

Can relaxation exercises improve students' OSCE grades: a prospective study

Les exercices de relaxation peuvent-ils améliorer les notes des étudiants aux ECOS : étude prospective

Damien Massalou,¹ Jérôme Doyen,² Fabien Almairac,³ Pierre-Simon Rohrlich,⁴ Jean-Paul Fournier,⁵ Clair Vandersteen,⁶ Nirvana Sadaghianloo⁷

¹Digestive surgery, Centre Hospitalier Universitaire de Nice, Université Côte d'Azur, Nice, France; ²Department of Radiation Oncology, Centre Antoine-Lacassagne, University of Côte d'Azur, France; ³Neurosurgery department, Centre Hospitalier Universitaire de Nice, Université Côte d'Azur, France; ⁴Department of Pediatric Hemato-Oncology, Centre Hospitalier Universitaire de Nice, Université Côte d'Azur, Nice, France; ⁵Emergency Department, Centre Hospitalier Universitaire de Nice, Université Côte d'Azur, Nice, France; ⁶Institut Universitaire de la Face et du Cou, Centre Hospitalier Universitaire, Université Côte d'Azur, Nice, France; ⁷Department of Vascular Surgery, Centre Hospitalier Universitaire de Nice, Université Côte d'Azur, Nice, France. Correspondence to: Dr Damien Massalou, Chirurgie Générale d'Urgence, Hôpital Pasteur 2, 30 voie romaine, 06000 Nice, France; phone: +33 663269264 and +33 492038614; secretary: +33 492033313; fax: +33 492033390; email: damienmassalou@gmail.com and massalou.d@chu-nice.fr

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Abstract

Introduction: OSCE (Objective Structured Clinical Examination) are a means of assessing health profession students. However, they are a source of stress or anxiety for students. The aim of our study was to improve medical students' performance during OSCEs by using human performance optimization techniques (HPOT).

Methods: Naïve students for OSCE were divided into blocks of five, randomized to HPOT and control groups. Before starting their OSCE circuit, HPOT blocks underwent a 30-minute preparation session. Anxiety was assessed before and after the OSCE using a Visual Analogic Scale (VAS).

Results: We randomized and assigned 206 students to 41 blocks of which 20 were HPOT and 21 were control. Anxiety before the exam was significantly reduced thanks to the HPOT procedure with a median value of six and four on the VAS respectively before and after the relaxation session ($p = 0.001$). The final exam score was not associated with pre-OSCE anxiety ($p = 0.5$). The HPOT procedure did not improve the final score ($p = 0.4$). Interestingly, the final score was inversely correlated with the final median anxiety VAS reading after the exam ($p = 0.01$): students with the lowest anxiety VAS achieved better scores.

Conclusion: Relaxation, conscious breathing, and positive reinforcement methods reduced students' anxiety prior to their OSCE; however, these techniques did not improve their scores.

Résumé

Introduction : Les ECOS (examens cliniques objectifs structurés) sont un moyen d'évaluer les étudiants des professions de santé. Cependant, ils sont une source de stress ou d'anxiété pour les étudiants. L'objectif de notre étude était d'améliorer les performances des étudiants en médecine pendant les ECOS en utilisant des techniques d'optimisation du potentiel (TOP).

Méthodes : Des étudiants sans expérience des ECOS ont été répartis en blocs de cinq, au hasard entre un groupe soumis à des TOP et un groupe contrôle. Avant de commencer leur circuit d'ECOS, les étudiants des blocs TOP ont suivi une séance de préparation de 30 minutes. L'anxiété a été évaluée avant et après l'ECOS à l'aide d'une échelle visuelle analogique (EVA).

Résultats : Nous avons réparti aléatoirement 206 étudiants dans 41 blocs, dont 20 blocs TOP et 21 blocs contrôle. L'anxiété avant l'examen a été significativement réduite grâce aux TOP, avec une valeur médiane de six et quatre sur l'EVA respectivement avant et après la séance de relaxation ($p = 0,001$). Le résultat final de l'examen n'était pas associé à l'anxiété avant l'examen ($p = 0,5$). La procédure TOP n'a pas amélioré le score final ($p = 0,4$). Il est intéressant de noter que le score final était inversement corrélé au niveau médian de l'EVA après l'examen ($p = 0,01$) : les étudiants dont l'EVA était la plus basse ont obtenu de meilleurs scores.

