

Applying Team-Based Learning to Educate Medical Students on Dermatological Conditions in Skin of Color



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INTRODUCTION

Underrepresentation of skin of color (SOC) dermatology in U.S. medical education contributes to disparities in diagnosing and treating skin conditions in people of color. Although melanoma incidence has increased to 22.8 cases per 100,000 annually², survival outcomes remain disproportionately worse for Black and Hispanic patients. This is known as the "minority melanoma paradox."²

- Lifetime melanoma risk: ~3% in White individuals, 0.1% in Black individuals, and 0.5% in Hispanic individuals¹
- 5-year survival rates range from 99.5% for localized disease to 31.9% for distant-stage disease³
- Black patients have a 5-year survival rate of less than 60%, compared to over 80% in White patients²
- From 1990 to 2004, invasive melanoma incidence rose annually by 7.3% in Hispanic men and 2.4% in Hispanic women²

We identified a lack of SOC dermatology representation in both our curriculum and commonly used third-party educational resources. After reviewing multiple studies confirming this disparity, we developed an interactive curriculum session to enhance medical students' knowledge and diagnostic skills related to dermatologic conditions in people of color.

OBJECTIVE

To assess a team-based educational curriculum's effectiveness in improving student confidence and diagnostic skill in dermatologic conditions across diverse skin tones.

METHODS

Participants: 77 first-year medical students at CUSM

Curriculum Structure:

- **Priming:** Students watched a short video about Bob Marley's death from acral lentiginous melanoma to highlight that melanoma can affect people with skin of color. This was followed by a brief group discussion.
- **Pre-Assessment:** A pre-intervention quiz was administered to assess baseline knowledge of dermatologic conditions, along with a confidence survey to gauge self-perceived diagnostic ability.
- **Instructional Design:** Students participated in a brief didactic lecture covering dermatologic conditions in both light and dark skin tones, followed by an interactive *Kahoot!* quiz game to reinforce learning.
- **Application Phase:** In a team-based, escape room-style activity, students worked together to solve USMLE Step 1-style dermatology cases, applying critical thinking to identify diagnoses.
- **Post-Assessment:** A post-intervention quiz and confidence survey were administered to evaluate knowledge acquisition and changes in self-reported confidence.

Analysis:

Paired t-tests were conducted using SPSS version 29 to assess statistically significant differences in quiz scores and confidence levels before and after the intervention.

Example of Discussion:

- Images below show varicella (chickenpox), often described as "dew drops on a rose petal."⁶
- This classic description is easily seen in the lighter skin image.
- In the darker skin image, the erythema appears more dusky and less pronounced.



RESULTS

- **Significant improvement in student outcomes:**
 - Diagnostic accuracy and confidence both increased post-intervention
- **Statistically significant gains across skin tones:**
 - Score improvement in light and dark skin tone conditions
 - Reduced knowledge gap and diagnostic disparities in SOC representation

Key Highlights:

- Confidence scores showed a strong increase ($p < 0.001$)
- Pre/post knowledge tests showed improvement in diagnostic accuracy

Graph 1: Confidence Questionnaire Results

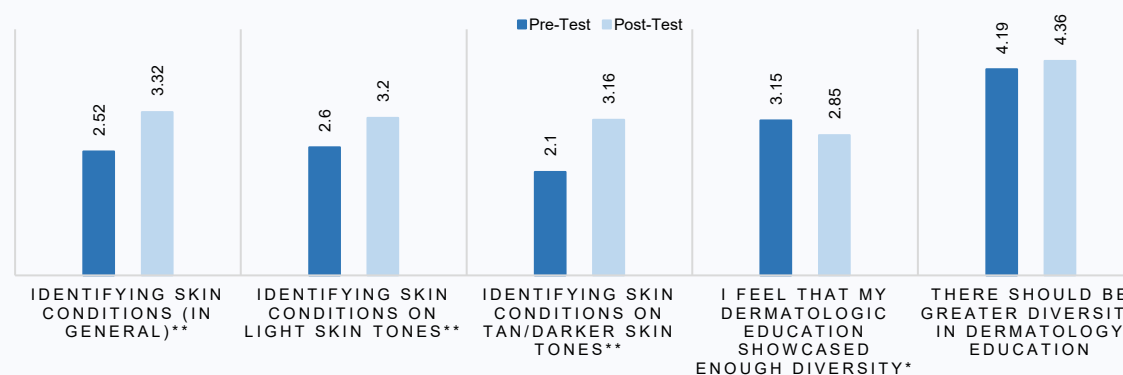


Table 1: Pre/Post-Test Comparison by Skin Tone & Condition

Condition	Skin Type	Pre-Test	Post-Test	T-Test	p-value
Seb Derm*	Light	32.79	47.62	-2.1938	0.0371
Seb Derm*	Tan/Dark	40.98	54.76	-2.6624	0.0315
Psoriasis**	Light	72.13	85.71	-5.5407	<0.0001
Psoriasis*	Tan/Dark	32.79	42.86	-2.4612	0.0288
Verruca*	Light	59.02	66.67	-2.5744	0.0314
Verruca*	Tan/Dark	55.74	80.95	-2.7598	0.0246
Atopic Derm**	Light	22.95	85.71	-8.1833	<0.0001
Atopic Derm*	Tan/Dark	65.57	95.24	-3.5842	0.0011
Basal Cell Carcinoma	Light	57.38	59.52	-0.5993	0.5539
Basal Cell Carcinoma	Tan/Dark	49.18	59.52	0	1
Melanoma**	Light	63.93	92.86	-4.8344	<0.0001
Melanoma	Tan/Dark	67.21	92.86	0	1

** designates highly statistically significant findings ($p < 0.001$) while * designates statistically significant findings ($p < 0.05$)

CONCLUSIONS

This study involving 77 medical students demonstrated that a targeted educational intervention significantly improved students' ability to recognize dermatological conditions across a spectrum of skin tones. Notably, statistically significant gains were observed in post-test scores compared to pre-test scores, especially for conditions presented in Skin of Color. The paired t-test results confirmed the effectiveness of the intervention in enhancing both knowledge and confidence.

Key Findings:

- Statistically significant ($p < 0.05$) improvements in recognition of:
 - **Atopic Dermatitis** (Light: $p < 0.0001$, Tan/Dark: $p = 0.0011$)
 - **Psoriasis** (Light: $p < 0.0001$, Tan/Dark: $p = 0.0288$)
 - **Verruca** (Light: $p = 0.0314$, Tan/Dark: $p = 0.0246$)
- Improvements were consistently noted across **both light and dark skin tones**, reducing prior disparities in recognition ability.
- **Melanoma (Light skin)** showed significant gains ($p < 0.0001$), highlighting the value of emphasizing high-risk conditions. However, no statistically significant improvement was observed for **Melanoma in darker skin tones**, suggesting a gap that needs further curricular emphasis.
- **Basal Cell Carcinoma** in both skin types showed no statistically significant improvement
- The curriculum significantly closed knowledge gaps and increased equity in dermatologic training related to Skin of Color.

These results support the integration of skin tone-inclusive dermatology education into medical training to foster clinical competence, promote accurate diagnoses across skin types, and advance healthcare equity.

Anecdotal Impact:

During his third-year clinical rotation, a student who had completed the team-based learning session successfully identified eczema in a patient with dark skin, prompting the care team to consider the diagnosis. He credited our interactive teaching session for giving him the confidence and clinical insight to speak up. This real-world example underscores the curriculum's lasting impact on diagnostic readiness and its potential to improve patient care for diverse populations.

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