

ORIGINAL RESEARCH

Level of satisfaction and correlation between the performance and self-evaluation of physical therapy students in the objective structured clinical examination (OSCE) when using physical agents

Nivel de satisfacción y correlación entre el desempeño y la autoevaluación de los estudiantes de fisioterapia en el examen clínico objetivo estructurado (ECO) al utilizar agentes físicos

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Abstract

Introduction: Objective structured clinical examination (OSCE) is a validated instrument that allows measuring clinical skills in health sciences students; thus, it is important to know the students' level of satisfaction with this strategy, as well as the correlation between performance and self-evaluation.

Objectives: To determine the correlation between the performance and self-evaluation (perceived performance) of Chilean physical therapy students in an OSCE designed to assess their clinical skills when using physical agents, and to assess their level of satisfaction with it.

Materials and methods: Cross-sectional study conducted in 111 physical therapy students who participated in an OSCE consisting of seven stations. Performance checklists were used at each station (passing score: 70% of the maximum score per station) and students were administered 2 perception surveys for self-evaluation purposes and for determining their level of satisfaction with the OSCE. The Spearman Rho test was performed to determine the correlation between station scores and the students' self-evaluation (significance level of $p < 0.05$).

Results: Median scores higher than the passing score were observed in 5 stations (S1=66, IQR: 52-70; S2=55, IQR: 45-60; S3=60, IQR: 50-69; S4=65, IQR: 55-73; S7=40, IQR: 33-45), except for the strengthening and parameter interpretation stations (S5=54, IQR: 46-65; S6=10, IQR: 9-13). A positive significant correlation was found between the OSCE scores and the students' self-evaluation in five stations (S3: $p=0.042$; S4: $p<0.0001$; S5: $p=0.000$; S6: $p=0.000$; S7: $p<0.0001$). The students' level of satisfaction with the OSCE was high, with 89.18% of them stating they agreed with how it was organized.

Conclusion: The OSCE allowed the evaluation of the participants' clinical skills when using physical agents. Also, their performance in the OSCE was consistent with their self-evaluation, which proves the usefulness of the instrument. The students' high level of satisfaction with this methodology supports its use, since they acknowledge both its contribution and the importance of using similar tools to improve their training.

Resumen

Introducción. La evaluación clínica objetiva estructurada (ECO) es un instrumento validado que permite medir las habilidades clínicas de los estudiantes de ciencias de la salud, por lo que es importante conocer su nivel de satisfacción con esta estrategia, así como la correlación entre desempeño y autoevaluación.

Objetivos. Determinar la correlación entre el desempeño y la autoevaluación (desempeño percibido) de estudiantes chilenos de fisioterapia en una ECOE diseñada para evaluar sus habilidades clínicas a la hora de usar agentes físicos, y evaluar su nivel de satisfacción con esta herramienta.

Materiales y métodos. Estudio transversal realizado en 111 estudiantes de fisioterapia que participaron en una ECOE de 7 estaciones. Se utilizaron listas de verificación de desempeño en las estaciones (nota aprobatoria: 70% de la nota máxima por estación) y 2 encuestas de percepción para la autoevaluación y determinar el nivel de satisfacción de los estudiantes con la ECOE. Se realizó la prueba de Rho de Spearman para determinar la correlación entre los puntajes por estación y la autoevaluación (nivel de significancia $p < 0.05$).

Resultados. Se observaron medianas de puntajes superiores al aprobatorio en 5 estaciones (E1=66, RIC: 52-70; E2=55, RIC: 45-60; E3=60, RIC: 50-69; E4=65, RIC: 55-73; E7=40, RIC: 33-45), pero no en las estaciones de fortalecimiento e interpretación de parámetros (E5=54, RIC: 46-65; E6=10, RIC: 9-13). Se observó una correlación positiva y significativa entre los puntajes de la ECOE y la autoevaluación en cinco estaciones (E3: $p=0.042$; E4: $p<0.0001$; E5: $p=0.000$; E6: $p=0.000$; E7: $p<0.0001$). El nivel de satisfacción con la ECOE fue alto, con un 89.18% de aprobación respecto a cómo fue organizada.

