



## Temporary tattoos: a novel OSCE assessment tool

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### SUMMARY

**Background:** There are many issues regarding the use of real patients in objective structured clinical examinations (OSCEs). In dermatology OSCE stations, standardised patients (SPs) with clinical photographs are often used. Temporary transfer tattoos can potentially simulate skin lesions when applied to an SP. This study aims to appraise the use of temporary malignant melanoma tattoos within an OSCE framework.

**Method:** Within an 11-station OSCE, a temporary malignant

melanoma tattoo was developed and applied to SPs in a 'skin lesion' OSCE station. A questionnaire captured the opinions of the candidate, SP and examiners, and the degree of perceived realism of each station was determined. Standard post hoc OSCE analysis determined the psychometric reliability of the stations.

**Results:** The response rates were 95.9 per cent of candidates and 100 per cent of the examiners and SPs. The 'skin lesion' station achieved the highest realism score compared with other stations: 89.0 per cent of candidates

felt that the skin lesion appeared realistic; only 28 per cent of candidates had ever seen a melanoma before in training. The psychometric performance of the melanoma station was comparable with, and in many instances better than, other OSCE stations.

**Discussion:** Transfer tattoo technology facilitates a realistic dermatology OSCE station encounter. Temporary tattoos, alongside trained SPs, provide an authentic, standardised and reliable experience, allowing the assessment of integrated dermatology clinical skills.

**Temporary transfer tattoos can potentially simulate skin lesions when applied to an SP**

Medical students, nearing graduation, lack confidence in assessing and managing dermatological conditions

## INTRODUCTION

Assessment plays a crucial role in the educational process, checking not only that learning has occurred, but also influencing future learning and practice.<sup>1,2</sup> Objective structured clinical examinations (OSCEs) are used widely in the assessment of clinical competency, providing the opportunity to observe candidates interacting with patients.<sup>3</sup> Patients can either be real or simulated. Real patients provide the opportunity to assess the ability of candidates to examine actual clinical features; however, the use of real patients in OSCEs raises significant issues.<sup>4</sup> The clinical features of real patients are often difficult to standardise, which can lead to differing examination experiences for candidates. Furthermore, because of the sensitivities of the patient's condition, for example in a cancer diagnosis, examination by a large cohort of students is inappropriate, and has the potential to cause patient distress. Standardised patients (SPs) are often used in OSCEs to simulate 'real' patient encounters.<sup>4</sup> SPs can be used to assess a range of clinical skills, including history taking, physical examination and procedural skills. Increasingly the use of technical equipment, in combination with SPs, is being used in OSCEs.<sup>5</sup> For example, special effects make-up and prosthetics applied to an SP to simulate a bruise or other type of injury.<sup>6</sup>

Skin conditions represent a common reason for patients to consult with their family doctor.<sup>7</sup> However, it is known that medical students, nearing graduation, lack confidence in assessing and managing dermatological conditions.<sup>8</sup> Thus dermatological conditions should be adequately taught and proportionately represented in any assessment blueprinting process. It is often common practice to present candidates with a



Figure 1. Example of a standardised patient, with a photograph of a skin lesion, used in an objective structured clinical examination (OSCE) station

clinical photograph of a skin lesion in an OSCE station (Figure 1).

Such assessment encounters are less than ideal and are far removed from actual clinical practice. When presented with a real patient with a skin condition in clinical practice, clinicians are not only expected to take a history and examine the skin lesion, but also to determine a diagnosis and communicate an appropriate management plan.

Langley and colleagues, from Dalhousie University, validated the use of a temporary transfer tattoo (TTT) to simulate a malignant melanoma.<sup>9</sup> They described the development of a temporary tattoo of a malignant melanoma that can be applied to an individual's skin. Such a novel technique has many potential educational uses.<sup>9</sup> In this study we aim to appraise the use of a TTT of an malignant melanoma within an OSCE framework.

## METHODS

The study was conducted in the School of Medicine at Queen's University Belfast. In the fourth year of their studies, students are presented with an 11-station

summative OSCE. In the January 2012 OSCE, six out of 11 stations had an SP present. Fourth-year medical students (cohort 2011–12;  $n = 123$ ) were invited to participate.

With patient consent, a high-resolution photograph of a histologically proven malignant melanoma was obtained. With transfer tattoo media (Tattoo 2.1 decal paper and glue sheet, The Magic Touch®), this image was used to produce malignant melanoma transfer tattoos (Figure 2). Such media has been tested and certified not to be a skin irritant, and has proven to be safe when applied to skin.

The context of the station was that a 'patient' (i.e. the SP) was consulting with their 'family doctor' (i.e. the candidate) about a changing 'mole'. The OSCE checklist scoring system was written by experienced OSCE writers using the ABCD criteria (asymmetry, border, colour and diameter).<sup>10</sup> The station aimed to judge the ability of candidates to clinically assess and communicate a provisional diagnosis of a malignant melanoma to a patient. All SPs attended pre-OSCE training, and were given a script regarding their role and asked to appear 'concerned'. Two



Figure 2. Photograph of a temporary transfer tattoo of a malignant melanoma



Figure 3. The temporary melanoma tattoo was applied to a standardised patient's lower limb

TTTs were applied to either their limbs or back to provide a back-up (Figures 3 and 4).

