
Answering the call to diversify the dermatology curriculum in undergraduate medical education

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Dear Editor, Healthcare disparities that have an impact on patients with skin of colour (SOC) (Fitzpatrick skin types IV–VI) can be partly attributed to inadequate diversity in dermatology education.¹ As dermatological diseases have varying presentations across skin tones, limited exposure during training can lead to diagnostic inaccuracies² and lower diagnostic self-confidence with darker skin tones.³ Given the substantial number of individuals in the USA who seek physicians' care for dermatological conditions⁴ and the increasing diversity of the US population, training to diagnose dermatological conditions in SOC is crucial.

Discrepancies in medical students' diagnostic accuracy of dermatological conditions between SOC and lighter skin (Fitzpatrick I–III) suggest that intentional dermatological training covering varying skin tones is needed. There are recommendations for developing an inclusive dermatological curriculum in the literature.⁵ In this study, we present the impact of a dermatology course intervention enhancing SOC content aimed at improving students' diagnostic knowledge

and confidence relating to common skin conditions across skin tones (Table 1).

This study was part of standard instructional activities for a 5-week second-year dermatology course at a north-eastern US medical school. Focused curricular and instructional changes were made to increase the representation of diverse skin tones and emphasize disease prevalence, cultural awareness and historical context. The course content was updated with culturally relevant lecture materials, and SOC image representation was doubled from prior years. A lecture devoted to important dermatology conditions and considerations in SOC was added. An image bank containing over 2500 dermatological images, with more than 50% representing SOC, was provided to students as a supplemental reference (Table 1).

Eighty-eight students [53% (47/88) female, 17% (15/88) under-represented-in-medicine] enrolled in the course (under-represented-in-medicine refers to self-identified race/ethnicity designations and includes American Indian or Alaskan Native, Black or African American, Hispanic, Latino or of Spanish origin, and Native Hawaiian or Pacific Islanders). We administered pre- and post-course multiple-choice assessments of students' knowledge and confidence in diagnosing 12 common dermatological conditions, providing images of each disease in light skin and SOC. A confidence rating using a five-point Likert-type scale followed each diagnostic question.

Of the 88 enrolled students, 63 (72%) completed pre- and post-assessments. Before the course, students earned a mean score of 60% in identifying common skin diseases in light skin, compared with a mean score of 51% in identifying the same conditions in SOC ($P < 0.001$). After the course, the mean knowledge scores increased to 84% correctly identified skin diseases in light skin ($P < 0.001$) and 82% in SOC ($P < 0.001$) (Figure 1a). Similar increases in diagnostic confidence were seen (Figure 1b).

For light skin, the conditions with the greatest increase in diagnostic accuracy between assessments included atopic dermatitis, tinea versicolor and lupus. For SOC, conditions with the greatest increases included tinea versicolor, warts, allergic contact dermatitis, squamous cell carcinoma and psoriasis (Figure 2a).

On average, the largest diagnostic confidence increases between assessments for lighter skin were for tinea versicolor, atopic dermatitis and psoriasis. Allergic contact dermatitis, psoriasis and atopic dermatitis had the largest confidence increases for diagnoses in darker skin tones (Figure 2b).

Our 5-week dermatology course resulted in comparable and significant increases in students' knowledge and confidence in diagnosing dermatological conditions in light skin and SOC regardless of different baseline levels. Similar to other studies,³ overall post-course diagnostic knowledge scores were above 80% in all skin tones. In a few instances, knowledge or confidence decreased in the post-assessment, and in most cases these decreases were not statistically significant; however, we intend to explore these findings further in future analyses.

This study demonstrates that a short-term course is feasible and beneficial for increasing dermatological diagnostic skills and confidence across a range of skin tones, especially when SOC education is purposefully integrated into

Table 1 Details of intentional and targeted curricula changes made to the dermatology course

