Skin Biopsy Indications in Primary Care Practice: A Population-Based Study

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Background: To better understand skin biopsy practice among primary care providers, we sought to describe (1) the type and variability of skin lesions biopsied within a defined population, (2) the providers' previous skin cancer experience in clinical practice, and (3) how providers are alerted to the lesions.

Methods: **Our study was based upon 1215 skin biopsies done by family physicians, internists, physician assistants, and certified nurse midwives at a health maintenance organization between June 1989 and February 1992. Biopsy reports were reviewed, and providers were both surveyed and interviewed.**

Results: **There were 1004 benign, 89 premalignant, and 122 malignant skin lesions removed for biopsy by 47 primary care providers. The five most frequent biopsy diagnoses were nevi, seborrheic keratoses, actinic keratoses, cysts, and dermatofibromas. Personal interviews indicated that providers noticed lesions based on their experience with pictures, text descriptions, or variation from expected growth, behavior, or response to treatment. Seventy percent of providers interviewed stated that most often the patient brought the lesion to the attention of the provider.**

Conclusions: **Among the skin lesions examined by biopsy in this primary care setting, 82.6 percent were benign, 7.3 percent were premalignant, and 10.0 percent were malignant. Worthy educational objectives suggested by this study include (1) meeting primary care providers' need for information about early detection of skin cancers, (2) increasing provider access to visual dermatology resources, and (3) increasing patient awareness of skin cancers. (J Am Board Fam Pract 1996;9:397-404.)**

Primary care providers have many opportunities to examine skin, and if they note unusual lesions on visual examination, they can perform a biopsy to confirm a diagnosis. In 1993, the incidence of melanoma in the United States continued to increase at a rate faster than that of any other cancer.[1] Given the excellent prognosis for melanoma diagnosed during the early stages of the disease, early recognition of skin cancers by primary care providers is crucial. Skin biopsy is generally regarded as a harmless procedure; however, scarring, bleeding, and infections can cause complications. Additionally, specimen processing, histopathologic examination, and documentation are both costly and time-consuming. Study of primary care biopsy practices could help in the development of a curriculum that improves early detection of skin cancers, and analysis of biopsy practices could increase the likelihood that skin samples biopsied on the basis of visual inspection or clinical impression are actually skin cancers (sensitivity).

Studies from England describe a significant increase in the number of biopsy specimens sent by general practitioners for histopathologic examination.[2-7] In an attempt to better understand skin biopsy practice among primary care providers in the United States, we proposed to describe (1) the types and variability of skin lesions biopsied by family physicians, internists, physician assistants, and certified nurse midwives within a defined patient population; (2) the providers' previous experience with skin cancer in clinical practice; and (3) how providers are alerted to lesions.

Methods

The database consisted of biopsies of skin lesions done by board-certified family physicians, internists, physician assistants, and nurse midwives at Group Health Northwest (GHNW), a health

Submitted, revised, 15 August 1996.

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This project was supported by the University of Washington School of Medicine Medical Student Research Training Program and an Arthur Campbell Fellowship Award from the American Cancer Society (Jones). This work was presented at the 1995 Western Student Medical Research Forum, Carmel, California.

maintenance organization (HMO) in Spokane, Wash. The setting of this study has been described in detail elsewhere.[8] Data collection consisted of two parts: review of pathology reports of biopsy specimens, and a survey of the GHNW primary care providers who performed these biopsies.

Selection of Lesions Biopsied

All biopsies done at GHNW were sent for pathologic examination to a group of pathologists in Spokane consisting of 1 board-certified dermatopathologist and 2 other pathologists trained in skin cancer. Biopsies of lesions done by primary care providers at GHNW during the period of study were selected by review of these pathology reports. A random sample of these biopsies in a previous study had shown excellent interrater reliability between this community pathology group and a University of Washington dermatopathologist (weighted kappa = 0.83).[9]

Biopsies excluded from the study included those from patients referred by GHNW providers to private dermatologists or surgeons, those done by podiatrists, or those from the genital region, which were beyond the scope of this study. The GHNW finance and marketing database was used to obtain demographic information on the patient population, which ranged from 41,000 to 53,000 during the study period.

Pathology Report Analysis

The patient's name, age, sex, diagnosis, site of biopsy, and the specialty of provider performing the biopsy were obtained from 1215 pathology reports on biopsies done between June 1989 and February 1992.

