ORIGINAL ARTICLE

The role of the ugly duckling sign in patient education

Muneeb Ilyas, BSc,[a] Collin M. Costello, BS,[a,b] Nan Zhang, MS,[c] and Amit Sharma, MD[a]
Scottsdale and Tucson, Arizona

Background: The ABCDE (with *A* standing for asymmetry, *B* for border irregularity, *C* for color variegation, *D* for diameter larger than 6 mm, and *E* for evolution) rule for melanoma (MM) recognition is widely taught in the general population. The ugly duckling (UD) sign is an alternate MM recognition strategy that is not generally taught.

Objective: To compare the sensitivity, specificity, and accuracy of MM recognition with UD sign and the ABCD rule in a general population.

Methods: Participants were randomized into either the ABCD or UD arm of the study. An educational tutorial on their respective teaching method followed. Participants were subsequently tested using images of 9 lesions (7 nevi and 2 MMs) and asked to categorize each image as MM or not MM.

Results: A total of 51 participants were randomized to the ABCD group and 50 to the UD group. The sensitivity for MM recognition of both groups was similar. The specificity and accuracy for MM recognition was significantly higher (P =.02, P = .02) in the UD group.

Limitations: The *E* for evolution in the ABCDE rule was not tested. No follow-up knowledge retention test was conducted.

Conclusion: The UD sign significantly improved accuracy and specificity of MM recognition. We recommend adding the UD sign to patient education in addition to the traditional ABCDE rule. (J Am Acad Dermatol http://dx.doi.org/10.1016/j.jaad.2017.06.152.)

Key words: ABCDE; malignant melanoma; melanoma education; melanoma recognition; patient education; skin cancer; ugly duckling.

Melanoma (MM) is estimated to have an incidence of 87,110 cases in 2017, making it the fifth most common cancer in the United States.[1] An aggressive malignancy, MM accounts for 71.6% of nonkeratinocyte skin cancer–related deaths. Although the increasing incidence of MM for the past 60 years is now slowing, the prevalence of MM continues to rise around the world in predominately fair-skinned populations.[2]

The early detection and management of MM is critical for reducing disease-associated morbidity and mortality. Soong et al[3] report that patients with early stage (IA) MM have a 10-year survival rate of 95%; however, in patients with a delayed diagnosis and more advanced disease (stage IIB or C), the-10-year survival rate drops to less than 60%. The primary reason for a delayed MM diagnosis is the inability of patients to adequately identify early features of MM.[4] It is imperative that the general population receive adequate education on MM features, as 57% to 72%

Abbreviations used:

MM: melanoma
UD: ugly duckling

From the Department of Dermatology[a] and Department of Biostatistics, Mayo Clinic Arizona, Scottsdale,[c] and University of Arizona College of Medicine, Tucson.[b]
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Correspondence to: Muneeb Ilyas, BSc, Department of Dermatology, Mayo Clinic Arizona, 13400 E Shea Blvd, Scottsdale, AZ 85259. E-mail: Ilyas.Muneeb@mayo.edu.
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of primary MMs and 62% of recurrent MMs are detected first by patients or their partners.[5-7]

The ABCD rule (with *A* standing for asymmetry, *B* for border irregularity, *C* for color variegation, and *D* for diameter larger than 6 mm) is a commonly used method to determine whether a nevus has features concerning for MM.[8] The ABCD rule was developed in 1985 and revised in 2004, at which time it was expanded to include an *E* for evolution.[9] This rule is considered a cornerstone of MM recognition for physicians and laypeople.[8] Although the ABCDE rule increases the ability of physicians and laypersons to identify MM, this strategy is not applicable to all MM presentations and may lead to missed MMs if relied on exclusively.[10-12] Another recent strategy for macroscopic MM recognition is the ugly duckling (UD) sign. The UD sign is when cutaneous lesions on a patient are compared and an obviously different lesion is identified (the UD). The UD lesion is considered suspicious for malignancy. As described by Gaudy-Marqueste et al,[13] the key difference between the UD sign and the ABCD rule is that UD requires an intrapatient comparative analysis of nevi whereas the ABCD rule depends on a lesion-focused analysis on an individual nevus. Recognition of MM is commonly taught to both the general population and dermatology residents by using the ABCDE rule or other analytical algorithms.[14,15] The utility of the UD sign to the general population compared with that of the ABCD rule remains to be elucidated. As the UD sign uses a comparative analysis that has been validated as a reliable cognitive process for recognizing a lesion that is different from all other lesions,[13] we hypothesize that for the public, the UD sign will show superiority to the ABCD rule for MM recognition.

In this study, we compared the ability of laypeople who were randomly assigned to a teaching group (ABCD or UD) to recognize MM. The principle aim of this study was to compare the laypeople's sensitivity, specificity, and accuracy for MM recognition when using the ABCD rule and the UD sign. A secondary aim of this study was to determine whether age, education, or prior knowledge of MM features affected laypeople's ability to recognize MM.

CAPSULE SUMMARY

- Physicians and laypersons are taught the ABCDE rule (with *A* standing for asymmetry, *B* for border irregularity, *C* for color variegation, *D* for diameter larger than 6 mm, and *E* for evolution). The ugly duckling (UD) sign is not commonly taught but is associated with improved MM recognition by physicians.
- The UD sign yields good accuracy and specificity for MM recognition by laypersons.
- The UD sign should be incorporated into laypersons' MM education.

METHODS

Study development and design

This study was approved by the institutional review board at the Mayo Clinic. The questionnaire used for this study was designed in a Google Form by a team composed of a dermatologist (A.S.) and 2 dermatology research fellows (M.I. and C.C.) at the Mayo Clinic. The survey and test were conducted on a 9.7-in Ipad Pro (Apple, Cupertino, CA). Participants were recruited from a waiting room at the Mayo Clinic in which patients were waiting for practitioners of various medical specialties, including neurology, gastroenterology, cardiology, and dermatology. There were no specific inclusion or exclusion criteria. Participants were randomized 1:1 into either the ABCD arm or the UD arm of the survey. The randomization was performed through a computer-assisted algorithm. Demographic information collected included age group, education level, and history of MM. Additional information collected included familiarity with MM, experiences with a dermatologist, interest in MM education, activity while waiting for a physician, and knowledge of the ABCD rule or the UD sign.

The ABCD arm of the study included a brief educational tutorial in which participants were taught the ABCD rule through the use of animated diagrams generated in Photoshop CC 2017 (Adobe Systems, Inc, San Jose, CA) (Supplemental Document 1; available as an e-component at www.jaad.org). Participants were taught each component of the ABCD rule individually by using illustrations (Fig 1, *A*) and an explanatory sentence. The final educational slide displayed an image of an actual MM (Fig 2, *A*) with the ABCD components labeled. Animated diagrams were used during the educational module in both arms of the study. This prevented the UD group from seeing photographs of nevi that were not shown to the ABCD group. Participants in both the ABCD arm and UD arm of the study were exposed to exactly 1 image of MM during the educational module. Subsequent to the education, participants immediately participated in a test in which they were shown images of 9 lesions (7 benign nevi and 2 MMs) in a consistent order. Participants were asked to categorize the image as