

# Dermascope Use by Osteopathic Primary Care Physicians

Jeffrey B. Morris, OMS III; Sarah V. Alfonso, BA; Nilda Hernandez, AA;  
and M. Isabel Fernández, PhD

From the Nova  
Southeastern University  
College of Osteopathic  
Medicine (NSU-COM) in  
Ft Lauderdale, Florida.

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Address correspondence to  
Jeffrey B. Morris, OMS III,  
NSU-COM,  
2000 S Dixie Hwy,  
Ste 108, Miami, FL  
33133-2441.

E-mail:  
jm3463@nova.edu

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**Context:** Osteopathic physicians (ie, DOs) in primary care may play a critical role in the early detection of skin cancer. Dermoscopy improves diagnostic accuracy; however, its use among primary care DOs remains understudied.

**Objectives:** To document dermascope use among DOs in primary care, to examine physician and practice characteristics associated with having used and having heard of a dermascope, and to examine the barriers to dermascope use.

**Methods:** Osteopathic physicians were recruited to complete an anonymous survey assessing demographic factors, physician and practice characteristics, confidence in differentiating skin lesions, knowledge and dermascope use, and barriers to dermascope use. Bivariate analyses were conducted, and the significant factors were entered into 2 separate logistic regressions.

**Results:** A total of 768 participants were included in the study. Four hundred ten (54%) had heard of a dermascope, and 123 (15%) had used one. The statistically significant multivariate predictors for having used a dermascope (model 1) were graduating from medical school after 1989 and having greater confidence in differentiating skin lesions (OR, 2.2; 95% CI, 1.66-2.79). Those who graduated after 2009 were 9.5 times more likely and those graduating between 2000 and 2009 were 4.3 times more likely to have used a dermascope than those graduating before 1990 (95% CI, 4.29-20.90 and 95% CI, 2.04-9.23, respectively). Ever having heard of a dermascope (model 2) was associated with being female (OR, 1.4; 95% CI, 1.02-1.87); practicing in a group (OR, 1.6; 95% CI, 1.05-2.36), academic (OR, 2.2; 95% CI, 1.26-3.86), or community center (OR, 2.2; 95% CI, 1.20-4.00); and having greater confidence in differentiating skin lesions (OR, 1.3; 95% CI, 1.15-1.55). Both models were statistically significant and correctly classified 605 (84.1%) (model 1) and 444 (58.4%) participants (model 2).

**Conclusion:** Dermascope use could help primary care DOs improve their diagnostic accuracy for skin cancer and reduce unnecessary referrals to specialists. Efforts to disseminate knowledge about the benefits of using a dermascope to primary care DOs are needed.

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With its patient-centered philosophy and focus on preventive care and holistic health, the practice of osteopathic medicine emphasizes treating the whole person instead of solely symptoms.<sup>1</sup> Given this orientation, it is not surprising that many osteopathic physicians (ie, DOs) choose specialties that are categorized under the umbrella of primary care, such as family medicine or internal medicine. An important component of primary care is providing patients with preventive health services, such as routine screening for cancers and common diseases.<sup>2</sup> Consequently, DOs in primary care play a critical role in promoting early detection of preventable cancers, such as skin cancer, which is the most commonly diagnosed cancer in the United States<sup>3</sup> and poses a substantial and increasing economic burden on the health care system.<sup>4</sup>

Many primary care DOs conduct routine skin cancer screenings, primarily through visual inspections, as part of annual physical examinations. Because visual inspection is not highly sensitive,<sup>5</sup> it may not be the optimum strategy for early detection of skin cancers. A dermascope is an easy-to-use tool that allows visualization of subsurface structures of the skin that are not visible to the naked eye or by simple magnification.<sup>6</sup> Several meta-analyses have demonstrated that dermoscopy improves the diagnostic accuracy of skin cancer compared with visual inspection alone.<sup>7-9</sup> It has also been shown to reduce unnecessary biopsies<sup>10</sup> and referrals to dermatologists.<sup>11</sup>

Although dermascope use has been adopted by dermatologists worldwide,<sup>12</sup> it has yet to be commonly used by primary care physicians overall. Even in countries like Australia<sup>13</sup> and France,<sup>14</sup> where more than 95% of dermatologists practice dermoscopy, use by general physicians is low (33% and 8%, respectively).<sup>15,16</sup> These data are unfortunate given strong evidence indicating that with minimal training, primary care physicians can improve their diagnostic accuracy for malignant skin lesions.<sup>17-19</sup> For instance, Argenziano et al<sup>17</sup> found that during a 16-month period, primary care physicians performing visual examinations missed

23 malignant skin tumors, whereas those using a dermascope missed 6. Despite these encouraging findings, dermascope use among DOs in primary care has yet to be examined, to our knowledge.