For the 1215 biopsies, 90 separate SnoMed-coded diagnoses were combined into 53 groups based on similarity of pathologic, clinical, or treatment characteristics. For example, all biopsies diagnosed as "cyst, NOS" were combined with those diagnosed as "cyst, epithelial inclusion" and "cyst, sebaceous/pilar." These 53 diagnostic subgroups were then analyzed according to sex of patient, specialty of provider, and number of diagnoses within a group.

Survey Development and Analysis

The provider survey consisted of a self-administered questionnaire and personal interview.[10] A draft questionnaire was developed that consisted of nine questions regarding providers' age, sex, years in practice, board certification, and specific skin cancer training. Additional questions addressed previous experience with diagnoses of skin cancer, practice of routine skin examinations, biopsy practice, and personal confidence in recognizing and diagnosing various skin lesions.

The questionnaire was successively revised after review by a family physician, a physician assistant, a psychiatrist, an internist, and a dermatologist. Revision was based upon a concurrent think-aloud interview technique whereby each of the 5 respondents thought aloud when answering questions while the observer noted ambiguities in the questionnaire.[11]

The test-retest method was used to test for reliability.[12] The answers to three questions in the self-administered questionnaire that were subject to recall bias were compared with the answers to the same three questions asked during a personal interview. Personal interviews also contained 10 open-ended questions regarding aspects of providers' experience with previous skin cancer diagnoses, skin biopsy referral practices, and dermatology training.

Survey of Providers

Providers included in the survey were those who performed skin biopsies during the period of study. Initial contact was made with these 47 providers through a letter describing the study along with a questionnaire and consent form. Those declining to participate were asked to return the questionnaire with a brief explanation.

Participants were contacted by telephone to arrange a personal interview with the primary investigator. Telephone interviews were conducted in four instances in which the participants were unable to be scheduled for an interview in their office. Survey data were derived from a qualitative in-depth interview technique with an open-ended question format.

A second letter was mailed to providers who had not responded within 3 weeks, and six follow-up letters were mailed to providers who had moved from Spokane.

Data Analysis

Survey responses were recorded into a spreadsheet database. The percentage of agreement between test and retest responses was calculated to

Table 1. Average Number of Biopsies per Provider by Specialty During Study Interval (2.7 years).

Specialty	No. of Providers	Malignant Biopsies	Premalignant Biopsies	Benign Biopsies	Total Biopsies	Range
Family practice	32	2.8	2.1	18.9	23.8	1-71
Internal medicine	4	1.3	0.3	8.0	9.5	1-23
Physician assistant	9	3.0	2.3	40.2	45.6	5-85
Nurse midwife	2	0.0	0.0	1.5	1.5	1-2

test for reliability for the three questions so evaluated. Data derived from personal interviews were entered immediately after each interview into a word processor exactly as recorded in field notes. Analysis of this qualitative data was based upon themes derived from responses to each question. Human subjects approval was granted by the University of Washington Human Subjects Review Committee.

Results

Biopsy Database Analysis

Of the 1215 biopsies performed, 82.6 percent of the lesions were benign, 7.3 percent were premalignant, and 10.0 percent were malignant. The mean number and range of biopsies per provider are listed by specialty in Table 1. Table 2 displays the sex-specific incidence of benign, premalignant, and malignant lesions diagnosed by primary care providers (number of new cases of skin lesions diagnosed during the study period per total person-time). The percentage of benign, premalignant, malignant, and total biopsies performed by each group of providers is listed in Table 3.

Biopsies done by family physicians were 1.5 times more frequent on women (n = 462) than men (n = 305), biopsies performed by physician assistants were 1.8 times more frequent on

Table 2. Sex-Specific Incidence of Top 10 Benign and All Premalignant and Malignant Skin Lesions Diagnosed on Biopsy by Primary Care Providers (per 100,000 person years).