Course curricular and instructional changes	Details
Intentional incorporation of SOC content into course objectives and required materials	Course objectives were revised to include SOC training in required learning goals. Course content was updated to increase SOC image representation and culturally relevant content in lecture materials. Changes included: <ul style="list-style-type: none"> (i) the doubling of SOC image representation from the prior year (22% of lecture slide images are now SOC); (ii) emphasizing diagnostic considerations in varying skin tones; (iii) incorporation of culturally relevant content when appropriate; and (iv) highlighting the importance of the patient's ethnic or racial backgrounds in diagnosing and treating skin diseases.
Provision of a supplemental comprehensive dermatological image bank with SOC images Use of a 'flipped' classroom format with added formative assessments for active learning	A comprehensive image bank with more than 50% SOC images was created and referenced as a supplemental resource for students at all stages of their undergraduate medical education. Image bank was subcategorized by dermatological disease for straightforward navigability. Students were provided with links to relevant image bank subcategories for each course lecture as prework. Traditional lectures were converted to a flipped classroom format with assigned prework and an embedded interactive aspect such as the use of polls, problem-based learning team activities and clinical case reviews. Required in-person patient clinic session plus simulated emergency room consult session focused on dermatological descriptions leading to accurate diagnoses. Slide challenge sessions for rapid review of rashes and neoplasms. Optional museum-based session titled 'Art of clinical observation' to enhance students' descriptive language and observation skills through examination of art followed by the application of observation skills to photographs of medical cases. Multiple formative assessments to enhance spaced repetition and retrieval; 50% of added questions with a SOC focus.
Lecture devoted to important dermatology conditions in SOC by content experts	'Important dermatology conditions in SOC' taught by a guest lecturer with SOC expertise for review of skin disorders that are more common in patients with SOC and various presentations of dermatological diseases in darker skin tones.

SOC, skin of colour.

the curriculum. Enhancing the diagnosis of common dermatological conditions in all skin tones is crucial for patient care. For example, there is a notable contrast in the manifestation of inflammation between light skin tones, in which inflammation appears red or pink, and SOC, in which inflammation can appear purple, grey or brown. Dermatological diagnoses, including their severity, may be under-recognized or misdiagnosed in SOC if the physician is not adequately trained.

Limitations of our study include the single institution setting and the repeated measures study design. Future studies should include a comparison group and other institutions. Planned course enhancements include expanding the library of dermatological disease images across a range of skin tones and creating additional supplemental web-based resources. Our findings highlight the usefulness of a short-term course in exposing medical students to common dermatological diseases they will encounter as physicians.

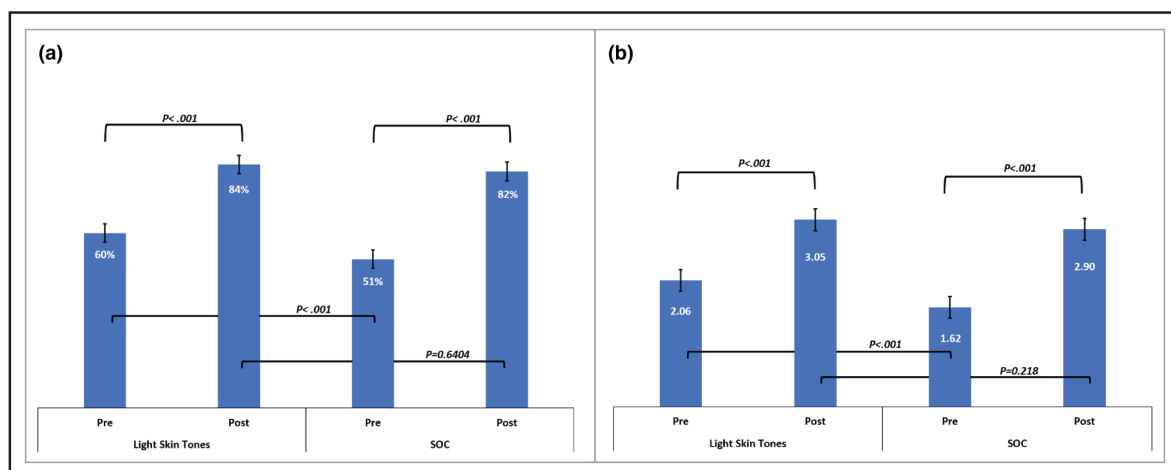


Figure 1 Average total knowledge and confidence score in light skin and skin of colour (SOC), pre- and post-dermatology course ($n=63$). Linear mixed modelling with Tukey honestly significant difference for contrasts. (a) Average total knowledge score (percentage correct) by skin tone. (b) Average total confidence in diagnosis rating by skin tone (1, not at all confident; 2, somewhat confident; 3, moderately confident; 5, extremely confident).

