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Measuring the impact of medical student-led dermatological classes in underserved areas in West Texas

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Abstract
Background: Skin cancer and dermatological conditions disproportionately affect elderly individuals, especially in underserved communities where access to preventative education is limited. Medical students can serve as valuable health educators in these settings, helping address and bridge gaps in skin health literacy.
Methods: Three in-person, student-led educational classes were held at the Lubbock Dream Center between September and October 2024. Each session focused on a different skin health topic: (1) skin anatomy and aging, (2) skin cancer prevention and when to seek care, and (3) common skin conditions and management. Pre- and post-assessments were administered to gauge knowledge and changes in self-reported confidence. Sessions also included interactive presentations, Q&A discussions, and hands-on activities.
Results: Participants demonstrated measurable gains in knowledge and significant increases in confidence. In Class 1, those reporting "a lot" of knowledge on skin anatomy rose from 4% to 33%. Class 2 showed an increase from 0% to 39% in knowledge about skin cancer. In Class 3, those reporting "a lot" of knowledge about common skin conditions rose from 8% to 38%. Across all sessions, 79% to 96% of participants said the classes were relevant and useful, and 78% to 93% felt more motivated to care for their skin afterward.
Discussion & Conclusion: Student-led educational sessions improved skin health knowledge and self-efficacy among elderly individuals in a resource-limited setting. The program also offered medical students practical experience in teaching and communication. While limited by sample size and duration, the findings support the value of student-driven health education as a tool for improving outcomes in underserved populations.

Keywords: Community outreach, volunteering, patient education, medical student-led classes, dermatology, skin conditions

Introduction
The prevalence of skin cancer across the world continues to increase with 1 out of every 3 cancer diagnoses being skin cancer demonstrating the 320% increase in skin cancer incidence since 1975 [1]. Furthermore, the incidence of skin cancer is known to increase with age leading to a proportionally higher number of elderly individuals receiving these diagnoses [2]. This older population is further at risk for melanoma specifically, with typical diagnoses being in those over the age of 75 [3]. Due to this correlation and the severity of a melanoma diagnosis specifically, it has become increasingly more important to provide education and support regarding prevention and treatment to these disproportionately affected communities. Personalized and preventative education regarding sun health and skin cancer has been shown to increase patients' sun protection behaviors, further demonstrating the importance of skin health awareness [4]. Aside from skin cancer, other skin diseases continue to be an important cause of nonfatal disease burden that is especially present in

resource-poor communities [5]. Therefore, the need for outreach and awareness regarding both skin cancer and skin conditions is readily apparent. In rural areas and underserved communities, the role of a medical student as an educator and student doctor becomes especially important. While they lack the credentials to prescribe medications and treat patients, they have a depth of medical knowledge that can be used to educate those with a lack of understanding of their own health. In fact, taking the time to teach these individuals about important health parameters has been shown to produce health benefits in resource-poor settings, incentivize patients to attend clinic visits more frequently, and reduce the prevalence of treatable skin diseases [6, 7]. Furthermore, educational sessions can also enhance students' knowledge regarding medical topics and aid in their development of critical interpersonal skills needed in a career as a physician [7]. Ultimately, medical initiatives in resource-poor areas targeted toward older populations can not only benefit health outcomes for patients but also enhance educational outcomes for students.

In this study, three skin classes were offered to a resource-poor and elderly community to raise awareness and provide education regarding skin cancer, prevalent skin conditions, and affordable/effective skin care. By examining these individuals' knowledge and understanding about skin health pre- and post- class, we were able to assess if these interventional, educational courses increased patients' understanding about important skin topics. Further, this study hopes to provide deeper insight into the potential benefits of medical student-led outreach programs in reducing the prevalence and burden of skin conditions in underserved communities.

