

Assessing the Effectiveness of Knowledge-Based Interventions in Increasing Skin Cancer Awareness, Knowledge, and Protective Behaviors in Skin of Color Populations

Ajay Kailas, BS; Ariel L. Botwin, BS; Ellen N. Pritchett, MD, MPH; Diane Jackson-Richards, MD; Suzanna Lewis, MD; Divya Sadhwani, MD; Seemal R. Desai, MD; Susan C. Taylor, MD



PRACTICE POINTS

- Patients of color should be informed that they are at risk for skin cancer including melanoma.
- Patients of color should be taught to identify suspicious skin lesions including the ABCDEs of melanoma.
- Patients of color should be instructed to perform self-body skin examinations, especially of the palms and soles, for any evolving skin lesions. Patients should be instructed on the importance of visiting a physician for an evolving or suspicious mole or lesion.

Skin of color (SOC) populations (ie, blacks, Hispanics, Asians) are at a notably higher risk for mortality from skin cancers such as melanoma than white individuals. In this article, we seek to answer the following question: Do knowledge-based interventions increase skin cancer awareness among SOC patients? Following an extensive literature search, a total of 4 articles were analyzed and discussed in this review.

Cutis. 2017;100:235-240.

Malignant melanoma, basal cell carcinoma, and squamous cell carcinoma account for approximately 40% of all neoplasms among the white

population in the United States. Skin cancer is the most common malignancy in the United States.¹ However, despite this occurrence, there are limited data regarding skin cancer in individuals with skin of color (SOC). The 5-year survival rates for melanoma are 58.2% for black individuals, 69.7% for Hispanics, and 70.9% for Asians compared to 79.8% for white individuals in the United States.² Even though SOC populations have lower incidences of skin cancer—melanoma, basal cell carcinoma, and squamous cell carcinoma—they exhibit higher death rates.³⁻⁷ Nonetheless, no specific guidelines exist to address sun exposure and safety habits in SOC populations.^{6,8} Furthermore, current demographics suggest that by the year 2050, approximately half of the US population will be nonwhite.⁴ Paradoxically, despite having increased sun protection from greater amounts of melanin in their skin, black individuals are more likely to present with advanced-stage melanoma (eg, stage III/IV) compared

RELATED CONTENT ONLINE

AUDIO: Why Is Skin Cancer Mortality Higher in Patients With Skin of Color?

>> <http://bit.ly/2fsowbd>

Skin Cancer Mortality in Patients With Skin of Color

>> <http://bit.ly/2hxxick>

Mr. Kailas and Mr. Botwin are from the University of Central Florida College of Medicine, Orlando. Drs. Pritchett and Jackson-Richards are from the Multicultural Dermatology Center, Henry Ford Medical Center, Detroit, Michigan. Drs. Lewis and Sadhwani are from the Department of Dermatology, University of South Florida, Tampa. Dr. Desai is from the Department of Dermatology, University of Texas Southwestern Medical Center, Dallas. Dr. Taylor is from the Department of Dermatology, Perelman School of Medicine, University of Pennsylvania, Philadelphia. The authors report no conflict of interest.

Correspondence: Ajay Kailas, BS, UCF College of Medicine, 6850 Lake Nona Blvd, Orlando, FL 32827 (ajay.kailas@knights.ucf.edu).

to white individuals.⁸⁻¹² Furthermore, those of non-white populations are more likely to present with more advanced stages of acral lentiginous melanomas than white individuals.^{13,14} Hispanics also face an increasing incidence of more invasive acral lentiginous melanomas.¹⁵ Overall, SOC patients have the poorest skin cancer prognosis, and the data suggest that the reason for this paradox is delayed diagnosis.¹

Although skin cancer is largely a preventable condition, the literature suggests that lack of awareness of melanoma among ethnic minorities is one of the main reasons for their poor skin cancer prognosis.¹⁶ This lack of awareness decreases the likelihood that an SOC patient would be alert to early detection of cancerous changes.¹⁷ Because educating at-risk SOC populations is key to decreasing skin cancer risk, this study focused on determining the efficacy of major knowledge-based interventions conducted to date.¹ Overall, we sought to answer the question, do knowledge-based interventions increase skin cancer awareness, knowledge, and protective behavior among people of color?