Furthermore, use of dermoscopes by primary care physicians has been associated with decreases in unnecessary biopsies<sup>10</sup> and referrals to dermatologists.<sup>11</sup> For instance, in a study in which participants examined the same lesion with and without use of a dermascope, Menzies et al<sup>11</sup> found that dermascope use nearly doubled primary care physicians' sensitivity of melanoma diagnosis ( $P=.006$ ) and reduced the number of benign lesions sent for excision or referral by 63.5% ( $P<.001$ ). Australian primary care physicians who used a dermascope referred a significantly lower number of patients with suspicious lesions for treatment per actual case of melanoma diagnosed (OR, 8.5; 95% CI, 8.1-9.0) compared with those who did not use a dermascope (OR, 17; 95% CI, 14.5-20.7).<sup>20</sup>

Although the evidence suggests that the dermascope can be a useful tool in primary care, little is known about its use by primary care DOs in the United States. To address this gap, we conducted a study to (1) document dermascope use among US-based DOs; (2) analyze physician and practice characteristics associated with having used or having heard of a dermascope; and (3) examine possible barriers to incorporating it into clinical practice.

## Methods

From September 2015 to February 2016, we recruited physicians representing 49 states to complete a brief cross-sectional survey. Prospective participants were recruited in person at conferences and national meetings as well as online through listservs of professional associations and personal e-mail. To be eligible, physicians had to be aged 18 years or older, currently practicing in the United States, and able to understand English. Participants who identified as allopathic physi-

cians (ie, MDs) were excluded. The study was approved by the Nova Southeastern University institutional review board as exempt.

We approached potential participants, described the study, and determined eligibility. Those eligible and willing to participate received the survey with an explanatory cover letter stating that participation was voluntary, that they would not receive an incentive, and that by completing the survey they were consenting to be in the study. We used SurveyMonkey to create an electronic version of the cover letter and questionnaire, which we distributed via professional listservs and personal e-mails. Participants clicked on the link provided and were redirected to a secure website to complete the survey. We entered paper surveys into SPSS (IBM) and merged the file with the data collected online.

### Survey

Because we found no standardized instrument to measure dermoscope use in the published literature, we selected specific items from past surveys directly relevant to our study and developed new items to assess domains of interest. We pilot tested the newly developed survey on 10 participants to assess comprehension and readability. We revised select items to improve comprehension and omitted items that were redundant or unclear. The final instrument consisted of 46 items measuring the following areas:

- demographic characteristics (age, sex, and race/ethnicity)
- physician characteristics (type of medical degree, primary specialty area, year of graduation from medical school, percentage of time spent in direct patient care, number of patients seen in a typical month, and number of patients presenting with suspicious lesions in a typical month)
- practice characteristics (eg, solo, group, academic), the state in which they practiced, and location of practice (urban, suburban, or rural)
- confidence in differentiating between cancerous and noncancerous skin lesions

using a 5-point Likert scale (1, “not confident at all,” to 5, “very confident”)

- knowledge and use of dermoscopes using 4 dichotomous items (whether they had heard of, read about, used, or currently used a dermoscope)
- barriers to use of a dermoscope (eg, added time to the patient encounter, cost of the equipment), the degree to which the item was a barrier (1, “no barrier,” to 5, “very big barrier”); for each item, mean scores were calculated and used to identify the top 3 barriers

### Statistical Analysis

A separate dataset comprised exclusively of primary care DOs who identified as practicing family medicine or internal medicine was created. We used measures of central tendency to examine sample characteristics and conducted bivariate analyses to examine the relationship between key factors and having used a dermoscope (model 1) and having heard of a dermoscope (model 2). We entered the variables whose *P* values were statistically significant ( $P < .05$ ) at the bivariate level in the logistic regression analysis.

### Results

A total of 768 participants were included in the study. Eighty-six percent of participants were recruited face-to-face. The sample was largely white (607 [79%]) and male (463 [60.3%]). Three hundred sixty participants (48%) saw at least 10 patients per month presenting with lesions suspicious for skin cancer, and 402 (53%) were confident or very confident in their abilities to differentiate cancerous from noncancerous skin lesions. Four hundred ten participants (54%) had heard of a dermoscope, and 193 (26%) had read about it in the medical literature. One hundred twenty-three participants (15%) had used a dermoscope, and 193 (6.0%) were currently using it in their clinical practice.

*Table 1* summarizes factors significantly associated with having used a dermoscope (model 1) and having heard of a dermoscope (model 2) at the bivariate level.