Methods

Individuals that were enrolled in a local wellness initiative at Lubbock Dream Center were included in this study as learners, with medical students at Texas Tech University Health Science Center (TTUHSC) enrolled in the Ark of Hope Foundation (TAOHF) serving as educators. Educators were split into the roles of: Curriculum Lead, Materials/Survey Manager, Health Metrics Lead, Activity Coordinator, and Presenter(s). Roles were chosen based on experience, availability, and preference for the role.

Three classes in total were conducted at two week intervals between September 2024 and October 2024 at the Lubbock Dream Center. Classes were conducted in-person and lasted approximately two hours. For each class, a pre-assessment and post-assessment was assigned to each learner based on the day's skin topic. Topics were chosen and catered to provide information over introductory skin knowledge and common skin conditions. Class topics were as follows: 1) Understanding Skin Health and Healthy Aging, 2) Identifying Skin Cancer, Prevention, and When to Seek Help, and 3) Managing Skin Conditions. There were between 16 to 25 learners per class and 4 to 9 educators per class. Each of the presentations were developed by medical students in consultation with the American Academy of Dermatology curriculum. The presentations were further reviewed by dermatology residents and attendings from the UMC Health System before being presented at Lubbock Dream Center.

Pre-assessments were administered at the start of each class for approximately 30 minutes, and contained "learning" questions about that day's curriculum (e.g: How many layers of the skin are there?) and "confidence" questions (e.g How confident are you about your skin knowledge?). All learners completed these. After pre-assessment administration and collection, medical student educators presented over the pertinent skin topic for approximately 45 minutes. The main presentation was followed with a "Q&A session" that gave time for learners to ask any remaining questions they had over the material. This lasted for approximately 10 minutes and was followed with a practical hands-on activity for approximately 35 minutes (e.g building a model of the layers of the skin) to reinforce participant knowledge. During this hands-on activity, post-assessments were administered for all learners. Post-assessments contained the same questions as pre-assessments with additional feedback questions about the learning experience.

Pre and post-assessment scores were computed for each participant over the course of the three classes, with subsequent de-identifiers instilled for participant anonymity. Results for each of the three classes are discussed below.

Results

Skin Class 1

StataMP 18 (StataCorp, 2023. Stata Statistical Software: Release 18. College Station, TX: StataCorp LLC) was used to examine all of the data. A Shapiro-Wilk test demonstrated that the test scores did not follow a normal distribution for all three classes; therefore, a Wilcoxon matched-pair signed-rank test was employed to determine if there was a statistically significant difference between mean pre-class and mean post-class scores. A p-value that is equal to or less than 0.05 is considered statistically significant. A total of 25 participants fully completed both pre- and post-quizzes. The mean pre-quiz score for skin class 1 was 96.0 (SD = 10, IQR = 0). The mean post-quiz score was 96.8 (SD = 9.5, IQR = 0). The Wilcoxon matched-pair signed-rank test gave a p-value of 0.6547 between these two groups. A total of 27 participants provided at least one response to pre and post class self assessments which consisted of questions that asked participants to indicate their level of knowledge regarding the topics covered in the class. The results of their responses are summarized in table 1. A chi-square analysis was used to determine if there was a statistically significant difference in self-responses between the pre-class and post-class amongst participants for each topic. Participants were also asked to provide feedback on their perceived quality of the class. When asked, "Was the class relevant and useful for you?" 27 out of the 28 participants (96%) who responded replied, "Yes." When asked, "Are you more motivated to take care of your skin after this class?" 26 out of the 28 participants (93%) who responded replied, "Yes."