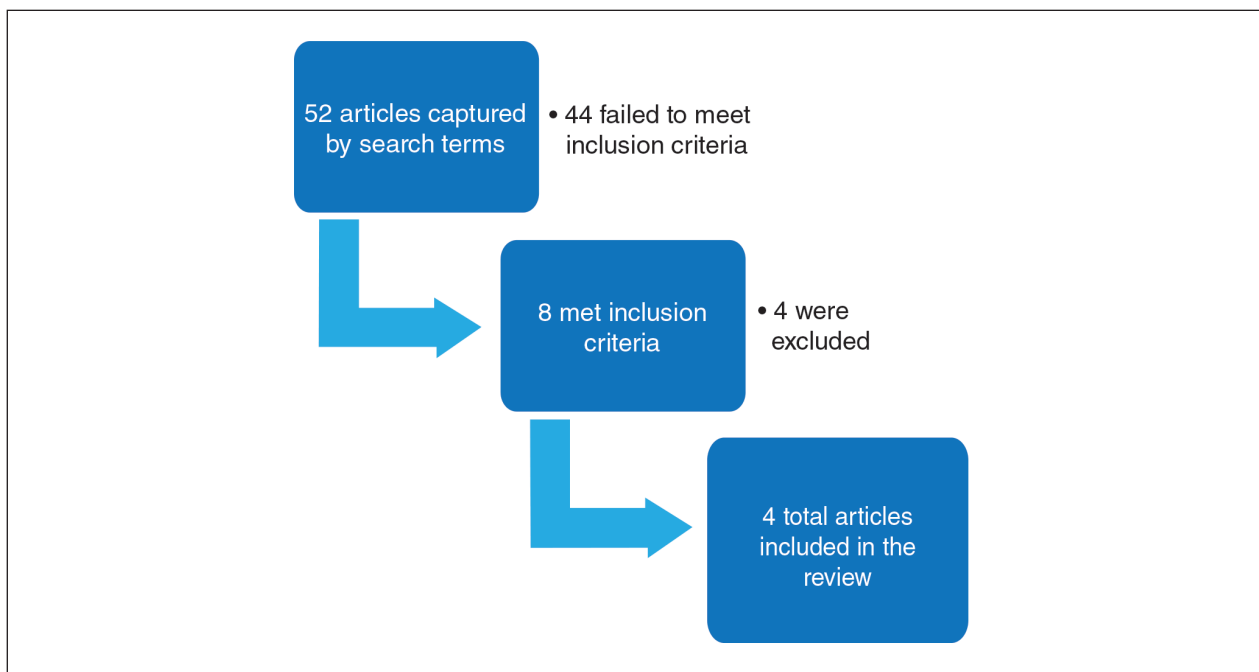
Methods

For this review, the Cochrane method of analysis was used to conduct a thorough search of PubMed articles indexed for MEDLINE (1994-2016), as well as a search of CINAHL (1997-2016), PsycINFO (1999-2016), and Web of Science (1965-2016), using a combination of more than 100 search terms including but not limited to *skin cancer*, *skin of color*, *intervention*, and *ethnic skin*. The search

yielded a total of 52 articles (Figure). Following review, only 8 articles met inclusion criteria, which were as follows: (1) study was related to skin cancer in SOC patients, which included an intervention to increase skin cancer awareness and knowledge; (2) study included adult participants or adolescents aged 12 to 18 years; (3) study was written in English; and (4) study was published in a peer-reviewed journal. Of the remaining 8 articles, 4 were excluded due to the following criteria: (1) study failed to provide both preintervention and postintervention data, (2) study failed to provide quantitative data, and (3) study included participants who worked as health care professionals or ancillary staff. As a result, a total of 4 articles were analyzed and discussed in this review (Table).

Results

Robinson et al¹⁸ conducted 12 focus groups with 120 total participants (40 black, 40 Asian, and 40 Hispanic patients). Participants engaged in a 2-hour tape-recorded focus group with a moderator guide on melanoma and skin cancer. Furthermore, they also were asked to assess skin cancer risk in 5 celebrities with different skin tones. The statistically significant preintervention results of the study ($\chi^2=4.6$, $P<.001$) were as follows: only 2%, 4%, and 14% correctly reported that celebrities with a very fair skin type, a fair skin type, and very dark skin type, respectively, could get sunburn, compared to 75%, 76%, and 62% post-intervention. Additionally, prior to intervention, 14% of the study population believed that dark brown skin type could get sunburn compared to 62% of the same group



Data collection flowchart of the total number of articles yielded in the literature search.