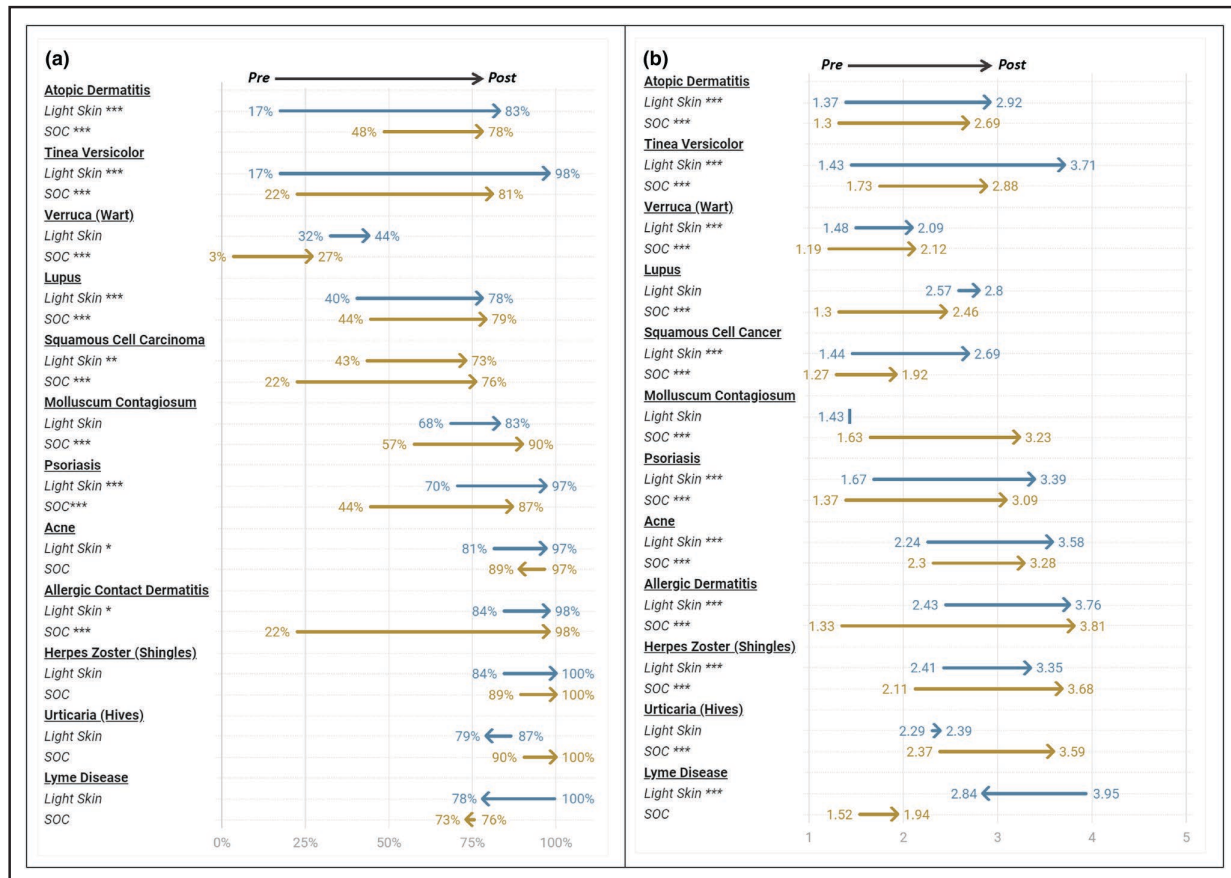


Figure 2 Average disease knowledge and diagnostic confidence scores in light skin and skin of colour (SOC), pre- and post-dermatology course ($n=63$). Post hoc tests for difference between pre- and post-assessments for light skin and SOC used Tukey honestly significant difference, significance level indicated by *** $P<0.001$, ** $P<0.01$, * $P<0.05$. (a) Average disease knowledge scores (percentage correct) pre- and post-course by skin tone. Generalized estimating equation with a binomial distribution tested overall model differences. (b) Average disease diagnostic confidence scores pre- and post-course by skin tone. Linear mixed modelling tested overall model differences. Blue arrows, light skin; brown arrows, skin of colour.

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