An anonymised questionnaire was developed for candidates, examiners and SPs following a review of the literature and a focus group of academics and dermatologists. The questionnaire aimed to sample opinions about the utility of using transfer tattoos within an OSCE framework,

and aimed to capture how candidates, examiners and SPs perceived the degree of realism (i.e. how the clinical scenario presented/reflected actual clinical experience) of each OSCE station (realism scoring: mean score on a five-point likert scale; 1, strongly disagree; 5, strongly agree). Following piloting, the revised questionnaire was administered to candidates, examiners and SPs after the OSCE.

Simple descriptive statistics were used to analyse questionnaire responses. Routine post-OSCE reliability analysis was performed, including Cronbach's alpha,  $R^2$  coefficient and the number of candidates below the cut score.

## RESULTS

The response rates for candidates, examiners and SPs were 95.9 per cent (118), 100 per cent (33) and 100 per cent (18), respectively; 75.4 per cent (89) of candidates were aged 20–22 years; 22.0 per cent (26) were aged 23–25 years; the remaining candidates were aged >25 years of age; 37.3 per cent (44) were male and 62.7 per cent (74) were female.

Candidates were asked a series of questions relating to the use of a melanoma tattoo within an OSCE. They were informed that the 'pigmented lesion' was in fact a temporary tattoo. Despite being temporary, overall 89.0 per cent (105) of candidates felt that the malignant melanoma temporary tattoo *appeared* realistic to them. Interestingly, 42.0 per cent (50) of candidates thought that it was an *actual* patient with a malignant melanoma. The majority of candidates (72.9%; 86) reported having never seen a patient with an actual malignant melanoma in their undergraduate studies. Of the 28.0 per cent (33) of candidates who had actually seen a real melanoma, this had occurred during their dermatology attachment, and not in general practice or any other clinical attachment.

Table 1 outlines the candidates' responses to other questions related to the use of such transfer tattoos within an OSCE. The majority of candidates felt that the use of the transfer tattoo improved the realism of the station because of the added factor of interacting with the patient

**Overall candidates felt that the malignant melanoma temporary tattoo appeared realistic**

Candidates felt that the transfer tattoo enhanced the degree of standardisation



Figure 4. A candidate interacting with a 'concerned' standardised patient presenting with a temporary melanoma tattoo

and also informing them of their diagnosis. The majority either strongly disagreed (34.7%; 41) or disagreed (33.9%; 40) that using a clinical photo of a skin lesion, compared with a temporary tat-

too, was superior. Furthermore, the majority of candidates felt that the transfer tattoo enhanced the degree of standardisation of this across different OSCE circuits and sessions.

Table 2 outlines candidates, examiners and SPs realism scores for each OSCE station. The melanoma station achieved the highest realism score of all stations for candidates, SPs and examiners.

Table 3 summarises the post-OSCE reliability analysis. The overall reliability of the OSCE, as measured using Cronbach's alpha, was 0.58. The value that the melanoma station contributed to this (0.264) was in keeping with, and in some instances greater, than other stations used in this OSCE. The  $R^2$  coefficient is a measure of the proportional change in the checklist score resulting from change in the independent variable global grade. A value of  $R^2 > 0.5$  indicates a reasonable relationship between checklist scores and global grades. The melanoma station had a respectable value of 0.66, which again was higher than a number of other stations used in this OSCE. The number of students failing in the melanoma station

**Table 1. Candidates' responses regarding the use of a temporary melanoma tattoo in an objective structured clinical examinations (OSCE) station**

Station title	Strongly disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly agree (5)	Mean	SD
<b>I felt that the application of a temporary transfer tattoo to a simulated patient enhanced the realism because of their interaction with a patient:</b>	0	0.9% (1)	6.9% (8)	55.2% (64)	37.1% (43)	<b>4.3</b>	0.63
<b>There was a sense of realism telling the 'patient' his/her potential diagnosis:</b>	0	2.6% (3)	10.3% (12)	56.0% (65)	31.0% (36)	<b>4.2</b>	0.71
<b>I believe that using clinical photographs (e.g. an A4 laminated print of a malignant melanoma) is a superior examination tool compared with using temporary transfer tattoos in an OSCE setting:</b>	35.3% (41)	34.5% (40)	19.0% (22)	8.6% (10)	2.6% (3)	<b>2.09</b>	1.06
<b>I feel the use of temporary transfer tattoos promotes a standardised OSCE station (i.e. all students will experience reasonably similar circumstances in a station):</b>	0	0.9% (1)	11.2% (13)	60.3% (70)	27.6% (32)	<b>4.1</b>	0.64

**Table 2. Responses from candidates, examiners and standardised patients to the perceived degree of realism for each objective structured clinical examinations (OSCE) station**