Lesion Type	Female Patients No. (Rate)	Male Patients No. (Rate)	Total No. (Crude Rate)
Benign			
Nevus	329 (484.9)	135 (231.7)	464 (367.9)
Seborrheic keratosis	82 (120.9)	52 (89.2)	134 (106.3)
Cyst	38 (56.0)	26 (44.6)	64 (50.7)
Dermatofibroma, histiocytoma	44 (64.8)	13 (22.3)	57 (45.2)
Polyp, skin tag	16 (23.6)	17 (29.2)	33 (26.2)
Folliculitis, contact dermatitis	18 (26.5)	13 (22.3)	31 (24.6)
Hyperplasia, hyperkeratosis	11 (16.2)	14 (24.0)	25 (19.8)
Lentigo	14 (20.6)	6 (10.3)	20 (15.9)
Verruca	6 (8.8)	13 (22.3)	19 (15.1)
Dermoid, hemangioma	5 (7.4)	11 (18.9)	16 (12.7)
Premalignant			
Actinic keratosis	47 (69.3)	41 (70.4)	88 (69.8)
Lentigo maligna	1 (1.5)	0 (0.0)	1 (0.8)
Malignant			
Squamous cell	5 (7.4)	12 (20.6)	17 (13.5)
Basal cell	36 (53.1)	53 (91.0)	89 (70.6)
Melanoma	7 (10.3)	8 (13.7)	15 (11.1)
Metastatic adenocarcinoma	1 (1.5)	0 (0.0)	1 (0.8)

Note: Biopsies from referral specialists were excluded, so incidence is based on primary care clinic population, not total health maintenance organization population.

Table 3. Biopsy Results by Provider.

Provider	Benign (n = 1004) No. (%)	Premalignant (n = 89) No. (%)	Malignant (n = 122) No. (%)
Family physician	607 (60.4)	67 (75.3)	90 (73.8)
Internist	32 (3.2)	1 (1.1)	5 (4.1)
Physician assistant	362 (36.1)	21 (23.6)	27 (22.1)
Nurse midwife	3 (0.3)	0 (0.0)	0 (0.0)
Total	1004 (100.0)	89 (100.0)	122 (100.0)

women (n = 264) than men (n = 148), and internists performed biopsies on women (n = 20) and men (n = 19) at nearly the same frequency. Among the three biopsies by nurse midwives, 2 patients were female and 1 was male. Overall, female patients had biopsies (n = 746) 1.6 times more frequently than male patients (n = 469).

Survey Results

The test-retest sample included 10 providers. The percentage of agreement ranged from 66.7 percent to 88.9 percent with a mean of 79.2 percent. Questions with reliability below 66.7 percent were excluded from the study. The questionnaire response and participation rates, as well as the demographics and dermatology training of respondents, can be found in Tables 4, 5, 6, and 7.

Table 4. Physician Response and Participation.

Characteristic	Number
Physicians selected to participate	47
Completed questionnaire and personal interview	10
Completed questionnaire only	21
Declined participation	6
Failed to respond	8
Could not be contacted	2
	Percent
Response	79
Participation	66

Personal Interview Results

Eight family physicians and two physician assistants agreed to be interviewed. Interview participants constituted 20 percent of providers who performed 33 percent of all biopsies. Providers were asked to elaborate on previously diagnosed cases of skin cancer, including anything unusual or distinct about these cases. Responses included discussions of cases in which the appearance of the lesion varied from typical textbook-appearance melanomas to amelanotic melanoma. Most cases of melanoma were those in which the lesion grew quickly, contained variegated colors, and often had highly irregular or bleeding borders. There was one reported case of amelanotic melanoma in which the family physician had biopsied this lesion on the basis of its rapid growth.

Another notable case of melanoma was one in which the lesion was not at first detected during a physical examination including a full-skin examination. At the end of the examination, the patient revealed the lesion on her shoulder that had been covered by her gown, and her physician immediately removed it. Seven of the 10 providers interviewed indicated that for the skin cancers they had diagnosed, it was most often the patient who brought the lesion to the attention of the provider.

Table 5. Demographics of Questionnaire Respondents (n = 31).

Characteristic	Number
Female	6
Male	25
Age, mean (yr)	45.2
Age, range (yr)	35-53
Board-certified family physician	22
Board-certified internal medicine	2
Board-certified physician assistant	6
Certified nurse midwife	1

The basal cell carcinoma diagnoses were all reported as textbook in appearance with the exception of one in which a patient had a rash on the side of the neck. The rash "looked like chronic eczema" but failed to respond to treatment and appeared to be infiltrating. This patient was referred to a dermatologist, who diagnosed the lesion as a basal cell carcinoma. One case of T cell lymphoma in an elderly patient appeared as an atypical rash that failed to respond to treatment. The patient was referred to a dermatologist who made the definitive diagnosis.

