STUDY

Rates of Skin Cancer Screening and Prevention Counseling by US Medical Residents

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Objective: To determine factors related to residents' self-reported skill level for the skin cancer examination (SCE).

Design: Survey of residents in November 2003.

Setting: Four US residency programs.

Participants: Medical residents in family medicine, pediatrics, obstetrics and gynecology, and internal medicine and specialists.

Main Outcome Measure: Proportion of residents reporting their current skill level for the performance of the SCE.

Results: Of 454 surveys distributed, 342 residents completed the survey (75.3% response rate). Clinical training for the SCE during residency was infrequent. During residency, 75.8% were never trained in the SCE, 55.3% never observed an SCE, and 57.4% never practiced the examination. Only 15.9% of residents reported being skilled in the SCE. However, the conduct of 4 SCEs (or slightly more than 1 per each year of residency) was associated with manifold increases in self-reported skill levels.

Conclusions: Information now collected from 7 medical schools and 4 residency programs underscores the need for more supervised opportunities to enable physicians in training to perform an SCE during routine patient examinations.

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With recent advances in screening tests and a national effort to promote early detection, many of the leading causes of cancer mortality are decreasing.[1] Melanoma is the only detectable cancer for which death rates are not decreasing, yet screening rates remain the same.[2] In 2008, it is estimated that 62 480 individuals will be diagnosed as having melanoma and 8420 will die of melanoma.[3] Melanoma remains the second most common cause of cancer in individuals 15 to 29 years of age. In response, a number of recommendations have been made to provide training programs for instruction of the skin cancer examination (SCE).[4-6]

An estimated one-fourth of all melanoma is discovered by a physician, most often a primary care physician.[7-9] In fact, there is an emerging consensus that melanoma detected by physicians as opposed to by patients themselves is generally thinner, with a more favorable prognosis.[10,11] However, most primary care physicians do not routinely examine the skin.[12]

Although earlier studies[6] have documented the lack of adequate teaching and practice opportunities for the SCE in US medical schools, there have been no similar studies of US residency programs. Therefore, we sought to examine associations among observation, training, practice, and self-reported skills for the SCE by medical residents.

METHODS

SURVEY ADMINISTRATION

In November 2003, we surveyed medical residents at teaching hospitals for the following residency programs: Cambridge Hospital/Cambridge Health Alliance, Cambridge, Massachusetts; University of North Dakota, Grand Forks; University of Tennessee, Chattanooga; and University of Texas Southwestern, Dallas. We selected residents from the primary care tracks of family medicine, internal medicine, obstetrics and gynecology, and pediatrics (94.1%) as well as medical subspecialties (5.9%). At 2 of the programs (University of Tennessee, Chattanooga, and University of Texas Southwestern), residents from all primary care tracks

Table 1. Demographic Variables Among Residents

Variable	No. (%) of Residents[a]
Sex	
Male	163 (49.7)
Female	165 (50.3)
Age, y	
<30	210 (61.4)
≥30	132 (38.6)
Postgraduate year	
1	128 (40.8)
2	94 (29.9)
3-4	92 (29.3)
White patients treated, %	
0-25	63 (20.1)
26-50	123 (39.3)
>50	127 (40.6)
Specialty group	
Family medicine	66 (19.3)
Internal medicine	150 (44.0)
Obstetrics and gynecology	40 (11.7)
Pediatrics	65 (19.1)
Other specialty	20 (5.9)
Residency program	
University of Texas Southwestern	182 (53.5)
University of Tennessee, Chattanooga	72 (21.2)
University of North Dakota	43 (12.6)
Cambridge Hospital/Cambridge Health Alliance	43 (12.6)

[a] Percentages may not total 100% because of rounding.

and 6 subspecialists were surveyed. At the other 2 programs (Cambridge Hospital/Cambridge Health Alliance and University of North Dakota), family medicine and internal medicine were represented, along with 14 subspecialists.

These residency training programs were chosen because of geographic diversity, inclusion of public and private institutions, diverse ethnic mix of patients, and interest in skin cancer screening among the 4 dermatology residents who conducted the surveys. The survey respondents were anonymous, and institutional review boards at the respective institutions provided exempt status.

