

## **ABSTRACT**

### **Background**

Detection of melanoma by physicians via opportunistic surveillance during focused physical examinations may reduce mortality. Medical students may not encounter a clinical case of melanoma during a dermatology clerkship.

### **Objective**

This study examined the proficiency of fourth-year University of Illinois at Chicago (UIC) medical students at detecting melanomas.

### **Methods**

Melanoma moulages were applied to the 2nd digit of standardized patients (SPs) participating in a wrist pain scenario during a required clinical skills examination. An observer reviewed videotapes of the examination, written SP checklists, and student notes for evidence that the student noticed the moulage, obtained a history, or provided counseling.

### **Results**

Among the 190 fourth-year medical students, 56 students were observed noticing the lesion, however 13 failed to write it in their notes or advise the patient. The detection rate is 22.6% (43 of 190 students). Students who detected the probable melanoma consistently inquired about changes in the lesion and symptoms, but did not examine the rest of the skin or regularly palpate for adenopathy.

**Limitations**

Testing one class of students from a single medical school with a time restricted standardized patient encounter while focusing the students' attention towards a different presenting complaint may hinder exploration of medical issues.

**Conclusion**

The low detection rate and failure of students who noticed the moulage to identify the lesion as atypical represents a lost opportunity to provide a patient intervention. Use of standardized patient examinations may help physicians-in-training build confidence and competence in cutaneous malignancy screening.

## INTRODUCTION

Since melanoma is detected by visual inspection of the skin, opportunistic screening can be provided by physicians during usual care and all physicians should have sufficient experience during their training to be comfortable identifying its classic findings. (1,2) However, access to patients willing and able to model skin disease during teaching experiences is a challenge in dermatology medical education. Physicians in training may not encounter a melanoma during the clinical experience of a brief dermatology clerkship. Perhaps for this reason, Moore et al. found that only 28.2% of medical students rated themselves as somewhat or very skilled in the performance of skin exams. (3) Others have also found low rates of physician training, low physician confidence and performance of skin cancer screening examinations by non-dermatologists. (4-6)

The medical students' second-year curriculum in Clinical Pathophysiology (CPP) at the University of Illinois at Chicago (UIC) includes a required 1 hour dermatology lecture reviewing the presentation of cutaneous malignancies including melanoma and performance of skin examinations. Students may attend lectures, listen to a recording, and presentation slides are uploaded to the medical student website allowing them review the materials at their convenience. In order to explore gaps in the melanoma screening skills of medical students, a study at UIC examined the proficiency of medical students early in their fourth year at (1) detecting, (2) inquiring about, (3) conducting a screening physical exam for, and (4) advising patients about melanomas during a non-dermatologic simulated encounter with an incidental finding of a suspicious lesion.

## **METHODS**

This study was approved by the UIC Institutional Review Board. All fourth-year UIC medical students undergo a comprehensive assessment of their clinical skills through a series of simulated clinical encounters utilizing standardized patients (SPs), professional actors trained to accurately portray a scripted clinical patient presentation consistently and accurately during multiple encounters. (7) A checklist of items that students must do correctly in order to successfully complete the examination is prepared for each case by medical center faculty who have expertise in the particular disease being simulated and is reviewed with the actors. The scenarios are practiced until they are reliably reproduced. Four female actors were trained to portray this simulated case and each underwent approximately 6 hours of training according to standard clinical performance center protocols. Students have 12 Objective Structured Clinical Examination (OSCE) stations to complete as part of their examinations.

The standardized patient case involved a 40-45 year old female presenting with occasional numbness, weakness, and tingling of the thumb, index, middle and ring fingers. A melanoma moulage [Medart-FX (New York, NY)] was applied to the SP's 2nd left hand digit in an area where it would be easily visible during the physical examination of the hands (Figure 1). The moulage measured approximately 3-4mm in diameter and was applied using a medical-grade adhesive blending into the skin so that it appeared quite natural. A board-certified dermatologist approved the realistic appearance of the moulage prosthetic for each SP.

A dermatologist (CH) coached the SPs how to answer questions about the history and symptoms of the simulated melanoma. The SP was instructed not to mention the nevus in her history or review of systems unless the moulage was noticed by the student. Only then would the SP answer specific questions by the student. The history prepared for this case included reporting heavy sun exposure while growing up in Florida and multiple (4-5) blistering sunburns. She had no prior skin cancer history, did not perform regular skin self-examinations, and had noted no other changes in any other moles. The lesion was to be reported as new with no pre-existing nevus at the site. Symptoms such as rapid growth of the lesion over a period of less than six months, color change, occasional sunscreen use, and no family history of skin cancer were to be reported if asked.

During the standard orientation, students are told to obtain an appropriate history and perform a pertinent physical examination. Everything they observed should be considered part of the patient's presenting findings. Scenarios with multiple medical problems beyond the stated chief complaint are not rare in simulated encounters. Each student had 15-minutes to conduct their history and physical examination with the SP. Their documentation should include pertinent history, physical examination findings, differential diagnosis (up to 5 items ranked), and plans for further work-up (up to 5 items). Students were given 10 minutes to enter a chart note into an electronic medical record system made specifically for simulation center based assessments and the encounters were also video-recorded.

Immediately after the encounter, the SPs completed a checklist regarding the history, physical examination, and follow-up recommendations, as well as a patient satisfaction survey. Student notes, SP checklists, and video-recordings were all reviewed by one of the authors (CH) to determine whether the student noticed the melanoma prosthetic, obtained a history relevant to the melanoma, performed the indicated screening physical exam, and counseled the patient regarding care of the pigmented lesion (Table 1 Checklist).