**Table 1.**  
**Bivariate Analysis of Osteopathic Primary Care**  
**Physicians' Use and Awareness of Dermoscopes**

Variable	Ever Used a Dermoscope		Ever Heard of a Dermoscope	
	$\chi^2$	P Value	$\chi^2$	P Value
Graduation year	23.773	<.001	3.343	.343
Ethnicity	3.824	.431	9.244	<.100
Sex	4.461	.035	4.221	.040
Practice location	2.443	.487	2.293	.515
Practice type	18.715	.002	11.725	.039
Time in direct patient care	2.403	.494	1.123	.773
No. of patients/mo	2.724	.606	0.954	.918
No. of patients/mo with suspicious lesions	4.404	.354	7.984	.092
Level of confidence differentiating lesions	46.124	<.001	22.114	<.001

The results of the 2 logistic regressions are reported in *Table 2* and *Table 3*. Owing to missing data, the final sample size for model 1 was 719 and for model 2, 760. In model 1, having used a dermascope was positively associated with having graduated from medical school after 1989 and having a greater level of confidence in differentiating skin lesions; it was negatively associated with having a hospital-based practice. Participants who graduated from 2000 to 2009 and from 2010 to 2016 were 4.3 times and 9.5 times more likely, respectively, to have used a dermascope than those who graduated before 1990. Physicians with greater confidence in differentiating skin lesions were 2.2 times more likely to have used a dermascope than those with less confidence. In model 2, the factors most associated with having heard of a dermascope were being female (OR, 1.4; 95% CI, 1.02-1.87); practicing in group (OR, 1.6; 95% CI, 1.05-2.36), academic (OR, 2.2; 95% CI, 1.26-3.86), or community centers (OR, 2.2; 95% CI, 1.20-4.00); and having a greater level of confidence in differentiating skin lesions (OR, 1.3; 95% CI, 1.15-1.55). Model 1 correctly classified 84.1% of participants ( $P<.001$ ) and model 2 correctly classified 58.4% of participants ( $P<.001$ ).

The most frequently cited barriers to incorporating dermascope use in routine care by mean (SD) score

were cost of the equipment (3.8 [1.2]), time and training requirements to become proficient in its use (3.5 [1.2]), and insufficient reimbursement (3.4 [1.4]).

## Discussion

Although dermoscopy increases diagnostic accuracy and reduces unnecessary biopsies, 85% of primary care DOs in our sample had never used a dermascope. Furthermore, 46.3% had not heard of a dermascope. To diagnose skin cancers in early stages, promotional efforts to increase dermascope use could lead to earlier detection and improved treatment outcomes. These efforts could also help reduce the high economic burden of treating patients with late-stage skin cancer.

Examining the factors associated with having used a dermascope is an important contribution of our study. The association between year of graduation and having used a dermascope is not surprising given the increasing availability of dermascopes during medical and residency training.<sup>21</sup> With each increasing decade, a parallel increase in the magnitude of the OR was observed. Participants graduating from 2010 to 2016, and those graduating from 2000 to 2009 were 9.5 and 4.3 times more likely, respectively, to have used a dermascope compared with those who graduated before 1990.

**Table 2.**  
**Logistic Regression Model for Osteopathic**  
**Primary Care Physicians' Use of Dermoscopes**

Variable	Model 1			
	$\chi^2$	OR	95% CI	P Value
<b>Year of Graduation</b>				
Before 1990 (referent)	...	...	...	...
1990-1999	0.95	2.59	(1.20-5.57)	.015
2000-2009	1.47	4.34	(2.04-9.23)	<.001
2010-2016	2.25	9.47	(4.29-20.9)	<.001
<b>Practice Type</b>				
Solo (referent)	...	...	...	...
Group	0.20	1.22	(0.65-2.28)	.544
Hospital	-0.83	0.44	(0.20-0.96)	.039
Academic	0.30	1.35	(0.62-2.97)	.454
Community	0.66	1.94	(0.87-4.35)	.107
Other	-0.21	0.81	(0.20-3.28)	.771
<b>Level of Confidence</b> <b>Differentiating Lesions</b>	0.77	2.15	(1.66-2.79)	<.001

**Table 3.**  
**Logistic Regression Model for Osteopathic**  
**Primary Care Physicians' Awareness of Dermoscopes**

Variable	Model 2			
	$\chi^2$	OR	95% CI	P Value
<b>Practice Type</b>				
Solo (referent)	...	...	...	...
Group	0.46	1.58	(1.05-2.36)	.027
Hospital	0.30	1.35	(0.87-2.10)	.184
Academic	0.79	2.21	(1.26-3.86)	.006
Community	0.78	2.18	(1.20-3.99)	.011
Other	0.80	2.22	(0.83-5.91)	.111
<b>Sex</b>				
Male (referent)	...	...	...	...
Female	0.32	1.38	(1.02-1.87)	.037
<b>Level of Confidence</b> <b>Differentiating Lesions</b>	0.29	1.33	(1.15-1.55)	<.001

It would be interesting to examine whether current use is also associated with recent graduation from medical school. We could not run these analyses because only 6.0% of participants reported currently using a dermascope. Future studies focusing on current dermascope use are warranted.