SURVEY INSTRUMENT

The resident survey was adapted from surveys used in previous studies of skin cancer education among medical students at Boston University School of Medicine and nationwide.[6] The current instrument was further refined by study leaders and pilot-tested to assess clarity, readability, difficulty, and time required to complete the survey.

SURVEY MEASURES

Medical residents were asked to rate their current skill levels for performance of the SCE categorized as very unskilled, somewhat unskilled, neither skilled nor unskilled, somewhat skilled, or very skilled. Independent predictors included the following: (1) demographics: age, sex, residency program (location), postgraduate year, percentage of white patients treated at that specific institution, and current specialty (family medicine, internal medicine, obstetrics and gynecology, or pediatrics); (2) dermatology course work: participation in medical school or residency dermatology elective, prior teaching of the SCE in medical school, and number of hours spent in the dermatology clinic; (3) training, practice, and observation: number or times during residency he or she received training in the SCE, number of adult patients for whom the SCE has been performed, and number of formal observations of a physician who performed the SCE; (4) prevention practices: routine examination of the skin of patients, teaching the ABCDs (asymmetry, border irregularity, color variability, and diameter larger than a pencil eraser) of melanoma to patients, questions with regard to changes in moles or new skin lesions in review of systems, and inquiry about family history of melanoma and skin cancer; and (5) personal risk reduction practices: skin self-examination practices and routine physician SCE and preferences for ideal teaching of the SCE during residency.

STATISTICAL ANALYSIS

We sought to determine factors associated with self-reported skill levels of residents. Self-reported skill was categorized in 2 distinct ways. The first set of comparisons divided the sample into 3 groups (very or somewhat skilled, neither skilled nor unskilled, and very or somewhat unskilled). Bivariate associations between the independent predictors and self-reported skill (skilled vs unskilled and neither vs unskilled) were then assessed. The second set of comparisons assessed the distribution of independent predictors among residents who reported being very or somewhat skilled compared with the other skill levels. Bivariate associations and associations adjusted for the age of the resident, percentage of patients who were white, and location of residency were assessed. All associations were assessed by means of logistic regression, and odds ratios and 95% confidence intervals are reported.

RESULTS

Of 454 surveys distributed, 342 residents completed the survey (75.3% response rate). Of these, 165 (50.3%) were female and 210 (61.4%) were younger than 30 years. Residents were postgraduate year 1 (128; 40.8%), postgraduate year 2 (94; 29.9%), and postgraduate years 3 and 4 (92; 29.3%). Specialties comprised internal medicine (150; 44.0%), pediatrics (65; 19.1%), family medicine (66; 19.3%), obstetrics and gynecology (40; 11.7%), and other medical specialties (20; 5.9%). A total of 127 residents (40.6%) reported that more than 50% of their patients were white (**Table 1**).

Most respondents had not taken a dermatology elective in medical school (196; 57.5%) or during their residency (272; 80.0%), and 142 (41.8%) had never received training in the SCE in medical school. Clinical training for the SCE during residency was infrequent. A total of 188 residents (55.3%) had never observed an SCE, 257 (75.8%) had never been trained in the SCE, and 195 (57.4%) had never practiced the SCE. More specific practice patterns related to early detection were also low. Less than one-third of residents reported routine examination of patient skin. Far fewer discussed the ABCDs of melanoma (33; 10.2%) or asked about changing moles or skin lesions (59; 18.3%) or a family history of melanoma (41; 12.7%). Overall, only 54 residents (15.9%) reported being somewhat to very skilled in the SCE, and 92 (27.1%) reported being neither skilled nor unskilled (**Table 2**). No differences were found in self-reported skill levels between residents in a primary care track vs those from medical subspecialties.

