



Psychometric assessment of the quality and satisfaction survey of clinical simulation and brief scale of perception of the quality of objective structured clinical examination in Chilean nursing students

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Proces prihvatanja/Article history

Datum prijema/Received: 16.04.2022.

Revidiran/ Received in revised form:

18.04.2022.

Prihvaćen/Accepted: 19.04.2022.

PSIHOMETRIJSKA PROCENA ISTRAŽIVANJA KVALITETA I ZADOVOLJSTVA KLINIČKE SIMULACIJE I KRATKE SKALE PERCEPCIJE O KVALITETU OBJEKTIVNO STRUKTURIRANIH KLINIČKIH ISPITIVANJA KOD STUDENATA SESTRINSTVA U ČILEU

SAŽETAK

Uvod: Obrazovanje medicinskih sestara uključuje različite metodologije nastave i učenja kako bi se postigao razvoj kompetencija medicinskih sestara. Klinička simulacija je strategija koja omogućava razvoj ovih alata i ugrađena je u nastavne planove i programe dodiplomske i postdiplomske obuke. U tom smislu, neophodna je široka evaluacija uvođenja ovih metodologija.

Cilj: Procena psihometrijskih svojstava istraživanja kvaliteta i zadovoljstva kliničke simulacije i kratka percepcija kvaliteta objektivnog strukturiranog kliničkog pregleda kod čileanskih studenata medicinskih sestara.

Metode: Studija poprečnog preseka sa anketom koja se sprovodi samostalno je primenjena na praktičnom uzorku od 96 čileanskih studenata medicinskih sestara. Kroz internu konzistentnost utvrđena je pouzdanost instrumenata. Valjanosti su utvrđene sadržajem i konstrukcijom. Da bi se uporedili srednje vrednosti, izvršene su jednosmerne analize varijanse sa post hoc Tukey HSD. Rezultati: Ispitivanje kvaliteta i zadovoljstva celokupne skale kliničke simulacije dalo je Cronbachovu alfu od 0,942, a korigovane korelacije stavka i ukupne vrednosti kretale su se od 0,356 do 0,817. Kratka skala percepcije kvaliteta objektivnog strukturiranog kliničkog pregleda celokupne skale dobija Cronbachovu alfu od 0,810, a korigovane korelacije stavka-ukupne su se kretale od 0,325 do 0,701. Nisu nađene značajne statističke razlike između grupa.

Zaključci: Ispitivanje kvaliteta i zadovoljstva kliničkom simulacijom i kratka skala percepcije kvaliteta objektivnog strukturiranog kliničkog pregleda pokazali su solidna psihometrijska svojstva za procenu percepcije kvaliteta i zadovoljstva kliničkom simulacijom i percepcije kvaliteta objektivno strukturiranog kliničkog pregleda, svaki. Oba u čileanskim studentima medicinskih sestara.

Ključne reči: simulaciona obuka, obrazovno merenje, obrazovanje medicinskih sestara, istraživanje obrazovanja sestara.

ABSTRACT

Introduction: Nursing education has been incorporating different teaching and learning methodologies to achieve the development of competencies for nurses. Clinical simulation is a strategy that allows the development of these tools and has been incorporated into the undergraduate and postgraduate training curricula. In this sense, a broad evaluation of the insertion of these methodologies is necessary.

Aim: To assess the psychometric properties of the quality and satisfaction survey of clinical simulation and brief scale perception of the quality of the objective structured clinical examination in Chilean nursing students.

Methods: A cross-sectional study with a self-administrated survey was applied in a convenience sample of 96 Chilean nursing students. Through internal consistence was determined the reliability of the instruments. Validities were established by content and construct. To compare the means, one-way analyses of variance with post hoc Tukey HSD were performed.

Results: The quality and satisfaction survey of clinical simulation entire scale obtained a Cronbach's alpha of 0.942, and the Corrected Item-Total Correlations ranged from 0.356 to 0.817. The brief scale of perception of the quality of objective structured clinical examination entire scale obtained a Cronbach's alpha of 0.810, and the Corrected Item-Total Correlations ranged from 0.325 to 0.701. No significant statistical differences between groups were found.

Conclusions: The quality and satisfaction survey of clinical simulation and brief scale of perception of the quality of objective structured clinical examination demonstrated sound psychometric properties for assessing the perception of the quality and satisfaction about clinical simulation and perception of the quality of objective structured clinical examination, each one. Both in Chilean nursing students.

Keywords (MeSH): Simulation Training, Educational Measurement, Nursing Education, Nursing Education Research.

INTRODUCTION

Clinical simulation is a tool for the development, assessment and certification of competencies that is under construction in undergraduate and postgraduate health sciences education in Chile. Because of this, the need has arisen to standardise and validate tools at all levels and in all contexts (1). This also includes the evaluation of the quality of simulation programmes, since there are no quality standards in Latin America and those proposed, mainly in Europe and the United States, have dissimilar criteria (2,3). Despite this context, there is a consensus (regional and international) that evaluation tools with validity and reliability should be used (4,5).

