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# Dermatology and anatomy laboratory: comparing three formats of integration

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## Abstract

**Background:** Medical schools rarely offer exposure to clinical dermatology in the first-year curriculum.

**Objective:** We describe and report student satisfaction results of three novel teaching methods for integrating basic dermatology concepts into gross anatomy laboratory.

**Methods:** During the first year of the intervention, 180 students attended an hour-long anatomy laboratory session during which skin lesions were examined. One attending and three resident dermatologists spent time at all tables of students, then circulated to answer questions. During the second year, 189 students participated in the same teaching session preceded by a 30-minute in-class lecture. During the third year, 172 students were given the option to view a supplemental online video module before or after the teaching session. Each year following the teaching session, students were sent an optional online survey regarding the impact of the teaching session on their understanding of skin lesions and their cadaver experience.

**Results** Overall, students felt the intervention helped them develop a better understanding and appreciation for dermatology. Preceding the laboratory session with a lecture or educational video yielded higher satisfaction scores.

**Conclusions:** This brief teaching intervention illustrates an approach to introducing dermatologic entities within the foundational science curriculum of the first year of medical school.

*Keywords: dermatology, horizontal integration, vertical integration, anatomy laboratory*

## Introduction

Medical education has traditionally been structured into two years of basic science followed by two years of clinical science, with the latter viewed as the practical application of knowledge gained in the former. However, with the ever-expanding knowledge base in science and increasing emphasis on the social sciences in clinical application, there develops a tension between time dedicated to each in the medical curriculum. There is agreement that both sciences are important, but traditional models emphasize a deep understanding of limited basic science topics at the expense of other relevant subject matters in behavioral, ethical, and social sciences. As a result, the “integrated curriculum” has risen in popularity as an attempt to reconcile this tension and break down the barrier between the two. Reports of curricular integration have increased significantly over the past two decades, with global support from many national medical education organizations [1]. In the United States, the Liaison Committee on Medical Education includes a requirement that medical schools design curricula that have “coordinated and integrated content within and across the academic periods of study” [2].

Our institution is working to develop connections between the foundational sciences and clinical medicine. Most medical schools offer limited or no exposure to clinical dermatology in the first-year curriculum [3]. In a preliminary study, we incorporated instruction on skin lesions into the first day of gross anatomy laboratory [4]. Using feedback

from this session, we adjusted the teaching approach and compared student responses to three different methods: a hands-on laboratory session alone, an in class lecture preceding laboratory time, and an optional online module preceding laboratory time. Following this teaching session, students were given the opportunity to provide feedback on their experience via an online survey.

## Methods

To compare three different instructional approaches, this study was conducted over the course of three years. In the first year, 180 students attended an hour-long session in anatomy laboratory during which cadaver skin lesions were examined. An attending and three resident dermatologists spent dedicated time at all twenty-four tables of students, then circulated to answer additional questions. Students were prompted to examine the skin for lesions and speculate about possible diagnoses and causes. In the second year, this teaching session was repeated with the addition of a 30-minute in-class lecture discussing common skin growths and cutaneous artifacts of fixation prior to the anatomy laboratory. During the second year, 189 students attended this session. In the third year of this study, students were given the option to view a 25-minute supplemental video that covered the same topics as the lecture. Students watched this on their own time and were encouraged to do so before the laboratory session. During the third year, 172 students attended the laboratory session. Each year, following the laboratory session, students were given the option to fill out an online survey regarding the impact of the

session on their understanding of skin lesions and the impact of skin examination on their connection with the cadaver. The survey instrument was approved by the Boston University Institutional Review Board. Answer choices were strongly agree, agree, neutral, disagree, and strongly disagree. All survey responses were collected through a free online survey tool.

We used R statistical software [5] to perform chi square tests to compare the proportion of students who agreed or strongly agreed with the survey questions between the year with no formal pre-session instruction (year 1) to the years with formal pre-session instruction (years 2 and 3), as well as between years 2 and 3. P-values less than 0.05 were considered significant.

## Results

In the first year, 100 students (56%) completed the survey. In the second and third years, 100 students (53%) and 86 students (50%) respectively completed the survey (**Table 1**). A majority of students felt the teaching session helped them feel more connected to their donor. The intent of this question was to determine if the session helped students reflect on and appreciate the life of their donor through understanding the donor's medical problems and lifestyle as visible from the skin surface in the form of dermatoheliosis, signs of joint replacements, surgical scars, and skin grafts. When supplemented with formal pre-session instruction (years 2 and 3), a significantly higher percentage of students reported an increase in their understanding of various types of skin lesions. A significantly higher percentage of

**Table 1.** Post-session survey results.

Question	Year 1	Year 2	Year 3	P-value*
I developed a better understanding of various types of skin lesions.	59(59%)	86(86%)	70(81%)	< 0.0001
I developed a basic framework for how skin examination can give clues to external exposures.	60(60%)	83(83%)	68(79%)	0.0002
I gained a better understanding of how skin findings could correlate with underlying systemic disease or genetic predispositions.	32(32%)	48(48%)	41(48%)	0.014
Examination of the skin helped me feel more connected to my cadaver.	62(62%)	70(70%)	63(73%)	0.130
The pre-session lecture or video helped me understand the types of skin findings I saw in my cadaver.	N/A	94(94%)	70(81%)	
A dermatologist stopped by my table.	90(90%)	98(98%)	83(97%)	0.018

Percentages of students who agreed or strongly agreed with each survey question.

\*P-values compare Year 1 (without formal pre-session instruction) to a combination of Year 2 and 3 data (with formal pre-session instruction).

students in years 2 and 3 also reported developing a basic framework for how skin examination can give clues to external exposures; additionally they gained a better understanding for how skin findings could correlate with underlying systemic disease or genetic predisposition compared to year 1. There was not a significant difference in responses between years 2 and 3 with one exception. The online video helped 81% to understand the skin lesions they saw on their cadaver, compared to 94% in the lecture group ( $P=0.015$ ). In the first year, 10% of students stated a dermatologist did not stop by their table. We suspect that some students did not realize who the dermatologist was because the anatomy faculty and student preceptors were also new to them. We addressed this issue of proper introductions in subsequent years.

## Discussion

Methods of introducing clinical topics within basic science courses have previously included case-based clinical sessions [6], and instruction in clinical skills like ultrasonography [7]. Basic science has also been integrated into instruction on clinical topics [8], into clerkships [9], and into anatomy in the context of histologic skin findings [10]. Studies have shown that curricular integration increases student confidence in their transition to postgraduate training [11]. Although the need for curricular integration is clear, less clear are the appropriate balance of basic science and clinical disciplines, and the best model for such integration. Brauer and Ferguson suggest

that of the three classic models of integration, spiral integration is the most ideal as it combines horizontal and vertical integration, unifying integration across both time and disciplines [1]. In this model, subsequent instruction builds upon earlier introduction of content and allows students to progress to more complex versions of the material. We applied this model in a focused way through integration of clinical dermatology concepts with the first-year gross anatomy curriculum. Horizontal integration of the two disciplines in the first year of medical school establishes the foundation for vertical integration, as core dermatology concepts are repeated in subsequent years.

Students' satisfaction scores were higher when a lecture or video preceded the laboratory session. The video was an efficient option as it required no additional class time and was available for students to view at their own pace. Students preferred the lecture, though the remainder of the survey results were similar between the video and lecture groups.

## Conclusion

This teaching intervention describes three formats for introducing dermatology into the foundational science anatomy curriculum for first-year medical students. Overall, the students felt the integrative anatomy laboratory session helped them develop a better understanding of dermatology, especially when paired with a short lecture or video-based instruction.

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