Conclusión. La ECOE permitió evaluar las habilidades clínicas de los participantes al usar agentes físicos, siendo sus puntajes consistentes con la autoevaluación, lo que demuestra la utilidad del instrumento. El alto nivel de satisfacción con esta metodología da soporte a su uso, ya que los estudiantes reconocen su aporte y la importancia de usar herramientas similares para mejorar su formación.



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Introduction

The training of health professionals involves teaching and evaluation methods that facilitate the assessment of their knowledge, skills, and attitudes, all of which are collectively referred to as professional skills to solve problems that are inherent to their professions in specific contexts.¹⁻⁵

Education in physical therapy programs is aimed at the development and acquisition of learning outcomes (LO), defined as the knowledge and actions students must master at the end of a learning period, which requires the use of teaching methods focused on the students' learning needs regarding their professional practice.⁶⁻⁸

LOs comprise the knowledge, skills, and attitudes that students must acquire and develop in a given learning period and in accordance with certain conditions and evaluation criteria established in the academic program.⁹⁻¹⁶

In the field of physical therapy, physical agents are defined as therapeutic resources that are commonly used in rehabilitation processes. They are often used to relieve pain, reduce edema, treat muscle tone alterations, promote tissue repair and muscle strength augmentation, or to increase the effectiveness of other interventions aimed at solving mobility problems and promoting functional rehabilitation. These resources are based on the use of electromagnetic, acoustic, and mechanical energies to produce biophysical changes in cells and tissues that will lead, ultimately, to physiological and clinical changes in the patient.¹⁷⁻¹⁹ Adequate use of physical agents is a requirement that undergraduate physical therapy students must meet during their training, as it is a key component of physical therapy programs.^{20,21}

Physical therapists are required to properly use these resources to prevent the occurrence of adverse effects in patients. This implies not only their training in using physical agents, but also appropriate assessment of these professional skills,²²⁻²³ which is why the development of teaching and evaluation strategies that allow assessing physical therapy students' skills and clinical reasoning capacity when selecting and using physical agents is required.²⁰⁻²³

Objective Structured Clinical Examination (OSCE) is regarded as a valid methodology to assess clinical skills in health sciences students. An OSCE is comprised of several evaluation strategies implemented throughout a circuit of stations that simulate clinical scenarios.²⁴⁻²⁷ Therefore, it is recognized as a multipurpose and versatile tool that can be used to assess, with uniform criteria, a wide array of clinical skills in different health sciences students in specific clinical contexts; likewise, it is a useful instrument to provide feedback, foster reflection, and improve the development of skills during the training of future health professionals.²⁸⁻³² Since OSCE is an efficient tool to provide feedback to students and facilitate the improvement of their clinical skills and reasoning to apply an intervention, it allows them to reflect on and assess the quality of their performance in each of the OSCE stations and identify the aspects to be improved. This is of great importance, for the assessment of one's own skills may enhance one's performance in future professional practice.^{33,34}

However, there is a double challenge that must be addressed: 1) having a well-designed OSCE that makes it possible to assess clinical skills and provide students with feedback on their performance, and 2) making sure that the observed (objective) performance is in line with the performance perceived by the students (subjective). Objective performance in a test such as OSCE must be positively correlated with the performance perceived by students, for it will facilitate the identification of strengths and aspects to improve, and it will promote self-reflection on their acquisition of clinical skills. This will result in the enhancement of the teaching-learning process through effective feedback.³⁵⁻⁴⁰ Another relevant aspect of OSCE is the students' level of satisfaction with the instrument, as it

provides feedback on its design, usefulness and efficacy to assess their skills during their professional training.^{29,39}

Taking this into account, the objectives of this study were to determine the correlation between the performance and self-evaluation (perceived performance) of Chilean physical therapy students in an OSCE designed to assess their clinical skills when using physical agents, and to assess their level of satisfaction with it.