Table 2. Participation in Dermatology Coursework; Opportunities for Observation, Training, and Practice; and Risk Reduction Counseling and Screening Practices (for Self and With Patients)

Variable	No. (%) of Residents[a]
Participation in dermatology elective in medical school	
No	196 (57.5)
Yes	145 (42.5)
Received teaching of SCE in medical school	
No	142 (41.8)
Yes	198 (58.2)
Participation in dermatology elective in residency	
No	272 (80.0)
Yes	68 (20.0)
Hours spent in dermatology clinic under supervision of dermatologist or dermatology resident	
None	158 (47.2)
1-3	34 (10.1)
≥4	143 (42.7)
No. of times during residency observing a physician perform an SCE	
None	188 (55.3)
1-3	94 (27.6)
≥4	58 (17.1)
No. of times during residency receiving training to perform an SCE	
None	257 (75.8)
1-3	66 (19.5)
≥4	16 (4.7)
No. of adults for whom an SCE has been performed during residency	
None	195 (57.4)
1-3	94 (27.6)
≥4	51 (15.0)
Skill level for performing the SCE[a]	
Very or somewhat unskilled	194 (57.1)
Neither skilled nor unskilled	92 (27.1)
Very or somewhat skilled	54 (15.9)
Routinely examine skin in patients	
Never or sometimes	222 (68.1)
Often or always	104 (31.9)
Discuss ABCDs of melanoma	
Never or sometimes	291 (89.8)
Often or always	33 (10.2)
Include questions about changes in moles or skin lesions in review of systems	
Never or sometimes	263 (81.7)
Often or always	59 (18.3)
Ask about family history of melanoma or other skin cancers	
Never or sometimes	283 (87.3)
Often or always	41 (12.7)
Practices skin self-examination	
Never or sometimes	221 (68.2)
Often or always	103 (31.8)
Has routine personal physician SCE	
No	247 (78.7)
Yes	67 (21.3)

Abbreviation: SCE, skin cancer examination.
[a] Percentages may not total 100.0% because of rounding.

Table 3. Residents' Self-reported Skill Level for the Skin Cancer Examination Relative to Covariates

Variable	OR (95% CI)	
	Neither Skilled nor Unskilled vs Very or Somewhat Unskilled	Very or Somewhat Skilled vs Very or Somewhat Unskilled
Sex		
Male	1.0 [Reference]	1.0 [Reference]
Female	0.83 (0.50-1.39)	1.52 (0.82-2.84)
Age, y		
<30	1.0 [Reference]	1.0 [Reference]
≥30	1.17 (0.70-1.94)	1.06 (0.57-1.96)
Postgraduate year		
1	1.0 [Reference]	1.0 [Reference]
2	1.19 (0.65-2.18)	0.54 (0.23-1.26)
3-4	0.94 (0.49-1.80)	1.22 (0.60-2.48)
White patients treated, %		
0-25	1.0 [Reference]	1.0 [Reference]
26-50	1.09 (0.52-2.28)	0.98 (0.36-2.63)
>50	2.12 (1.03-4.38)	2.90 (1.16-7.26)
Specialty group		
Family medicine	1.0 [Reference]	1.0 [Reference]
Internal medicine	0.49 (0.25-0.96)	0.44 (0.21-0.93)
Obstetrics and gynecology	0.28 (0.11-0.73)	0.14 (0.04-0.53)
Pediatrics	0.35 (0.16-0.78)	0.09 (0.02-0.33)
Other specialty	0.31 (0.09-1.08)	0.31 (0.08-1.24)

Abbreviations: CI, confidence interval; OR, odds ratio.

Residents who treated a greater proportion of white patients and family medicine residents were more likely to report being very or somewhat skilled in the SCE; however, no differences were found by age, sex, or postgraduate level (**Table 3**).

After adjustment for the sex and age of the resident, percentage of patients who were white, and geographic location of residency, residents who received training in the SCE in medical school, participated in a dermatology elective in residency, spent 1 or more hours in a dermatology clinic, and had at least 4 observations, trainings, or practice opportunities were more likely to report being very or somewhat skilled in the performance of SCEs (compared with neither skilled nor unskilled and very or somewhat unskilled) (**Table 4**).

Practice of at least 1 SCE during residency was driven by one's earlier training in medical school or residency. Of 257 residents with at least 1 experience in the SCE (defined as those residents who received training in the SCE in medical school or participated in a dermatology elective in residency or medical school or spent more than 1 hour in a dermatology clinic), 128 (49.8%) had examined at least 1 patient during their residency. In contrast, only 13 (17.1%) residents without similar prior exposures had practiced the examination even once.