The frequency with which family physicians refer patients for biopsy to physician assistants was highly variable. Four respondents felt there were situations when they did not have time and therefore asked a physician assistant to biopsy the lesion. The referral was dependent upon the exper-

Table 6. Dermatology Training of Questionnaire Respondents (n = 31).

Characteristic	Percent
Formally trained to examine skin for skin cancers	74
Previously diagnosed a skin cancer in clinical practice	97
Diagnosed basal cell carcinoma	94
Diagnosed squamous cell carcinoma	84
Diagnosed melanoma	97
Routinely do directed skin examinations for cancer	77
Directed skin cancer examinations that take place on all patients during annual physical examination or during visits specifically for skin examination	81

tise of the physician assistant with whom the physician worked. Two respondents said they never referred patients to a physician assistant for biopsy, and if a biopsy was needed, they made the time to do it themselves. Other responses included those of physician assistants who indicated they never referred biopsies to family physicians because the physicians' time is more limited and often physician assistants had greater expertise in biopsy techniques. When these physician assistants made a referral for skin biopsy, it was to a dermatologist.

Asked whether there were any areas of dermatology in which providers would like more training, 7 of the 10 responded affirmatively, whereas 3 were satisfied with their current level of training. The areas for which providers wanted more training included courses that reflect changes in the field, ie, human immunodeficiency virus infection related to dermatology; courses on specific and new biopsy techniques; recognition and typing of unusual lesions; melanoma detection; and additional training on rashes. Providers preferred such training by review of high-quality photographs, as a clinical clerkship-preceptorship with specialists, or as part of a larger continuing medical education (CME) review course.

Suggestions for improving dermatology training in medical schools included generally increasing curriculum requirements in dermatology training, replacing didactic dermatology course requirements with clinical experiences in dermatology, and increasing the emphasis on common skin diseases.

Suggestions for improving dermatology training in family practice residency programs were to increase the time requirements in dermatology clinic, establish a core curriculum in biopsy practices, provide multimedia resources in dermatology education, make it possible for more lesions to be seen before they are removed for examination, and implement a follow-up system on all biopsy results. Improvement suggestions for CME dermatology training included offering dermatology courses that had a specialist track and a family practice track, providing high-quality photomicrographs, and developing accessible means by which to have immediate feedback on lesions, such as by digitalized computer systems or video cassettes.

All providers interviewed felt the GHNW system helped expedite the diagnoses of skin cancers. Reasons given were the strong emphasis on preventative care, including scheduling preventative examinations; the absence of financial barrier to access, including no copayment for skin examinations; the ease with which dermatology referrals are made; the belief that providers spend more time with patients in the examination room and therefore are more likely to observe a lesion; and an increased skin cancer awareness among both patients and providers as a result of educational efforts. Lack of appointment availability as a result of provider shortage compared with patient demand was mentioned by all providers interviewed as a major barrier to making a skin cancer diagnosis in a timely manner.

Table 7. Questionnaire Respondents' Self-rated Confidence Score in Correctly Recognizing and Diagnosing Various Lesions.

Lesion Type	Score*
Seborrheic keratosis	3.7
Actinic keratosis	3.4
Pigmented nevi	3.3
Basal cell carcinoma	3.2
Squamous cell carcinoma	2.8
Melanoma	2.8

*Based on a scale from 1 to 4 in which 1 = no confidence, 4 = very confident.

Changes in the GHNW system since 1992 that improve skin cancer detection are improved appointment availability, increased numbers of educational pamphlets both inside and outside GHNW, and efforts for health promotion to the public through consumer media.

Discussion

This study quantitatively describes the types of skin lesions biopsied by primary care providers in an HMO population. In addition, by using a questionnaire and qualitative in-depth interview, themes were obtained describing previous skin cancer experience in clinical practice and characteristics of lesions that bring them to the attention of providers. There were 1004 benign, 89 premalignant, and 122 malignant skin lesions biopsied by 47 providers during a period of 32 months. The incidences of biopsy diagnoses from this northwestern US HMO population are shown in Table 2. By far the most frequent benign diagnoses were nevi (n = 464) and seborrheic keratoses (n = 134), both of which are in the differential diagnosis of melanoma and basal cell cancers.[13-16] Other frequently examined benign lesions, such as cysts (n = 64), dermatofibromas or fibrous histiocytomas (n = 57), and polyps or skin tags (n = 33), were consistent with skin lesions that were most commonly excised by general practitioners in a 1993 study from England.[5]

More female patients underwent skin biopsy in this study than male patients, probably because the female patient population was larger than the male patient population, and because women in this population seek medical care more often than men. Results similar to ours were reported in a study conducted at a British military hospital, which compared 546 skin biopsies taken by general practitioners with 454 taken by hospital specialists and reported almost two thirds of all patients having a skin biopsy were female.[6] General practitioners in that study performed biopsies on 1.6 times more women than men.