## RESULTS

A total of 190 students were tested during July- December 2009. Of the 190 SP examinations completed, 189 students (99.5%) correctly documented carpal tunnel syndrome in their differential diagnosis for the patient's wrist pain complaint. In contrast, only 56 students (29%) noticed the melanoma moulage according to the SP, who recorded students who verbally mentioned the nevus and/or asked questions regarding it. A review of the medical notes, SP checklist, and video-recordings revealed that some students incorrectly concluded the melanoma prosthesis was benign. Of the 56 students who noticed the lesion 13 students told the SP "not to worry about it" or failed to comment on it any further, either verbally to the patient or in their written notes. The number of students who recommended follow-up/biopsy was used to determine the detection rate. The overall detection rate for the entire class was 43 of 190 students (22.6%).

Students, who detected the probable melanoma, consistently asked the two most important questions to predict the risk of malignancy: a history of change in the lesion (size, color) or symptoms from the lesion (itching, tingling, bleeding) (Table 2). Only five students obtained a family history of skin cancer, and two asked about a prior diagnosis of skin cancer. One student palpated for lymphadenopathy after detection of the lesion and another examined other cutaneous sites for atypical pigmented lesions. No patient was offered a full body skin examination.

## DISCUSSION

This study found that 56 students (29%) noticed the moulage, however only 43 of 190 students (22.6%) correctly concluded the lesion was atypical and warranted further investigation. The failure of students who noticed the moulage but concluded it was benign is disappointing as it represented a lost opportunity to intervene. In addition, to documenting a low detection rate our study adds to the simulation literature that those who detected the lesion obtained the two salient aspects of the history to assist with diagnosis: symptoms and change in the lesion. We also determined that even if a student detected the atypical lesion, examining other cutaneous sites was not performed. We acknowledge that time limitations during the clinical testing scenarios may reduce the number of students performing a skin examinations (please see study limitation discussion below).

UIC medical students learn about melanoma in didactic sessions during their second year in the CPP course. Multiple choice formats, are widely used to assess dermatologic knowledge at the end of a rotation focusing only on the base of Miller's clinical competence pyramid, "knows" or factual recall. (8) However, the ability to recall information does not translate into the ability to utilize the information, physician's actual performance in real life, the tip of Miller's pyramid "does" (Figure 2). The multiple choice exam that students take at the completion of their CPP course consists of 98 questions, with 2 exam questions dealing specifically with melanoma. One question dealt with common melanoma locations and the other with risk factors for its development. Ninety-one percent of the students correctly answered the question regarding common



melanoma anatomic locations, while 61% of the class correctly answered the risk factor question. This same medical school class had a 22.6% detection rate utilizing standardized patients which focuses on the third step of the pyramid "show how". Although our students could recapitulate knowledge, they had not successfully integrated it into a clinical skill indicating the need for further refinement of our curriculum.

Our results support the findings of previous studies reporting a low rate of melanoma detection by medical students. (9,10) Robinson and McGaghie found only a single fourth-year student among 285 detected the melanoma lesion using a SP with a headache and a moulage applied below the earlobe.(9) The improved detection rate in this study may be attributed to the examination of the hand being part of the evaluation of carpal tunnel syndrome, in contrast to examination of the skin of the neck not being part of the headache neurologic examination. A separate study of second-year medical students participating in a dermatology elective found only 16% of participants detected a moulage placed on the foot during a demonstration of cutaneous diseases.(10) These second-year students were cued to perform visual inspection by virtue of the case being dermatologic; nonetheless, their rate of detection by opportunistic screening approached but did not exceed that of the fourth-year medical students in this study.

Limitations of the study include testing only one class of students from one medical school. The under-representation of dermatology in most curricula makes it likely that the low detection rate is all likelihood not isolated to our center. The context of the

testing (OSCE) is important to examine since the purported focus of the test was wrist pain evaluation according to the chief complaint given by the SP. It is not possible to completely separate students who saw and did not correctly interpret this testing situation as a potential opportunity to refer the SP for the further testing for the moulage finding. Time limitations for interacting with the SP could affect the number of students who decide to perform skin examinations. Students may also chose not to address the lesion during a examination for fear that it may negatively affect their performance if they felt they should focus only on the wrist pain complaint leading them to disregard other incidental findings. In this study, we did not explore the reasons for the decision that students made regarding the benign versus malignant nature of the lesion but examining these decision factors would be helpful in designing curriculum improvements.

For students pursuing careers in primary care, the medical student educational experience may represent their only exposure to dermatology. The management of an atypical pigmented skin lesion by medical students in this study supports physicians' self report of poor skin cancer screening skills (3-6), and help us to understand why the rates of skin cancer screening are low in the primary care setting. (11-15). Students' performance in the simulation indicated that our dermatology curriculum needs to be improved to help students recognize the importance of obtaining a comprehensive dermatologic history, physical examination skills for signs of melanoma, lymphadenopathy assessment, and full body examinations when an atypical lesion is found.

Although additional studies are needed to document that simulation exercises improve physician performance, these simulated clinical encounters have the potential to bridge the gap between melanoma knowledge and its application. Additional benefits of a simulated skin cancer evaluation encounter would include gaining additional proficiency in full body skin examinations, and providing students with constructive feedback about their evaluation and communication skills. Early detection remains one of the most important interventions for melanoma. Physicians should be part of the solution for early melanoma detection and not a factor in the delay of care.

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**Figure Legends**

Figure 1 -Melanoma moulage applied to second digit of standardized patient.

Figure 2 - Miller's clinical competence pyramid