Personal practices had little bearing on practices with patients. Performance of skin self-examinations or having had a physician skin examination had little effect on resident screening practices with patients. Only 103 residents (31.8%) performed skin self-examinations, and only 67 (21.3%) had ever had a physician SCE. Among those who reported a skin self-examination, 20 (19.4%) were

Table 4. Likelihood of Reporting Skill (Somewhat or Very Skilled) in Performing Skin Cancer Examination

Variable	Unadjusted OR (95% CI)	Adjusted OR (95% CI)[a]
Participation in dermatology elective in medical school		
No	1.0 [Reference]	1.0 [Reference]
Yes	1.89 (1.05-3.39)	1.66 (0.87-3.19)
Received teaching of SCE in medical school		
No	1.0 [Reference]	1.0 [Reference]
Yes	3.74 (1.81-7.73)	3.33 (1.49-7.41)
Participation in dermatology elective in residency		
No	1.0 [Reference]	1.0 [Reference]
Yes	6.60 (3.51-12.38)	7.02 (3.37-14.62)
Hours spent in dermatology clinic under supervision of dermatologist or dermatology resident		
None	1.0 [Reference]	1.0 [Reference]
≥1	7.63 (3.33-17.49)	5.77 (2.43-13.71)
No. of times during residency observing a physician perform an SCE		
None	1.0 [Reference]	1.0 [Reference]
1-3	1.39 (0.60-3.23)	1.19 (0.47-2.98)
≥4	10.76 (5.15-22.50)	10.97 (4.57-26.36)
No. of times during residency receiving training to perform an SCE		
None	1.0 [Reference]	1.0 [Reference]
≥1	5.67 (3.04-10.59)	6.28 (3.00-13.13)
No. of adults for whom an SCE has been performed		
None	1.0 [Reference]	1.0 [Reference]
1-3	1.82 (0.84-3.96)	1.66 (0.72-3.6)
≥4	9.95 (4.69-21.08)	10.03 (4.23-23.79)

Abbreviations: CI, confidence interval; OR, odds ratio; SCE, skin cancer examination.
[a] Controlling for sex, age, percentage of patients who are white, and location of residency.

skilled in the patient SCE; among those who did not report a skin self-examination, 30 (13.6%) were skilled in the SCE (P=.18). Among those who reported a personal physician SCE, 9 (13.4)% were skilled in the SCE; among those who did not report a personal physician SCE, 40 (16.2)% had performed an SCE (P=.57). When asked to list possible areas in the curriculum for the incorporation of SCE education, 127 residents thought core curriculum sessions would be ideal, whereas 60 preferred departmental sessions and 30 preferred grand rounds sessions.

COMMENT

Prompt recognition and appropriate triaging of persons with suspicious lesions are essential. Visits to internists and family practitioners make up an estimated 40% of physician visits in the United States, and nearly two-thirds of patients with melanoma report a physician visit in the year before diagnosis.[13] Primary care physicians are thus ideally suited to screen and triage high-risk patients and those with suspicious lesions. The teaching of physicians in training, such as medical students and primary care residents, is a vital part of a professional education strategy.

We examined the relationship between medical school and residency training and self-reported skill for performance of the SCE among medical residents. Self-reported skill levels were low, as were observation, training, and practice in the SCE. Fifty-five percent of respondents never practiced the SCE during their residency, and only 16% reported being skilled in the SCE. A prior study[6] showed that 43% of fourth-year US medical students had never practiced the SCE and only 28% of students reported being somewhat to very skilled in the SCE. Information now collected from 7 medical schools and 4 residency programs underscores the need for more supervised opportunities for physicians in training to perform SCEs.

There are many barriers to effective integration of the SCE in residency programs. First, the lack of evidence for the SCE in the reduction of melanoma mortality from a randomized trial may preclude it from being added to the resident program curriculum. However, it should be noted that other examinations, such as the digital rectal examination, are routinely taught in both medical school and residency without convincing evidence that suggests efficacy in the reduction of prostate cancer mortality.[14] Second, it is possible that residency program preceptors and/or chief residents have never been trained to perform the SCE and do not feel adequately prepared to teach skin examination skills. Third, there is often an insufficient number of dermatology faculty members to provide small-group teaching or to interact with primary care residents in clinics, on the wards, or in offices. Fourth, expansion of dermatology didactic teaching may be impractical given the increasingly large volume of information that must be covered during these years.

