.

An online video conferencing platform was utilized for an orientation session and 4 subsequent weekly 1.5-hour virtual meetings. The weekly DL meetings focused on a discussion of clinical images pertinent to the American Academy of Dermatology modules covered for the week. These interactive analytic sessions were referred to as *Clinpic* sessions. With instructor guidance, the students learned to describe images, and they provided differential diagnoses, workup, and treatments for various skin diseases. The virtual meetings

included supplemental lectures detailing the use of tele dermatology and laser therapy in the Military Health System and a journal review on the cutaneous manifestations of COVID-19.

A 40-question, image-based pretest and posttest utilized during clinical rotations evaluated knowledge recall and comprehension. A precourse and postcourse survey using a 5-point Likert scale (1=not confident; 5=extremely confident) assessed students' confidence levels across course objectives: general knowledge of dermatology, working knowledge of tele dermatology, ability to accurately describe skin lesions, generate sound differential diagnoses, and formulate a reasonable treatment plan. Statistical analysis was performed using free online statistical software at statskingdom.com.<sup>12</sup>

## Results

All 14 student enrollees completed the precourse and postcourse tests and surveys. Pretest and posttest scores followed a normal distribution and therefore met criteria for utilization of a parametric test. The precourse test average of 67% (range, 40%–90%) improved to 84% postcourse (range, 70%–98%;  $P<.001$ ; 95% CI, 11–23 by paired  $t$  test). Not surprisingly, the 2 students who had completed a dermatology rotation had higher average pretest and posttest scores (pretest, 87%; posttest, 94%). Students' confidence with the course objectives were mostly at the somewhat confident level on the 5-point Likert scale precourse survey. By the end of the course, student survey responses increased to confident and very confident levels, corresponding to an overall improvement of 1.3 points ( $P<.001$  by paired  $t$  test)(Table 2) when the mean of the survey results was aggregated across every question. Instructor evaluation of student performance mirrored student assessments.

## Comment

The DL dermatology course succeeded in helping the enrolled students attain course objectives and offered a reasonable solution when in-person interaction was restricted. The students in the DL course made notable improvements in their dermatology knowledge and improved their communication, diagnosis, and management skills. Although a blended dermatology curriculum with e-learning combined with clinical experience has been shown to increase knowledge acquisition,<sup>13,14</sup> our results suggest that an online-only program also can increase comprehension as well as students' confidence in their abilities.

A major challenge for the DL course was the lack of opportunity to perform common dermatology procedures. The addition of a hands-on skin procedure module would have been a great supplement to the course but was not possible due to social distancing guidelines during the COVID-19 pandemic. The small sample size and voluntary enrollment were limitations to this study.

**TABLE 1. Student Demographics (N=14)**

Demographic	Student data
Mean age (range), y	29 (26–35)
Gender, n	
Male	6
Female	8
Medical school year, n	
MS3	11
MS4	3
Prior clinical dermatology rotation, n	2

**TABLE 2. Precourse and Postcourse Survey Data<sup>a,b</sup>**

Course objectives	Precourse average	Postcourse average	Mean increase in confidence (95% CI)	P value
General knowledge of dermatology	1.9	2.9	1.1 (0.6-1.5)	<.001
Ability to accurately describe skin lesions	1.9	3.5	1.6 (1.1-2.1)	<.001
Generate sound differential diagnoses	1.9	2.9	1.0 (0.6-1.4)	<.001
Formulate a reasonable treatment plan	1.9	3.3	1.4 (0.9-1.9)	<.001
Working knowledge of teledermatology	1.6	3.2	1.6 (1.1-2.2)	<.001
Course objectives overall	1.8	3.2	1.3 (0.9-1.7)	<.001

<sup>a</sup>All values noted rounded to the nearest tenth.

<sup>b</sup>5-point Likert scale: 1=not confident; 2=somewhat confident; 3=confident; 4=very confident; 5=extremely confident.

## Conclusion

Although the traditional dermatology rotation remains the gold standard for clinical instruction, a well-organized DL teaching environment allowed for a more controlled learning experience with a broader coverage of topics to include potentially greater exposure to rare skin disorders not typically encountered in everyday practice. A DL dermatology course may serve as an enduring curriculum for those who wish to learn dermatology more broadly and are not interested in performing skin procedures or direct patient exposure (eg, those pursuing non–primary care specialties, pathology, or radiology). It also may be attractive to students who have had a prior clinical dermatology rotation and desire a different learning experience with a wide coverage of topics.

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