Conclusion : La relaxation, la respiration consciente et les méthodes de renforcement positif ont réduit l'anxiété des étudiants avant leur ECOS; cependant, ces techniques n'ont pas amélioré leurs résultats.

Introduction

OSCE (Objective Structured Clinical Examination) stations are one of the assessment formats used in health professions training. OSCE stations simulate real-life clinical situations, grading students' medical knowledge but also their ability to communicate and empathize.¹ Despite their usefulness, OSCEs induce more stress and anxiety among students,²⁻⁴ than other academic assessment formats.⁵ Stress management techniques could improve students' scores during OSCE stations² even though conflicting results have been reported.^{3,6} Deep, slow breathing exercises could also have a positive effect on grades.⁴

The French Army developed Human Performance Optimization Techniques (HPOT) to prepare aviators, members of certain special military units, and high-level athletes to increase their tactical capabilities and improve their recovery. HPOT focuses on three major objectives: dynamization, arousal regulation and recovery. Procedures include breathing, relaxation, mental imaging and internal dialogue.⁷ HPOT has been adapted for healthcare professionals.^{5,8} In a randomized study of high-fidelity simulations, anaesthesia residents showed enhanced performance and a 17% decreased level of stress decreased.⁸

To our knowledge, the benefits of HPOTs when completing OSCE stations have never been evaluated. The primary objective of the present study was to improve medical students' performance during OSCEs using human potential optimizing techniques. A secondary objective was to reduce students' anxiety during their OSCE stations.

Methods

This was a single-centre, prospective study conducted in Nice Université Côte d'Azur medical school, during OSCE stations completed in November 2021. The work was carried out in accordance with the Declaration of Helsinki, including the anonymity of participants has been guaranteed and the informed consent of participants has been obtained.

The medical school had 205 fourth-year students work in groups of 10. They were then allocated to five OSCE station circuits; two circuits took place in parallel covering the same OSCE stations. OSCE station scenarios were then switched once per half-day: there were four rotations of five stations a day, over two days (Figure 1).

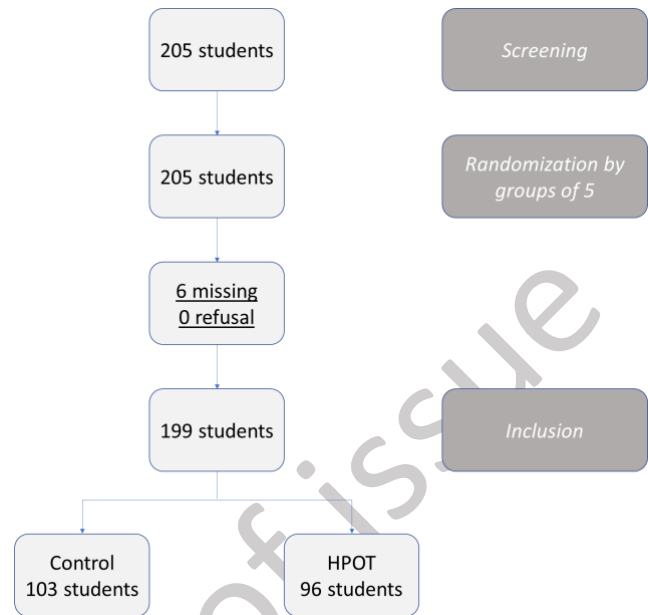


Figure 1. Flowchart of the study

HPOT: Human Performance Optimization Techniques

The 5-station circuits were homogeneous for all groups with one procedural station, two interrogation stations, one physical examination station, and one non-patient data analysis station. In assigning points to students, the faculty had a binary choice of 0-1 for assigning technical skill points. The allocation of points for non-technical skills were allocated according to a Likert scale of 1-6. Some non-technical skills were specific to the type of OSCE station proposed; the non-technical skills used are between two and five per station. There are 13 non-technical skills that can be used, as defined by the national OSCE organising group (available for French medical teachers' OSCE certification and OSCE vademecum on www.uness.fr). For each station, the non-technical skills are chosen from these 13 skills, depending on the type of station. The number of non-technical skills could therefore be slightly different between certain OSCE circuits.

Students were naïve to OSCEs as an assessment modality and to practised HPOT. We randomized students to HPOT and control groups, with a 1:1 ratio. We conducted the study single-blinded, as the evaluating teachers were not informed of the randomization.