Summary of Key Findings of the Interventions

| Reference (Year) | No. of Participants | Type of Intervention | Preintervention Survey Score | Postintervention Survey Score | Change in Score Following Intervention | Statistics | Comment |
|--------------------------------------|---|--|---|--|---|--|---|
| Robinson et al ¹⁸ (2010) | 120 (black, n=40; Asian, n=40; Hispanic, n=40) | 2 focus groups lasting 2 h each | Knowledge: sunburn risk in celebrities with dark-brown skin, 14%; suntan risk in celebrities with dark skin, 13%; skin cancer risk in celebrities with dark-brown skin, 10% | Knowledge: 62%, 74%, 64%, respectively | Knowledge: +48%, +61%, +54%, respectively | Knowledge: $P < .001$, $P < .001$, $P < .001$, respectively ^a | Only study reviewed that included equal numbers of participants of each major SOC group; furthermore, the study used photographs of celebrities to help participants understand descriptive skin tones better |
| Hernandez et al ¹⁹ (2014) | 80 (Hispanic females, n=67; Hispanic males, n=13) | Two 3-min Spanish-language videos | Knowledge: fair-skinned Hispanics at risk for skin cancer, 68%; dark-skinned Hispanics at risk for skin cancer, 55%; behavior: sunscreen use, 70% | Knowledge: 90%, 86%, respectively; Behavior: 95% | Knowledge: +22%, +31%, respectively; behavior: +25% | Knowledge: $P < .0002$, $P < .0001$, respectively ^b | Study focused on Hispanics only with primarily female participants; data were gathered from participants in a beauty parlor |
| Kundu et al ¹⁷ (2010) | 71 (black, n=44; Asian, n=15; Hispanic, n=10; multiethnic, n=2) | 20-min teaching session with verbal and visual instruction | Knowledge: melanoma risk in SOC populations, 48.4%; attitude: perceived personal risk for developing melanoma, 60.2%; behavior: perform monthly skin checks, 3.1% | Knowledge: 82.8% (40.8% at 3-mo follow-up); attitude: 96.8% (94.4% at 3-mo follow-up); behavior: 85% (67.6% at 3-mo follow-up) | Knowledge: +34.4% (-7.6% at 3-mo follow-up); attitude: +36.6% (+34.2% at 3-mo follow-up); behavior: +81.9% (+64.5% at 3-mo follow-up) | Knowledge: pre vs post, $P < .0001$ (pre vs 3-mo follow-up, $P = .48$); attitude: pre vs post, $P < .0001$ (pre vs 3-mo follow-up, $P < .0001$); behavior: pre vs post, $P < .0001$ (pre vs 3-mo follow-up, $P = .0001$) ^b | Only study reviewed that included interventions that focused on skin cancer knowledge, attitude, and behavior |
| Chapman et al ²⁰ (2015) | 148 (black, n=54; Hispanic, n=94) | 1-day educational course | Behavior: sunscreen use, 68% | Behavior: 80% | Behavior: +12% | No P value recorded | Only study reviewed that included adolescents and focused only on black and Hispanic respondents |

Abbreviation: SOC, skin of color.

^a P values calculated using χ^2 test.

^b P values calculated using McNemar test.

postintervention. This study demonstrated that the intervention helped SOC patients better identify their ability to get sunburn and identify their skin cancer risk.¹⁸

Hernandez et al¹⁹ used a video-based intervention in a Hispanic community, which was in contrast to the multiracial focus group intervention conducted by Robinson et al.¹⁸ Eighty Hispanic individuals were recruited from beauty salons to participate in the study. Participants watched two 3-minute videos in Spanish and completed a preintervention and postintervention survey. The first video emphasized the photoaging benefits of sun protection, while the second focused on skin cancer prevention. Preintervention surveys indicated that only 54 (68%) participants believed that fair-skinned Hispanics were at risk for skin cancer, which improved to 72 (90%) participants postintervention. Furthermore, initially only 44 (55%) participants thought those with darker skin types could develop skin cancer, but this number increased to 69 (86%) postintervention. For both questions regarding fair and dark skin, the agreement proportion was significantly different between the preeducation and posteducation videos ($P<.0002$ for the fair skin question and $P<.0001$ for the dark skin question). This study greatly increased awareness of skin cancer risk among Hispanics,¹⁹ similar to the Robinson et al¹⁸ study.