Notwithstanding these important barriers, there are small but important steps that residency programs can provide to increase opportunities for the teaching of the SCE. First, although it is important to have realistic expectations of the amount of new teaching that residency programs can absorb, in our study the conduct of 4 SCEs (or slightly more than 1 per each year of residency) was associated with manifold increases in self-

reported skill levels. Residents expressed their strongest preferences for core curriculum sessions as ideal teaching venues. Given obvious time constraints and the overall lack of resources, it would be impractical for dermatologists alone to lead new core curriculum sessions for residents or students. However, the American Academy of Dermatology could be instrumental in the sponsorship of a national initiative to educate residency program directors and/or chief residents at medical schools and teaching hospitals in the basics of the SCE and triage via Web-based learning modules. These program leaders can then serve as primary educators during the core curriculum sessions at their home institutions. Such an initiative has been shown to be effective in the growth of teaching confidence and practice when tested in alcohol clinical training.[15] In programs that cannot feasibly add new core curriculum sessions, innovative educational sessions that use online education or CDs should be explored.

Although lack of time for integration of the SCE in the residency curriculum may be a barrier, primary care residents exposed to a brief 3- to 4-hour, multicomponent educational intervention program showed improvement in the evaluation and diagnosis of melanoma and squamous cell carcinoma.[16] Web-based education has been shown to be a useful and beneficial learning tool for promotion of self-guided teaching at all levels of medical education.[17-20] A recent study[18] highlighted the ability of computer-based learning modules to be at least as effective as traditional lecture series in the education of medical students with regard to dermatology morphology. A separate study[19] of a Web-based interactive teaching and examination model for the study of dermatology morphology found that 93% of students strongly supported the development and integration of Web-based resources into their curriculum. Standardized patients could be used to assess clinical practice and facilitate ongoing education by providing information and direct feedback on clinical practice, as well as to promote time-efficient strategies for the performance of an SCE in the primary care setting.[21]

We acknowledge several limitations to this study. First, the analysis was conducted at only 4 residency programs; thus, the results may not be generalizable. It is possible that students with a particular interest in dermatology or those with a more favorable impression of their SCE training would be more likely to respond to and complete the survey. However, the generally poor self-ratings for skill levels, observation, training, and practices slightly mitigate any concern about overestimation of performance. Second, all data were self-reported, with no objective measures available to assess accuracy in the SCE. Third, although the survey question asked residents to rate their skill on a 5-point scale, some residents may have indirectly reported their confidence for this technique. Future studies should consider ways to more objectively evaluate the accuracy for the assessment and triage of significant lesions. Fourth, although the effect sizes are generally large, the distribution of respondents in the strata of the predictors is uneven, which results in small cell sizes. As a result, there is a lack of precision in the estimates (ie, wide confidence intervals). Strengths of the study include its relatively high response rate, inclusion of major primary care disciplines, and recall of experiences in medical school and residency programs.

Although our survey of 4 US resident training facilities included geographically diverse institutions with different training curricula, residents from the University of Texas Southwestern had fewer white patients than the other 3 programs and reported lower rates for performing the SCE. With a large Hispanic patient population, it could be argued that the importance of the SCE was less emphasized in this program or in other programs that serve a large Hispanic population. With increasing rates of melanoma in populations other than that of whites, attention must also be paid to teaching the SCE across diverse populations.[22] Another potential concern was the inclusion of pediatric residents in the sample. Likewise, the incidence of pediatric melanoma is increasing,[23] which justifies the need to examine the skin of high-risk children and adolescents.

To our knowledge, this is the first study to explore the SCE practices of US medical residents. We see reasons for strong concern mixed with cautious optimism. Few residents report adequate practice or skill in the SCE, but small increases in training and practice opportunities were associated with higher self-reported skill levels. Residency programs and medical schools may have neither the time nor the infrastructure to teach an expert, comprehensive examination to all physicians in training. However, the basic ability to recognize potentially suspicious lesions and triage persons with such lesions should be a vital and key component of both training programs. If current physicians in training do not learn this skill set in medical school or residency, there is a low likelihood that they will acquire this knowledge in their day-to-day practice, which could have potentially devastating consequences for melanoma recognition going forward. New generations of physicians in training should be instructed to perform a careful and thorough SCE in their clinical training.

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