Students randomized to the HPOT group learned performance optimization techniques for 30 minutes before starting their five OSCE station circuit. Training included an educational briefing, an imaginary sensory walk (five minutes), mental pre-activation (five minutes), normal, and then relaxing breathing exercises (one minute of normal abdominal breathing followed by three minutes

of relaxing breathing—a cardiac coherence exercise) as well as learning the exercises that students should do between each station (breathing and positive reinforcement).

Between each OSCE station, students were asked to take a series of slow, deep breaths, coupled with positive reinforcement using success, positive memories or well-being situations they encountered. At the end of the circuit, students in the HPOT group used recovery techniques: relaxing breathing exercises (one minute) and a one-minute mental relaxation time. A short debriefing session followed each OSCE circuit, regardless of the randomization group.

We assessed all students' levels of anxiety using a visual analog scale (VAS) before and after their five OSCE station circuit, from 0 (no anxiety) to 10 (maximal anxiety).⁹ We selected the VAS to assess anxiety because it has already been validated as a simple, reproducible tool for assessing anxiety in patients and students.^{10,11} We compared students' grades for both blocks, as well as their level of stress (with the VAS), by block and not by circuit, because the number of students was too small for a comparison between OSCE circuits. Our hospital's Ethics Committee (Espace Ethique Azuréen, CHU de Nice) approved the study.

Statistical analysis

We performed statistical comparisons using Chi-square tests for categorical data. We used the Mann-Whitney U test, ANOVA and Spearman's rank coefficient for continuous variables. We selected the Mann-Whitney test instead of the t-test because variables were not normally distributed. It is also less sensitive to the presence of outliers.¹²

We based cut-offs using the variables' median value. We used linear regression to assess the independency of factors that were significantly correlated in the univariate analysis. We used p -value < 0.05 for statistical significance. All statistical analyses were two-sided and performed using the Statistical Package for the Social Sciences (SPSS®) version 21.0.

Results

Student Characteristics

Students were randomized and allocated to 41 groups of 5: 20 HPOT groups and 21 control groups. The class size was 205 students. The hospital ethic board has been advised and gave an oral consent. Two hundred and five students were invited: six were absent and 199 completed their five

OSCE station circuit. None of them dropped out of the circuit. All the students signed written consents; they had the opportunity to refuse but none of them declined this study. Thus, 103 students were included in the control groups and 96 in the HPOT groups. There were 120 female, and 76 male students included. Students' distribution by group, their grades and level of anxiety are shown in Table 1. There was a similar proportion of women in the HPOT and the control groups (64.6% versus 60.2%, respectively, $p = 0.5$, Chi-square test).

Table 1. Descriptive data of the students and according to control or HPOT group

	Global	Control group	HPOT group	p-value
Number of participants	199	103	96	
Score (/20)	11.16 [6 ;14]	11.1 [8 ;14]	11.1 [6 ;14]	0.7
Initial anxiety VAS (/10)	6.01 [1 ;10]	6.21 [1 ;10]	5.8 [1 ;10]	0.19
Anxiety VAS after HPOT (/10)	NA	NA	4.53 [1 ;10]	0.001 *
Anxiety VAS after OSCEs (/10)	3.01 [0 ;10]	3.11 [1 ;10]	2.9 [0 ;10]	0.9
Results given as median				
* by comparing before and after HPOT				
OSCE: Objective Structured Clinical Examination				
VAS: Visual Analogic Scale				
HPOT: Human Performance Optimization Techniques				

Predictive factors of anxiety

Women presented with a higher degree of anxiety before the exam with a median Visual Analog Scale (VAS) of 7 (on ten) [IQR 1;10] in the women's group *versus* a median score of 5 on 10 [IQR 1;10] in the men's group, $p = 0.001$, Mann-Whitney U test) but anxiety did not differ between genders after the exam (median VAS of 2 [0;10] in both groups, $p = 0.3$, Mann-Whitney U test).

Pre-exam anxiety decreased significantly for students in the HPOT procedure group, with a median VAS of 6 [IQR 1;10] before relaxation *versus* 4 [IQR 1;10] after relaxation ($p = 0.001$, Mann-Whitney U test). This effect was observed both for women (median VAS of 6 [IQR 1;10] *versus* 5 [IQR 1;10], $p < 0.001$, Mann-Whitney test) and men (median VAS of 5 [2;8] *versus* 3.5 [1;8], $p = 0.006$, Mann-Whitney test). Anxiety after the exam was not correlated with exposure to a HPOT procedure (median VAS of 2 [0;10] for both groups, $p = 0.9$, Mann-Whitney U test).