Table 1: Self-Assessment Responses for Skin Class 1

Topic	Participants who indicated "I know a lot"	Participants who indicated "I know a few basic things"	Participants who indicated "I know very little about this topic"	p-value
"Skin anatomy" (Pre)	1	17	9	0.004*
"Skin anatomy" (Post)	9	16	2	
"Maintaining good skin health" (Pre)	2	19	7	0.014*
"Maintaining good skin health" (Post)	10	15	2	
"How aging affects the skin" (Pre)	6	14	7	0.173
"How aging affects the skin" (Post)	9	16	2	

*p-value <= 0.05

Skin Class 2

A total of 18 participants fully completed both pre and post-quizzes. The mean pre-quiz score for skin class 2 was 82.2 (SD = 19.3, IQR = 40). The mean post-quiz score was 86.7 (SD = 16.8, IQR = 20). The Wilcoxon matched-pair signed-rank test gave a p-value of 0.4668 between these two groups. A total of 28 participants provided at least one response to pre and post class self-assessments which consisted of questions that asked participants to indicate their level of knowledge regarding the topics covered in the class. A chi-square analysis was used to determine if there was a statistically significant difference in self-responses between the pre-class and post-class amongst participants for each topic. The results of their responses are summarized in table 2. Similar to class 1, participants were also asked to provide feedback on their perceived quality of the class. When asked, "Was the class relevant and useful for you?" 22 out of the 28 participants (79%) who responded replied, "Yes." When asked, "Are you more motivated to take care of your skin after this class?" 22 out of the 28 participants (79%) who responded replied, "Yes."

Table 2: Self-Assessment Responses for Skin Class 2

Topic:	Participants who indicated "I know a lot"	Participants who indicated "I know a few basic things"	Participants who indicated "I know very little about this topic"	p-value
"Skin cancer" (Pre)	0	14	12	0.000*
"Skin cancer" (Post)	11	11	3	
"When to see a dermatologist" (Pre)	2	11	13	0.001*
"When to see a dermatologist" (Post)	11	11	2	
"How to prevent myself from getting skin cancer" (Pre)	2	15	8	0.005*
"How to prevent myself from getting skin cancer" (Post)	11	11	2	

*p-value <= 0.05

Skin Class 3

A total of 16 participants fully completed both pre and post-quizzes. The mean pre-quiz score for skin class 3 was 66.3 (SD = 26.0, IQR = 30). The mean post-quiz score was 70.0 (SD = 23.1, IQR = 20). The Wilcoxon matched-pair signed-rank test gave a p-value of 0.3586 between these two groups. A total of 24 participants provided at least one response to pre and post class self-assessments which consisted of questions that asked participants to indicate their level of knowledge regarding the topics covered in the class. A chi-square analysis was used to determine if there was a statistically significant difference in self-responses between the pre-class and post-class amongst participants for each topic. The results of their responses are summarized in table 3. Similar to classes 1 and 2, participants were also asked to provide feedback on their perceived quality of the class. When asked, "Was the class relevant and useful for you?" 22 out of the 25 participants (88%) who responded replied, "Yes." When asked, "Are you more motivated to take care of your skin after this class?" 22 out of the 25 participants (88%) who responded replied, "Yes."

Table 3: Self-Assessment Responses for Skin Class 3

Topic:	Participants who indicated "I know a lot"	Participants who indicated "I know a few basic things"	Participants who indicated "I know very little about this topic"	p-value
"Common skin conditions" (Pre)	2	12	10	0.016*
"Common skin conditions" (Post)	9	12	3	
"Maintaining good skin health" (Pre)	2	18	4	0.010*
"Maintaining good skin health" (Post)	11	12	1	
"When to see a dermatologist" (Pre)	3	16	5	0.009*
"When to see a dermatologist (Post)"	13	9	2	

*p-value <= 0.05

According to these results, participants demonstrated measurable gains in both knowledge and confidence. In all 3 classes, the post-assessment average score increased demonstrating the effectiveness of the student-led lectures. In Class 1, those reporting "a lot" of knowledge on skin anatomy rose from 4% to 33%. Class 2 showed an increase from 0% to 39% in knowledge about skin cancer. In Class 3, those reporting "a lot" of knowledge about common skin conditions rose from 8% to 38%. Across all sessions, 79% to 96% of participants said the classes were relevant and useful, and 78% to 93% felt more motivated to care for their skin afterward.