Per provider, physician assistants performed more biopsies than did other providers in this setting (Table 1). Most of these lesions were benign. It was difficult to determine from the records whether the provider who performed the biopsy was actually the same as that who recognized a questionable lesion. From 10 personal interviews, 4 providers recalled frequent occasions when they did not have time to excise a lesion and referred the patient to a physician assistant for biopsy. There was no case in which a physician assistant referred a patient with a highly suspect lesion to a family physician for biopsy. Therefore, family physicians might be recognizing more questionable lesions than their biopsy rate indicates.

Assertions in the literature regarding diagnostic skills of primary care providers[2,4,8,17] range from "internists and other physicians reveal a profound lack of knowledge about melanoma and its precursor lesions and show an extremely limited capacity to accurately diagnose cutaneous lesions,"[18] to "general practitioners are able to detect suspicious lesions with a high degree of accuracy."[6] Some of this variability of perception regarding competence can be explained by our study, in which there was considerable variability in terms of (1) the number of skin cancers diagnosed and (2) the number of biopsies performed by individual providers and specialties (Table 1).

Opportunities for recognizing skin diseases in this primary care setting are optimal and might be of limited generalizability to some other primary care settings. Most of the providers participating in the survey were those who performed the greatest number of biopsies, and they could have had an increased interest and expertise in skin diseases. Results from the provider survey and personal interviews might therefore represent disease recognition by the most motivated and qualified of the providers. In addition, the strong emphasis on patient-provider education and preventative care by the HMO, plus the absence of financial barriers to such care, were perceived as facilitating skin cancer diagnosis. Moreover, all providers working in this system were board certified and had a mean age of 45.2 years. A notable hindrance in the timely diagnosis of skin cancer in this setting mentioned by all providers interviewed was lack of appointment availability.

The setting of a British study with similar findings is comparable to ours in several respects: the population consisted of 46,000 patients, biopsies were done by general practitioners in an army hospital where providers are not paid on a fee-for-service basis, and resources to perform biopsies did not come from a provider's budget.[6] Performing biopsies in this setting depends on clinical indications and the general practitioner's expertise and enthusiasm.

Incidence rates of biopsy diagnoses shown in Table 2 are for this mostly white, northern latitude primary care population. The rate of biopsies that can be expected in similar populations might be useful in estimating biopsy resources needed within similar primary care systems.

Provider confidence in recognizing and diag-

nosing lesions indicates a need for educational efforts in squamous cell and melanoma detection, which showed lowest provider confidence. The most popular means by which providers would like such training was in the form of clinical preceptorship with specialists or as part of a larger CME course. There was also an interest in increasing accessibility to dermatology resources, such as high-quality photomicrographs, video cassettes, and digitalized computer programs.

Suggestions from providers for improving dermatology training in both medical school and residency programs emphasized the value of and need for increased clinical dermatology requirements, including establishment of core curriculum in biopsy practice and skin cancer recognition. In most US family practice residency programs, dermatology training is offered through lectures and preceptorship rotations in dermatologists' offices.[19] Skin conditions encountered in a dermatology practice, however, might not include common conditions likely to be seen in the office of a family physician. In addition, continuity in evaluating and treating chronic and evolving skin conditions might be lacking in this setting.

Family practice residents at the Maine Medical Center Family Practice Residency Program overwhelmingly preferred monthly photography conferences with a dermatology consultant in a group session with other residents for learning the essentials of treating skin diseases and learning about skin disease in children.[20] Residents in this study reported that some skills, including techniques for diagnostic studies and skin biopsy, were better learned during a preceptorship with a dermatologist. Based on these and our findings, implementing photographic conferences as an adjunct to increasing clinical dermatology requirements might provide the most valuable and effective method of improving dermatology training in residency programs.