Station title	Study participant	Realism score*
Interpretation of a PEWS chart**	• Candidate	3.5
	• Examiner	3.8
Observation of a Psych video with a patient describing auditory hallucinations**	• Candidate	3.0
	• Examiner	4.6
Review of a chest x-ray with free air under the diaphragm**	• Candidate	4.0
	• Examiner	3.7
Review of a hip x-ray with a fractured neck of femur**	• Candidate	3.8
	• Examiner	4.4
Prescription for analgesia in a patient with knee osteoarthritis**	• Candidate	3.9
	• Examiner	4.1
Discharge planning for a stroke patient	• Candidate	3.8
	• Examiner	4.7
	• Standardised patient	3.7
Interview with a patient who has an eating disorder	• Candidate	3.4
	• Examiner	4.0
	• Standardised patient	4.2
Assessment of a skin mole	• Candidate	4.4
	• Examiner	5.0
	• Standardised patient	4.7
Review of a patient who has post-chemotherapy sepsis	• Candidate	3.6
	• Examiner	4.4
	• Standardised patient	4.3
Blood pressure (BP) measurement and cardiovascular risk assessment	• Candidate	4.1
	• Examiner	4.6
	• Standardised patient	4.6
Discussion with a patient about antidepressant treatment	• Candidate	3.8
	• Examiner	4.1
	• Standardised patient	3.8

\*Realism score for how well the candidates perceived the station mirrored a realistic clinical encounter: mean score on a five-point Likert scale; 1, strongly disagree; 5, strongly agree.

\*\*Stations that did not have a standardised patient present.

was in keeping with other stations.

## DISCUSSION

Our findings would indicate that in combination with a trained SP, the TTT helped to provide a realistic, consistent and reliable

method of representing a patient with a malignant melanoma in an OSCE. Furthermore, the psychometric performance of the melanoma OSCE station was comparable with other stations in this OSCE. On a practical level they were relatively straightforward to produce and no technical difficulties were encountered. In

terms of material costs they were relatively inexpensive (roughly £0.05, €0.06 or \$0.08 per tattoo).

Diagnosing a malignant melanoma is an important clinical skill, not only for dermatologists but also other for health care professionals, including general practitioners (GPs). Given that

The only formal dermatology training for many health care professionals will be provided during medical school

**Table 3. Post objective structured clinical examination (OSCE) psychometric reliability and quality analysis**

Station	Corrected item – total correlation	Cronbach's alpha (if item deleted)	Passing % score	$R^2$	Number of failing students
• Interpretation of a Clinical Observation Chart	0.256	0.559	58.82	0.63	16
• Observation of a Psychiatric video with a patient describing auditory hallucinations	0.079	0.598	56.75	0.67	17
• Review of a chest X-ray with free air under the diaphragm	0.517	0.501	61.36	0.73	11
• Review of a hip X-ray with a fractured neck of femur	0.336	0.539	54.93	0.53	14
• Prescription for analgesia in a patient with knee osteoarthritis	0.171	0.578	66.94	0.58	23
• Discharge planning for a stroke patient	0.315	0.544	55.41	0.68	11
• Interview with a patient who has an eating disorder	0.213	0.568	54.94	0.45	16
• Assessment of a skin mole	0.264	0.560	63.01	0.66	16
• Review of a patient who has post-chemotherapy sepsis	0.165	0.581	58.74	0.48	27
• BP measurement and cardiovascular risk assessment	0.176	0.584	56.16	0.68	22
• Discussion with a patient about antidepressant treatment	0.363	0.535	50.44	0.56	18

the only formal dermatology training for many health care professionals will be provided during medical school, and the increasing incidence of cutaneous malignancies, it is important that high-quality clinical skill training occurs at undergraduate level; however, not all students will encounter a patient with a melanoma, as our results have shown.

Given the visual nature of dermatology, photographs are often used to teach students how to recognise different skin lesions; however, in practice there are many other skills that practitioners call upon during patient interactions, including clinical reasoning, pattern recognition and communication skills. In dermatology OSCEs using photographs it can also appear that candidates are going through the 'motions' of the checklist OSCE

scoring system, rather than demonstrating how they would react in a real clinical situation. Thus enhancing authenticity is of utmost importance when assessing clinical competency.<sup>1</sup> This will depend not only on the explicit cues at the focus of the clinical scenario, but also on the implicit sensory and emotional cues (e.g. the patient looking concerned). The TTTs represented an excellent adjunct in assessing candidates' dermatological skills in an OSCE.

The main strength of this study is that it assesses a concept that is easily reproducible, inexpensive and applicable to any medical school that use OSCEs in student assessment. Limitations include the questionnaire, as it has not been validated by prior research. Additionally, although we achieved an excellent response rate our results may not be generalisable to all medical schools.

Furthermore, only flat skin lesions can be recreated by this technique.

In conclusion, such tattoo technology can help facilitate a dermatology OSCE station encounter that is closer to a real patient experience. Transfer tattoos of skin lesions, in combination with trained SPs, can provide an authentic, standardised, valid and reliable assessment experience for candidates. They can enable the assessment of integrated clinical skills, including the more humanistic aspects of the dermatology patient encounter. Furthermore, given the durability and low cost of the tattoos, they are very well suited to an OSCE framework.

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