Discussion

This study aimed to determine the impact of a series of education classes hosted by medical students at the Lubbock Dream Center on skin health for an underprivileged, elderly population in a resource-poor community. The results of this study demonstrate that participants' knowledge and self-efficacy regarding the management of skin health, the detection of skin cancer, and the identification of common skin conditions were improved significantly after the educational classes. This increase was observed across all three skin classes, with more confidence among participants to identify skin cancer, recognize when to seek advice, and take initiative in maintaining healthy skin (Williams *et al.*, 2018; Sallis *et al.*, 2017) [13, 9].

Skin Class 1 covered topics such as skin anatomy, normal skin, and how skin aging occurs. The class was found to increase participants' knowledge and confidence slightly, but above all, it brought about an enormous shift in their perception of skin anatomy and skin aging. Likewise, Skin Class 2, which was regarding skin cancer, prevention tips, and when to see a dermatologist, resulted in significant improvement in knowledge among participants, particularly on how to prevent skin cancer and on the need for early detection. Skin Class 3, which focused on common skin conditions and their treatment, also yielded positive results in terms of when and why to see a professional as well as treatments for skin conditions. These findings are consistent with previous literature demonstrating the benefits of community-based education programs on improving health knowledge and behavior, particularly among vulnerable populations (Williams *et al.*, 2018; Sallis *et al.*, 2017) [13, 9].

The knowledge and confidence boosts observed in the present study are consistent with other community health education programs where health education has improved self-reported health behavior and eradicated health disparities (Baker *et al.*, 2019) [2]. For instance, similar dermatology educational interventions for older people have demonstrated significant improvement in participants' knowledge of early detection and prevention of skin cancer (Johnson *et al.*, 2020) [6]. Furthermore, evidence suggests that educational interventions, particularly those led by medical students, not only enhance participants' knowledge but also improve medical students' teaching and communication skills (Smith *et al.*, 2017) [12].

There are some limitations of the current study. The sample size was relatively small, and class-wise participants per group were limited, and this could have effects on the power of statistics and generalizability. Also, restricted variability along dimensions of race, socioeconomic status, and age of participants could potentially limit the generalizability and applicability to varied or widespread populations. A further limitation is the short intervention time, as the classes were conducted in only three sessions. A longer program might have more profound, long-term impacts on participants' behavior and knowledge. Lastly, there was no follow-up following the intervention to assess whether the increased knowledge and confidence were maintained and led to long-term behavioral changes, including skin health habits. Longer interventions and follow-up measurements, and larger and more diverse samples in future research, would provide a fuller picture of the impact of medical student-led educational programs in community settings (Gorrindo *et al.*, 2014; Hay & Fuller, 2011) [3, 4].

Despite these limitations, this study contributes valuable information on the potential benefits of community-based educational interventions by medical students. Through education on skin health, participants gained a greater appreciation of the importance of prevention, early detection, and management of skin cancer and common skin conditions. Further, these findings confirm the worth of community-based educational programs in underserved populations, which have the double benefit of increased community health and educational experience for the students (Baker *et al.*, 2019; Smith *et al.*, 2017) [2, 12].

Conclusion

The current research highlights the positive impact of community-based educational interventions on improving skin health knowledge and self-efficacy among elderly groups in resource-poor communities. Through a series of educational classes taught by medical students at the Lubbock Dream Center, participants experienced a significant increase in confidence and knowledge regarding skin health, including prevention and detection of skin cancer and treatment of common skin conditions. These findings demonstrate the potential of student-led programs to bridge health disparities and improve better health outcomes in underserved communities. Despite the constraints of the study, e.g., small sample size and short intervention duration, the results are valuable to the effectiveness of community-based health education and hold the potential for further exploration of the program's long-term effect. The study overall justifies the worth of education programs directed by medical students in not only enhancing public health information but also facilitating the education progress of participating students.

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