In contrast to 2-hour focus groups or 3-minute video-based interventions, a study by Kundu et al¹⁷ employed a 20-minute educational class-based intervention with both verbal and visual instruction. This study assessed the efficacy of an educational tutorial on improving awareness and early detection of melanoma in SOC individuals. Photographs were used to help participants recognize the ABCDEs of melanoma and to show examples of acral lentiginous melanomas in white individuals. A total of 71 participants completed a preintervention questionnaire, participated in a 20-minute class, and completed a postintervention questionnaire immediately after and 3 months following the class. The study population included 44 black, 15 Asian, 10 Hispanic, and 2 multiethnic participants. Knowledge that melanoma is a skin cancer increased from 83.9% to 100% immediately postintervention ($P=.0001$) and 97.2% at 3 months postintervention ($P=.0075$). Additionally, knowledge that people of color are at risk for melanoma increased from 48.4% preintervention to 82.8% immediately postintervention ($P<.0001$). However, only 40.8% of participants retained this knowledge at 3 months postintervention. Because only 1 participant reported a family history of skin cancer, the authors hypothesized that the reason for this loss of knowledge was that most participants were not personally affected by friends or family members with melanoma. A future study with an appropriate control group would be needed to support this claim. This study shed light on the potential of class-based interventions to increase both awareness and knowledge of skin cancer in SOC populations.¹⁷

A study by Chapman et al²⁰ examined the effects of a sun protection educational program on increasing awareness of skin cancer in Hispanic and black middle school students in southern Los Angeles, California. It was the only study we reviewed that focused primarily on adolescents. Furthermore, it included the largest sample size (N=148) analyzed here. Students were given a preintervention questionnaire to evaluate their awareness of skin cancer and current sun-protection practices. Based on these results, the investigators devised a set of learning goals and incorporated them into an educational pamphlet. The intervention, called "Skin Teaching Day," was a 1-day program discussing skin cancer and the importance of sun protection. Prior to the intervention, 68% of participants reported that they used sunscreen. Three months after completing the program, 80% of participants reported sunscreen use, an increase of 12% prior to the intervention. The results of this study demonstrated the unique effectiveness and potential of pamphlets in increasing sunscreen use.²⁰

Comment

Overall, various methods of interventions such as focus groups, videos, pamphlets, and lectures improved knowledge of skin cancer risk and sun-protection behaviors in SOC populations. Furthermore, the unique differences of each study provided important insights into the successful design of an intervention.

An important characteristic of the Robinson et al¹⁸ study was the addition of photographs, which allowed participants not only to visualize different skin tones but also provided them with the opportunity to relate themselves to the photographs; by doing so, participants could effectively pick out the skin tone that best suited them. Written SOC scales are limited to mere descriptions and thus make it more difficult for participants to accurately identify the tone that best fits them. Kundu et al¹⁷ used photographs to teach skin self-examination and ABCDEs for detection of melanoma. Additionally, both studies used photographs to demonstrate examples of skin cancer.^{17,18} Recent evidence suggests the use of visuals can be efficacious for improving skin cancer knowledge and awareness; a study in 16 SOC kidney transplant recipients found that the addition of photographs of squamous cell carcinoma in various skin tones to a sun-protection educational pamphlet was more effective than the original pamphlet without photographs.²¹

In contrast to the Robinson et al¹⁸ study and Hernandez et al¹⁹ study, the Kundu et al¹⁷ study showed photographs of acral lentiginous melanomas in white patients rather than SOC patients. However, SOC populations may be less likely to relate to or identify skin changes in skin types that are different from their own. This technique was still beneficial, as acral lentiginous melanoma is the most common type of melanoma in SOC populations. Another benefit of the study was that it was the only study reviewed that

included a follow-up postintervention questionnaire. Such data is useful, as it demonstrates how much information is retained by participants and may be more likely to predict compliance with skin cancer protective behaviors.¹⁷

The Hernandez et al¹⁹ study is unique in that it was the only one to include an educational intervention entirely in Spanish, which is important to consider, as language may be a hindrance to participants' understanding in the other studies, particularly Hispanics, possibly leading to a lack of information retention regarding sun-protective behaviors. Furthermore, it also was the only study to utilize videos as a method for interventions. The 3-minute videos demonstrated that interventions could be efficient as compared to the 2-hour in-class intervention used by Robinson et al¹⁸ and the 20-minute intervention used by Kundu et al.¹⁷ Additionally, videos also could be more cost-effective, as incentives for large focus groups would no longer be needed. Furthermore, in the Hernandez et al¹⁹ study, there was minimal to no disruption in the participants' daily routine, as the participants were getting cosmetic services while watching the videos, perhaps allowing them to be more attentive. In contrast, both the Robinson et al¹⁸ and Kundu et al¹⁷ studies required time out from the participants' daily schedules. In addition, these studies were notably longer than the Hernandez et al¹⁹ study. The 8-hour intervention in the Chapman et al²⁰ study also may not be feasible for the general population because of its excessive length. However, the intervention was successful among the adolescent participants, which suggested that shorter durations are effective in the adult population and longer interventions may be more appropriate for adolescents because they benefit from peer activity.