Materials and methods

Type of study

Non-experimental, descriptive, cross-sectional study.

Study population and sample

The study population consisted of 114 physical therapy students who were enrolled in the physical agents course in the first academic semester of 2019, which is regularly taught during the seventh semester of the Physical Therapy program offered by the Universidad Andres Bello, Santiago campus (Santiago, Chile). Students who did not participate in the OSCE, those who did not complete all the stations, those who did not fully complete both the performance self-evaluation and the level of satisfaction with the OSCE surveys, and those who did not provided their consent, through a written consent form, to use their data, were excluded; thus, the sample consisted of 111 students.

Instruments

OSCE

The OSCE consisted of seven stations that were designed to assess the LOs of the physical agents course, namely: 1) to analyze and understand the physical and physiological effects of using non-ionizing physical agents; 2) to know different non-ionizing physical agents modalities and know when to use them, based on the therapeutic objective, in several health care provision contexts to address impairments and functional limitations caused by several health conditions, and 3) to know how to assess the level of impairment and/or functional limitation caused by various health conditions, as well as the relevance of using non-ionizing physical agents to address such impairment and/or functional limitation.

Out of the seven stations, five involved working with a standardized patient, also known as a “standardized patient” station (S1-S5), one was a mailbox station (S6), and in one (S7) a dummy was used; besides, a rest station was set up between S4 and S5. In each station, students were evaluated as follows: in S1, S2, S3, S4, S5, and S7 they were assessed by observers using checklists, while in S6 they were evaluated through an answer sheet they had to put in a mailbox; these checklist and answer sheet included several criteria grouped into three domains: attitudes, knowledge, and clinical skills. It is worth noting that checklists were numbered and kept by the lead researcher in order to preserve the students’ anonymity. In addition, each student was given eight minutes to complete each station (i.e., a total test time of 64 minutes) and in order to assess the achievement of the LOs, a passing score of 70% of the maximum score in each station was established. The main characteristics of the seven stations included in the OSCE are described in Table 1.

Table 1. Main characteristics of the stations included in the objective structured clinical examination.

Station	Station name	Learning outcome *	Station type	Clinical skill and/or action to be evaluated	Total score
S1	Connective tissue flexibility	LO 1 LO 2 LO 3	Standardized patient	To use ultrasound to make connective tissue more flexible	0-74
S2	Muscle relaxation	LO 1 LO 2 LO 3	Standardized patient	To identify contraindications for the use short-wave diathermy to induce muscle relaxation	0-64
S3	Analgesia	LO 1 LO 2 LO 3	Standardized patient	To use biphasic pulsed current (TENS) properly to induce analgesia.	0-80
S4	Drainage	LO 1 LO 2 LO 3	Standardized patient	To demonstrate knowledge on the proper use of biphasic pulsed current (NMES) for edema drainage purposes.	0-80
S5	Muscle strengthening	LO 1 LO 2 LO 3	Standardized patient	To adequately perform electric muscle strengthening to increase muscle trophism	0-80
S6	Parameter interpretation	LO 1 LO 2 LO 3	Mailbox	To describe the intervention-energy model	0-18
S7	Equipment installation	LO 1 LO 2	Dummy	To install electrotherapy equipment safely	0-53

LO: Learning outcome; NMES: Neuromuscular electrical stimulation; TENS: Transcutaneous electrical nerve stimulation.

* Learning outcomes of the Physical Agents course.

Source: Own elaboration.