Explaining the relationship between greater confidence in differentiating lesions and having used a dermascope is more challenging. Logically, confidence should be related to use. What we do not know is the direction of the relationship. Are physicians who have greater confidence more likely to have used a dermascope or does experience using a dermascope increase physicians' confidence in their diagnostic abilities?

Sex, although statistically significant at the bivariate level, was not statistically significant in the multivariate model. Because there were 20% more men than women in our sample, the sample size differences may explain the bivariate associations, and these effects were washed out in the multivariate model. We had no reason to suspect that dermascope use would vary by sex.

A statistically significant association was found between practice type and dermascope use at the bivariate level. Yet, in the multivariate model, practicing in a hospital was the only statistically significant predictor, and it was a negative association. The characteristics of our sample could, in part, help to explain this finding. Primary care physicians practicing in hospital settings have to address patients' immediate presenting condition and are less focused on preventive care than physicians practicing in outpatient settings. Dermoscopes are much less useful under these circumstances. However, because we asked about having used a dermascope instead of currently using a dermascope, the influence of practicing in a hospital setting was attenuated. To cross-check, we conducted post hoc analysis and reran the logistic regression analyses, excluding primary care DOs who practiced in hospital settings. Although the values slightly differed, the variables in the model remained the same.

Model 2 examined factors associated with having heard of a dermascope. Practice type was the strongest predictor in this model. Compared with solo practitio-

ners, those who practiced in academia or community centers were 2.2 times more likely to have heard of a dermascope. It could be that solo practitioners have fewer opportunities to engage in casual conversations with other physicians, and some of our participants might have heard of dermascopes in casual conversations. Similar to model 1, confidence in differentiating skin lesions was a statistically significant predictor of having heard of a dermascope. Explaining this association presents similar challenges in both models. Female DOs in our sample were more likely to have heard of a dermascope than male DOs. Because a larger proportion of women in our sample practiced in academia or community centers, the association with sex may have been due, in part, to the setting in which they practiced. We have no reason to suspect that sex per se would affect having heard of a dermascope.

The main barrier to using dermascopes was cost of the equipment. In the managed care environment, with negotiated payment structures and dwindling reimbursements, often coupled with high debt level from medical training, primary care DOs face tremendous pressures.<sup>22</sup> Because the costs of numerous unnecessary biopsies and the treatment of late-stage skin cancers far exceed the initial cost of the equipment, one approach is to have the government subsidize the initial purchases. Providing primary care DOs access to a reliable tool that improves diagnostic accuracy for the most commonly diagnosed cancers in the United States may boost patients' confidence in their providers, reduce unnecessary visits to specialists, and strengthen the patient-physician relationship.

Although we recruited participants from 49 states, owing to our sampling strategy, the sample may not be representative of the population of US-based primary care DOs. Our recruitment efforts took place largely at conferences in the Southeastern region of the country; thus, our findings can only be generalized to physicians attending these conferences. Another limitation was the self-report nature of the survey. However, because we were not dealing with sensitive topics, the tendency toward providing socially desirable responses was

reduced. Also, because many participants completed the survey without direct oversight from the researchers, some skip pattern errors and missed responses occurred. A larger and more representative survey of the entire membership of the American Osteopathic Board of Internal Medicine and the American Osteopathic Board of Family Physicians is needed to more comprehensively examine the use of dermascopes among primary care DOs.

## Conclusion

Our study represents an initial step in understanding dermascope use among primary care DOs in the United States. Dermascopy could help primary care DOs improve their diagnostic accuracy with regard to skin cancer and reduce unnecessary referrals to specialists. Because knowledge and use of dermascopes in our sample was low, efforts to disseminate knowledge to primary care DOs about the benefits of using dermascopes are needed.

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## Author Contributions

All authors provided substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data; all authors drafted the article or revised it critically for important intellectual content; Student Doctor Morris, Ms Alfonso, and Dr Fernández gave final approval of the version of the article to be published; and Student Doctor Morris and Dr Fernández agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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