Predictive factors of final exam score

The final score of the exam was not correlated with the initial anxiety VAS (Spearman coefficient of -0.05, $p = 0.5$). Nor did the HPOT procedure significantly improve the final score (Spearman's rank coefficient of -0.05 between VAS

after relaxation and final score, $p = 0.4$; median score of 11/20 in the control group, *versus* 11/20 in the HPOT group, $p = 0.7$, Mann-Whitney U test). Interestingly, the final score was inversely correlated with the final anxiety VAS, measured after the exam (Spearman's rank coefficient of -0.18 , $p = 0.01$): students with the lowest anxiety VAS post-OSCE had greater success rates on their final OSCE. There was no link between the median final exam score and gender (median of 10[7;15] in the men's group, *versus* 11[8;14] in the women's group, $p = 0.2$, Mann-Whitney test).

The multivariate analysis indicated post-exam anxiety VAS to be the only predictive factor for exam score ($B = -0.1$ [95%CI: -0.178 ; -0.023], $p = 0.01$, linear regression). For this analysis, we included factors with $p > 0.1$: post-exam VAS and gender.

Forty students responded to the survey (40/205, 20%). Sixty percent of the respondents were happy that their anxiety was taken into account. Ninety percent of students were pleased or very pleased to have been allocated to a HPOT group, while, conversely, 94.7% in the control group were disappointed not to have received the HPOT preparation. The HPOT were considered useful by 56.4% of students, and 76.5% felt that the HPOT had helped them to improve their grades. Only 36.9% stated that HPOT reduced their level of anxiety, while 61.5% wished to continue using HPOTs for the following OSCE sessions (30% did not reply). Fifty-six percent would like to receive more in-depth training for HPOT (23% were undecided).

Comparison with the year's grades

There was a positive correlation (Spearman rho = 0.443, $p < .001$) between the OSCE score and the yearly average score: the better the yearly average score, the better the average OSCE score. However, the R2 coefficient is low with $R^2=0.136$.

Discussion

Our study showed that the use of a 30-minute HPOT prior to OSCE significantly decreased anxiety in students but did not improve their grade. It is possible that the relaxation before did not affect the performance, but the performance affected their level of stress. Since this is a correlation, it could be that exam scores predict anxiety through personal perceptions of success and that brilliant OSCE students are less anxious because they are more confident.

We chose to use the HPOT method because it was previously validated with medical residents performing

technical and stressful procedures.^{13,14} Another advantage, HPOTs correspond to several techniques derived from meditation, deep relaxation and hypnosis programs, so we could use some of them in the limited amount of time before OSCE, and we could expect results with minimal training. We could not use the full HPOT program, however, which may explain why we could not show improved students' grades in this study.

Our results highlight the ability of the HPOTs to reduce anxiety before beginning the exam. At the end of the exam there were also no differences between the HPOT and control groups, with a very low median VAS of two [0;10] for both groups. Failure of HPOT to reduce post-exam anxiety might be related to this very low VAS.

High levels of stress lead to lower grades. A study of biology students showed that those with the highest "academic" anxiety were those who gave themselves the worst marks. Anxiety above 4/10 was the threshold at which students self-assessed their performance as inadequate, and were at risk of dropping out of the program.¹⁵

For Longyshore, efforts to assist students in OSCE performance should focus on other means than reducing associated anxiety.¹⁶ For example, completing emergency training courses has increased scores in OSCEs or exams.¹⁷

The results of the questionnaire, despite a low response rate (20% of students included in the study), clearly indicate that students are liked and want more HPOT training.

Limitations

Although similar, the OSCE circuits were not identical among groups. It was not possible for the HPOT and control groups to be simultaneously present at the same stations. The type of circuit was shown to significantly modify students' grades (p -value < 0.001). This may have introduced a methodological bias, which complicates the assessment of the benefits of HPOT for students.

Debriefing immediately following relaxation exercises improves students' recall at three months.¹³ However, because groups were examined in quick succession, it was not possible to hold a proper debriefing session with the students following their circuit. A debriefing session, focusing on specific knowledge and skills, took place during a videoconference one week after the exam; the impact of this debriefing method was not evaluated in this study.

Conclusion

OSCEs are a highly effective assessment modality but they generate a significant level of stress among students. Relaxation, breathing and positive reinforcement exercises, reduced students' anxiety prior to OSCEs; however, we could not show that these selected techniques reduce students' anxiety following OSCEs nor improve their grades.

Conflicts of Interest: Authors declare no competing interests.

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