Self-evaluation and satisfaction surveys

Immediately after finishing the OSCE, students were asked to complete two surveys in order to obtain data about their perception on their performance in the test (self-evaluation) and about their level of satisfaction with it. In the performance self-evaluation survey, a 1 to 5 Likert scale was used to establish the perceived performance of students in each station (1=very poor, 2=poor, 3=fair, 4=good, and 5=very good). On the other hand, the satisfaction survey consisted of 5 questions about, among others, the general structure and usefulness of the OSCE, as well as the appropriateness of the stations; similarly, a 1 to 5 Likert scale was used in each question to determine the students' level of satisfaction with the OSCE (1=strongly disagree, 2=disagree, 3=neither agree nor disagree, 4=agree and 5=strongly agree).^{40,41}

Statistical analysis

All statistical analyses were performed using the STATA software (version 16.0). Scores obtained in each station were analyzed using the Shapiro-Wilk normality test to determine their distribution and, therefore, the statistical procedures and descriptive statistics to be used.⁴² Qualitative variables (results of the self-evaluation and level of satisfaction surveys) are described using absolute frequencies and percentages, while quantitative variables (scores obtained in each station) are described using medians and interquartile ranges (IQR=P25-P75).

Finally, the Spearman's Rho test was performed to determine the correlation between the scores obtained in the stations and the students' self-evaluation of their performance (perceived performance) in each station (significance level of $p < 0.05$).

Ethical considerations

Compliance with the ethical principles for conducting biomedical research involving human subjects established by the Declaration of Helsinki⁴³ was verified by the Bioethics Committee of the Rehabilitation Sciences Faculty of the Universidad Andres Bello, as stated in Certificate A161, issued on June 3, 2019. In addition, all participants signed an informed consent form prior to their enrollment in the study.

Results

The scores obtained by students in the OSCE showed a non-normal distribution at stations S1, S2, S3, S4, S6, and S7 (Table 2). Except for stations S5 and S6, median scores were above the passing score. In addition, in stations S1, S2 and S4, the scores of the 25th percentile (P_{25}) were equal or greater than the passing score, that is, more than 75% of students had a passing score in said stations (S1=77.19%; S2=83.33%; S4=79.82%).

Table 2. Scores in the seven stations of the objective structured clinical examination.

Station	Station name	p-value	Median score	(P25-P75)	Minimal score	Maximum score	Total score
S1	Connective tissue flexibility	0.000 *	66	(52-70)	10	74	0-74
S2	Muscle relaxation	0.000 *	55	(45-60)	21	64	0-64
S3	Analgesia	0.011 *	60	(50-69)	21	80	0-80
S4	Drainage	0.006 *	65	(55-73)	35	80	0-80
S5	Muscle strengthening	0.010	54	(46-65)	12	80	0-80
S6	Parameter interpretation	0.037 *	10	(9-13)	1	18	0-18
S7	Electrotherapy equipment installation	0.000 *	40	(33-45)	0	53	0-53

* $p < 0.05$; normality analysis performed with the Shapiro-Wilk test.

Source: Own elaboration.

In addition, in spite that the score of the p_{25} was below the passing score in stations S3 and S7, median scores in said stations show that the passing rate was above 50% (S3=62.28%; S7=69.30%). The lowest performance was observed in stations S5 and S6, where scores of the p_{25} and the p_{50} were below the passing score, which is consistent with a passing rate below 50% in both stations (S5=48.25%; S6=34.20%). The highest passing rate was observed in the muscle relaxation station (S2=85.51%), while the lowest was observed in the parameter interpretation station (S6). The overall passing rate in the OSCE, that is, the sum of scores obtained in all stations, was 88.40%.

Regarding the results of the self-evaluation survey, a high proportion of students perceived their performance as good (“good” and “very good” responses) at stations S1, S2, S3, and S4 (S1=62.15%, S2=64.85%, S3=62.16%, and S4=57.66%). On the contrary, in stations S5, S6, S7 less than 50% perceived their performance as good (S5=20.73%, S6=44.13%, S7=43.25%) (Table 3).

Table 3. Self-evaluation of the performance in each station of the objective structured clinical examination.