Despite the success of the educational interventions as outlined in the 4 studies described here, a major epidemiologic flaw is that these interventions included only a small percentage of the target population. The largest total number of adults surveyed and undergoing an intervention in any of the populations was only 120.¹⁷ By failing to reach a substantial proportion of the population at risk, the number of preventable deaths likely will not decrease. The authors believe a larger-scale intervention would provide meaningful change. Australia's SunSmart campaign to increase skin cancer awareness in the Australian population is an example of one such large-scale national intervention. The campaign focused on massive television advertisements in the summer to educate participants about the dangers of skin cancer and the importance of protective behaviors. Telephone surveys conducted from 1987 to 2011 demonstrated that more exposure to the advertisements in the SunSmart campaign meant that individuals were more likely to use sunscreen and avoid sun exposure.²² In the United States, a similar intervention would be of great benefit in educating SOC populations regarding skin

cancer risk. Additionally, dermatology residents need to be adequately trained to educate patients of color about the risk for skin cancer, as survey data indicated more than 80% of Australian dermatologists desired more SOC teaching during their training and 50% indicated that they would have time to learn it during their training if offered.²³ Furthermore, one study suggested that future interventions must include primary-, secondary-, and tertiary-prevention methods to effectively reduce skin cancer risk among patients of color.²⁴ Primary prevention involves sun avoidance, secondary prevention involves detecting cancerous lesions, and tertiary prevention involves undergoing treatment of skin malignancies. However, increased knowledge does not necessarily mean increased preventative action will be employed (eg, sunscreen use, wearing sun-protective clothing and sunglasses, avoiding tanning beds and excessive sun exposure). Additional studies that demonstrate a notable increase in sun-protective behaviors related to increased knowledge are needed.

Because retention of skin cancer knowledge decreased in several postintervention surveys, there also is a dire need for continuing skin cancer education in patients of color, which may be accomplished through a combination effort of television advertisement campaigns, pamphlets, social media, community health departments, or even community members. For example, a pilot program found that Hispanic lay health workers who are educated about skin cancer may serve as a bridge between medical providers and the Hispanic community by encouraging individuals in this population to get regular skin examinations from a physician.²⁵ Overall, there are currently gaps in the understanding and treatment of skin cancer in people of color.²⁶ Identifying the advantages and disadvantages of all relevant skin cancer interventions conducted in the SOC population will hopefully guide future studies to help close these gaps by allowing others to design the best possible intervention. By doing so, researchers can generate an intervention that is precise, well-informed, and effective in decreasing mortality rates from skin cancer among SOC populations.

Conclusion

All of the studies reviewed demonstrated that instructional and educational interventions are promising methods for improving either knowledge, awareness, or safe skin practices and sun-protective behaviors in SOC populations to differing degrees (Table). Although each of the 4 interventions employed their own methods, they all increased 1 or more of the 3 aforementioned concepts—knowledge, awareness, or safe skin practices and sun-protective behaviors—when comparing postsurvey to presurvey data. However, the critically important message derived from this research is that there is a tremendous need for a substantial large-scale educational intervention to increase knowledge regarding skin cancer in SOC populations.