Our results indicate that primary care providers are noting lesions from recollections based on pictures and text descriptions as well as when a lesion is atypical either in terms of growth, behavior, or response to treatment. Seventy percent of providers interviewed also stated that it was most often the patient who brought the lesion to the attention of the provider. These results are consistent with those found in a study in which medical providers detected only 20 percent of melanomas; the remainder were discovered by the patient (53 percent), family (17 percent), and others (3 percent).[21] Continued efforts should be made to increase the awareness of patients regarding skin disease recognition and the awareness of providers regarding the importance of questioning patients about changes in their skin.

On the basis of our study and available literature, educational efforts to improve detection and diagnosis of skin cancer should be directed toward (1) increasing clinical dermatology requirements in medical schools and residency programs; (2) further educating primary care providers on lesion detection, particularly squamous cell carcinoma and melanoma; (3) increasing accessibility of visual dermatology resources to providers; and (4) increasing patient awareness of skin cancers.

Karl Weyrauch, MD, Orville H. Mann, MD contributed to the study design. L R Bernard, Patty Peterson, and Vera Pillars at Pathology Associates; Mark Williams and Kathy Hardy at Sacred Heart Pathology; Kelly Tripp and Sherry Conners of the medical records department; and Diana Gaffey at Group Health Northwest, Spokane, assisted with data gathering. Bill Sayres of the GHNW research committee provided data entry support.

References

1. Boring CC, Squires TS, Tong T, Montgomery S. Cancer statistics, 1994. CA Cancer J Clin 1994; 44(1):7-26.
2. McWilliam LJ, Knox F, Wilkinson N, Oogarah P. Performance of skin biopsies by general practitioners. BMJ 1991;303:1177-9.
3. Cox NH, Wagstaff R, Popple AW. Using clinicopathological analysis of general practitioner skin surgery to determine educational requirements and guidelines. BMJ 1992;304:93-6.
4. Williams RB, Burdge AH, Jones SL. Skin biopsy in general practice. BMJ 1991;303:1179-80.
5. Shorrock K. Use of histopathology services by general practitioners: recent changes in referral practice. J Clin Pathol 1993;46:989-92.
6. Bricknell MC. Skin biopsies of pigmented skin lesions performed by general practitioners and hospital specialists. Br J Gen Pract 1993;43:199-201.
7. Hillan KJ, Johnson CP, Morton R. Effect of general practitioner contract on referral of specimens for histological examination. BMJ 1991;303:1180.
8. Boiko PE, Koepsell TD, Larson EB, Wagner EH. Skin cancer diagnosis in a primary care setting. J Am Acad Dermatol 1996;34:608-11.
9. Boiko PE, Piepkorn MW. Reliability of skin biopsy pathology. J Am Board Fam Pract 1994;7:371-4.
10. Aday LA. Designing and conducting health surveys: a comprehensive guide. San Francisco: Jossey-Bass, 1989.

11. Jobe JB, Mingay DJ. Cognitive research improves questionnaires. Am J Public Health 1989;79:1053-5.
12. Armstrong BK, White E, Saracci R. Principles of exposure measurement in epidemiology. New York: Oxford University Press, 1992.
13. Glickman, FS. Basal cell carcinoma. Fam Pract Recert 1990;12(8):74-9.
14. Runkle GP, Zaloznik AJ. Malignant melanoma. Am Fam Physician 1994;49(1):91-8, 102-4.
15. Glickman FS. Seborrheic keratosis. Fam Pract Recert 1992;14(10):17-20.
16. Hacker SM, Flowers FP. Squamous cell carcinoma of the skin. Will heightened awareness of risk factors slow its increase? Postgrad Med 1993;93(8):115-21, 125-6.
17. Rampen FH, Rumke P. Referral pattern and accuracy of clinical diagnosis of cutaneous melanoma. Acta Derm Venereol 1988;68:61-4.
18. Cassileth BR, Clark WH Jr, Lusk EJ, Frederick BE, Thompson CJ, Walsh WP. How well do physicians recognize melanoma and other problem lesions? J Am Acad Dermatol 1986;14:555-60.
19. Little JM Jr, Hall MN, Pettice YJ. Teaching dermatology: too dependent on dermatologists? Fam Med 1993;25:92-4.
20. Cyr PR. Family practice center-based training in skin disorders: a photographic approach. Fam Med 1995;27:109-11.
21. Koh HK, Miller DR, Geller AC, Clapp RW, Mercer MB, Lew RA. Who discovers melanoma? J Am Acad Dermatol 1992;26:914-9.