Station	Very poor n (%)	Poor n (%)	Fair n (%)	Good n (%)	Very good n (%)
S1	3 (2.70)	13 (11.71)	26 (23.42)	44 (39.63)	25 (22.52)
S2	9 (8.10)	11 (10.00)	19 (17.11)	40 (36.03)	32 (28.82)
S3	1 (0.90)	11 (9.91)	30 (27.03)	48 (43.24)	21 (18.92)
S4	3 (2.70)	14 (12.61)	30 (27.03)	34 (30.63)	30 (27.03)
S5	8 (7.21)	40 (36.04)	40 (36.04)	17 (15.32)	6 (5.41)
S6	1 (0.90)	17 (15.31)	44 (39.63)	33 (29.72)	16 (14.41)
S7	10 (9.01)	13 (11.71)	40 (36.04)	31 (27.93)	17 (15.32)

Source: Own elaboration.

Finally, after performing the Spearman's Rho test, a statistically significant positive correlation was found between the students' perceived performance and the scores obtained in the following stations: S3, S4, S5, S6, and S7 (Table 4).

Table 4. Correlation between the median scores obtained in the stations of the objective structured clinical examination and the students' perceived performance in each station.

	S1 SE	S2 SE	S3 SE	S4 SE	S5 SE	S6 SE	S7 SE
S1 score	0.11 111 0.268						
S2 score		0.15 111 0.121					
S3 score			0.19 111 0.042 *				
S4 score				0.56 111 0.000 *			
S5 score					0.36 111 0.000 *		
S6 score						0.36 111 0.000 *	
S7 score							0.47 111 0.000 *

SE: Self-evaluation.

* $p < 0.05$ (Spearman's Rho).

Source: Own elaboration.

Regarding the level of satisfaction with the OSCE, it was found that most students reported a high level of satisfaction with it, as most of them chose agreed or strongly agreed in all five questions: Q1: 89.18%, Q2: 82.60%, Q3: 92.67%; Q4: 90.74%; Q5: 98.17% (Table 5).

Table 5. Students' level of satisfaction with the objective structured clinical examination.

Questions	Strongly disagree n (%)	Disagree n (%)	Neither agree nor disagree n (%)	Agree n (%)	Strongly agree n (%)
Q1. was the general organization of the OSCE organization adequate?	1 (0.90)	8 (7.20)	3 (2.70)	46 (41.44)	53 (47.74)
Q2. were the stations adequate for my current level of knowledge?	0 (0.00)	4 (3.60)	15 (13.51)	51 (45.94)	41 (36.94)
Q3. was the OSCE useful for my training as a physical therapist?	0 (0.00)	4 (3.60)	4 (3.60)	31 (27.93)	72 (64.86)
Q4. will taking similar tests improve my training?	0 (0.00)	4 (3.60)	6 (5.41)	32 (28.83)	68 (61.26)
Q5. is it relevant to take tests that allow assessing my clinical skills?	0 (0.00)	0 (0.00)	2 (1.80)	26 (23.42)	83 (74.77)

Source: Own elaboration.

Discussion

The training of health professionals is not only aimed at acquiring knowledge, but also at acquiring and developing skills that will allow them to solve clinical problems.^{17,44,45} In the case of physical therapy students, the learning and development of skills related to the planning and implementation of therapeutic and rehabilitation interventions must be emphasized, since such interventions require physical therapists to constantly interact with patients and, based on said interaction, use several procedures and techniques, including physical agents, to generate changes in the health condition or conditions affecting the patient.²⁰

In this sense, defining which physical agents can be used and how to use them (e.g., their dosage) requires the development of clinical reasoning skills to assess their relevance and therapeutic benefits to treat a given health condition. Furthermore, some problems frequently observed when using physical agents in clinical practice involve their installation and configuration with pre-established parameters, especially in the case of electrotherapy resources.^{8,21} This is why implementing teaching strategies that include the development of clinical skills related to the use of physical agents in the training of physical therapy students is of great importance.²² OSCE is a multidimensional tool designed to assess the performance of health sciences students in specific clinical settings by testing their knowledge, attitudes, and their clinical reasoning and interpersonal communication skills. The use of this instrument for the training of other health professionals has already been validated.^{4,7,40,46,47} Likewise, students play a major role in this process, so obtaining information about their perceived performance and their levels of satisfaction with it is essential to carry out feedback processes.^{28-31,34,37,48}

The aims of this study were to determine the correlation between the performance and self-evaluation (perceived performance) of Chilean physical therapy students in an OSCE designed to assess their skills when using physical agents, and to assess their level of satisfaction with it.