REFERENCES

1. Agbai ON, Buster K, Sanchez M, et al. Skin cancer and photoprotection in people of color: a review and recommendations for physicians and the public. *J Am Acad Dermatol*. 2014;70:748-762.
2. Cormier JN, Xing Y, Ding M, et al. Ethnic differences among patients with cutaneous melanoma. *Arch Intern Med*. 2006;166:1907-1914.
3. Gloster HM Jr, Neal K. Skin cancer in skin of color. *J Am Acad Dermatol*. 2006;55:741-760.
4. Dawes SM, Tsai S, Gittleman H, et al. Racial disparities in melanoma survival. *J Am Acad Dermatol*. 2016;75:983-991.
5. Byrd KM, Wilson DC, Hoyler SS, et al. Advanced presentation of melanoma in African Americans. *J Am Acad Dermatol*. 2004;50:21-24.
6. Hu S, Parmet Y, Allen G, et al. Disparity in melanoma: a trend analysis of melanoma incidence and stage at diagnosis among whites, Hispanics, and blacks in Florida. *Arch Dermatol*. 2009;145:1369-1374.
7. Wu XC, Eide MJ, King J, et al. Racial and ethnic variations in incidence and survival of cutaneous melanoma in the United States, 1999-2006. *J Am Acad Dermatol*. 2011;65(5, suppl 1):S26-S37.
8. Byrd-Miles K, Toombs EL, Peck GL. Skin cancer in individuals of African, Asian, Latin-American, and American-Indian descent: differences in incidence, clinical presentation, and survival compared to Caucasians. *J Drugs Dermatol*. 2007;6:10-16.
9. Hu S, Soza-Vento RM, Parker DF, et al. Comparison of stage at diagnosis of melanoma among Hispanic, black, and white patients in Miami-Dade County, Florida. *Arch Dermatol*. 2006;142:704-708.
10. Hu S, Parker DF, Thomas AG, et al. Advanced presentation of melanoma in African Americans: the Miami-Dade County experience. *J Am Acad Dermatol*. 2004;5:1031-1032.
11. Bellows CF, Belafsky P, Fortgang IS, et al. Melanoma in African-Americans: trends in biological behavior and clinical characteristics over two decades. *J Surg Oncol*. 2001;78:10-16.
12. Pritchett EN, Doyle A, Shaver CM, et al. Nonmelanoma skin cancer in non-white organ transplant recipients. *JAMA Dermatol*. 2016;152:1348-1353.
13. Shin S, Palis BE, Phillips JL, et al. Cutaneous melanoma in Asian-Americans. *J Surg Oncol*. 2009;99:114-118.
14. Stubblefield J, Kelly B. Melanoma in non-caucasian populations. *Surg Clin North Am*. 2014;94:1115-1126.
15. Bradford PT, Goldstein AM, McMaster ML, et al. Acral lentiginous melanoma: incidence and survival patterns in the United States, 1986-2005. *Arch Dermatol*. 2009;145:427-434.
16. Pichon LC, Corral I, Landrine H, et al. Perceived skin cancer risk and sunscreen use among African American adults. *J Health Psychol*. 2010;15:1181-1189.
17. Kundu RV, Kamaria M, Ortiz S, et al. Effectiveness of a knowledge-based intervention for melanoma among those with ethnic skin. *J Am Acad Dermatol*. 2010;62:777-784.
18. Robinson JK, Joshi KM, Ortiz S, et al. Melanoma knowledge, perception, and awareness in ethnic minorities in Chicago: recommendations regarding education. *Psychooncology*. 2010;20:313-320.
19. Hernandez C, Wang S, Abraham I, et al. Evaluation of educational videos to increase skin cancer risk awareness and sun safe behaviors among adult Hispanics. *J Cancer Educ*. 2014;29:563-569.
20. Chapman LW, Ochoa A, Tenconi F, et al. Dermatologic health literacy in underserved communities: a case report of south Los Angeles middle schools. *Dermatol Online J*. 2015;21. pii:13030/qt8671p40n.
21. Yanina G, Gaber R, Clayman ML, et al. Sun protection education for diverse audiences: need for skin cancer pictures. *J Cancer Educ*. 2015;30:187-189.
22. Dobbins SJ, Volkov A, Wakefield MA. Continued impact of sunsmart advertising on youth and adults' behaviors. *Am J Prev Med*. 2015;49:20-28.
23. Rodrigues MA, Ross AL, Gilmore S, et al. Australian dermatologists' perspective on skin of colour: results of a national survey [published online December 9, 2016]. *Australas J Dermatol*. doi:10.1111/ajd.12556.
24. Jacobsen A, Galvan A, Lachapelle CC, et al. Defining the need for skin cancer prevention education in uninsured, minority, and immigrant communities. *JAMA Dermatol*. 2016;152:1342-1347.
25. Hernandez C, Kim H, Mauleon G, et al. A pilot program in collaboration with community centers to increase awareness and participation in skin cancer screening among Latinos in Chicago. *J Cancer Educ*. 2013;28:342-345.
26. Kailas A, Solomon JA, Mostow EN, et al. Gaps in the understanding and treatment of skin cancer in people of color. *J Am Acad Dermatol*. 2016;74:144-149.