Regarding the students' performance in the OSCE, a passing rate > 75% was observed in stations S1, S2, S3, and S4, which means a high performance in terms of the achievement of the LOs assessed in said stations. In the case of station S3, the p_{50} and p_{25} scores were greater than the passing score, however the passing rate in this station did not reach 70% (69.30%); therefore, it can be concluded that students had an average performance in S3. On the contrary, low passing rates were observed in stations S5 and S6 (48.25% and 34.21%), that is, a low performance.

Regarding the results of the self-evaluation survey, it was found that more than 60% of students perceived their performance as good or very good in stations S1, S2, S3,

and S4 (S1=62.15%; S2=64.85%; S3=62.16%; S4=57.66%); however, it should be noted that in stations S5, S6, and S7 less than 50% thought they had had a good or very good performance (S5=20.73%; S6=44.13%; S7=43.25%). Self-evaluation results (subjective performance) allow knowing the level of attainment of LOs that students believe they have achieved during the course. On the other hand, scores obtained in the OSCE (objective performance) show the LOs attained by the students and allow them to analyze their own performance in each station in terms of high, average or low performance, which facilitates their reflection on their ability to use in their professional practice what they have learned during their training.^{20,27,26,39}

Furthermore, a positive and significant correlation between the students' perceived performance (self-evaluation) and the actual scores obtained in the OSCE was found in 5 out of 7 stations (S3-S7). It should be noted that this correlation was observed in stations where students had both a high (S4) and a low performance (S5 and S6), which shows a high level of agreement between the students' real performance (as observed by the evaluators) and the students' perception of their own performance. Also, these findings allow the making of improvements to the training process, the implementation of self-reflection practices, and the generation of effective feedback for both students and instructors as reported by other studies.^{24,29,35}

Regarding the level of satisfaction with the OSCE, the majority of students reported having a high level of satisfaction with it, as more than 82% rated the instrument with positive qualitative criteria (agree and strongly agree) through all the five questions asked in the survey. In fact, most of them said the OSCE was well organized (89.18%) and that it was useful for their training process (92.79%).

Finally, considering the results reported here, we recommend to include more stations in the OSCE in order to reinforce those clinical skills where a lower performance was observed, as well as to enhance the development of such skills during the training process.^{47,49}

A limitation of the present study might be the number of stations used and the time established for the completion of the tasks of each station, which in future applications of the OSCE could be adjusted by increasing the number of stations or the time allotted per station, which will probably result in a better overall performance by students.^{50,51} However, it must be noted that this type of assessment requires a large amount of resources, including equipment, properly trained human resources, and support personnel.

Another limitation is that during the physical agents course students did not receive enough training with dummies and standardized patients. As the use of the OSCE was a first-time approach to this assessment modality in the course, it would have been ideal that students would have had more experience in performing these tasks in order to improve their confidence levels in the execution of every task included in the stations where the participation of standardized patients and/or the use of dummies was involved.

Conclusions

The OSCE is a useful instrument to assess both clinical skills and clinical reasoning in physical therapy students. Thus, implementing it as a final examination tool is essential to assess the achievement of LOs.

The overall passing rates and the positive significant correlation between the scores obtained by the students and their perceived performance observed in most of the stations included in the OSCE show that it is a useful tool for assessing the development clinical skills related to the use of physical agents. Also, said correlation means that the

tool allows students to identify their strengths and the aspects they need to improve, and provides them with an opportunity to reflect on their clinical skills acquisition process.

Finally, the fact that the majority of students reported a high level of satisfaction with this methodology supports its use in this context, since they acknowledge both its usefulness to assess the acquisition and development of their clinical skills and the importance of using similar tools to improve their training as physical therapists.

Also, future studies may include the assessment of the OSCE by instructors and standardized patients as part of the students' feedback process.

Conflicts of interests

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