In this context, when considering the instructional design of clinical simulation plans and programmes, a course of action must be structured. There is a model that is recognised as an umbrella that helps us in this task. The ADDIE model includes five stages: analysis, design, development, implementation and evaluation (6).

Clinical simulation is embedded in all stages of instructional design, but there are key points that need to be assessed. In order to choose the relevant assessment tool, the skills that need to be developed must be taken into account. According to Miller (7) there are four stages (knowledge, competence, performance and action) in his framework (pyramid) in which the Objective Structured Clinical Examination (OSCE) is in the performance stage (shows how) is one of the strategies proposed for the evaluation of competences (4,8). OSCE has been described as an assessment tool based on the principles of objectivity and standardisation, allowing the assessment of performance in a simulated environment of candidates compared to scoring schemes by trained assessors and has been proposed as the most appropriate way to assess performance (shows how) (9). Likewise, the Association for Medical Education in Europe (AMEE) OSCE organisation and administration guidelines recommend inviting participants (candidates and examiners) to provide feedback on their examination experience as part of the quality assurance process (10).

Furthermore, when exploring nursing students' satisfaction with clinical simulation, it has been observed that there is evidence in three broad categories: student satisfaction/self-confidence with simulation, effectiveness of simulation in competency training and the impact of various simulation teaching strategies on the acquisition of nursing competencies. Fur-

thermore, evidence shows that students report that simulation is a teaching methodology that increases their knowledge, skills, patient safety and confidence levels in the delivery of care, which is reflected in performance and satisfaction (11).

Based on the above, it was proposed to evaluate the psychometric properties of two instruments that aim to assess the experience of clinical simulation and the quality of the implementation of an OSCE in undergraduate nursing students, for the evaluation of the processes previously mentioned.

AIM

To assess the psychometric properties of the quality and satisfaction survey of clinical simulation and brief scale of perception of the quality of the objective structured clinical examination in Chilean nursing students.

METHODS

Study design

A quantitative, descriptive, cross-sectional study was developed.

Sample and settings

A convenience sample of 96 nursing students of a Chilean baccalaureate (BSN) of a private university was included in this study (response rate = 98.97%). The inclusion criteria were: a) registered in fourth year-level, b) have participated in at least one OSCE, and c) voluntarily indicated their intention to participate.

Instrument

A three sections self-administrated questionnaire was used to collect data from the students. The first section contains a single question about the number of OSCEs they had completed during the 4 years of their undergraduate program.

The second section was the quality and satisfaction survey of clinical simulation (QSS-CS) by Cádiz Medina et al. (12). The QSS-CS has 15 items in the original version and 5 points Likert scale was used. The questionnaire presents an original one-factor design. This scale was derived from a content validity process (expert panel) of 18 items version by Durá Ros (13). Astudillo Araya et al. tested the psychometric properties in Chilean nursing students demonstrating acceptable reliability and validity (14). For this study, the 15 original items were used, but it was decided to change to 7 Likert points (1 = Totally disagree to 7 = Totally agree) to ensure greater variability in the responses. The scores can be range from

15 to 105, with higher scores indicate higher levels of perception of quality and satisfaction of clinical simulation.

The third part was the brief scale of perception of the quality of objective structured clinical examination (BSPQ-OSCE). This scale was developed for the study with 6 statements that reflects the perception of the quality of OSCE. The questionnaire was built by the researchers and was presented to a five-member panel of experts. After that, it was tested for content validity by the panel. A pilot was tested with 15 first-year-level nursing students. They were requested to answer the BSPQ-OSCE and give feedback about the comprehension of the scale. No changes were requested by the students thus the final version was consolidated.

Data collection

Data Collection was performed in December 2018 by independent research assistants. In a previous OSCE coordination meeting the guidelines for the evaluation, information about the research, its implications were given, and the signing of the informed consent. The instrument is distributed after the last OSCE performed for this cohort. Between 20 and 25 minutes it took them to complete the entire instrument.

Ethical consideration

The study followed Ezequiel Emanuel's criteria for studies with people (15). The rights of the students were safeguarded before the evaluation, providing the necessary information about their participation, risks, benefits, nature of the study and informed consent. Confidentiality was protected at all times during the investigation process. The study protocol was approved by the Institutional Review Board of Universidad Autónoma de Chile (No. 088-17).

Statistical analysis

The numbers of OSCEs, scores and global scores for QSS-CS and BSPQ-OSCE were analysed using descriptive statistics.

Internal consistency reliability was demonstrated with Cronbach's alpha calculated of the scales (α value ≥ 0.70) (16,17).

The content validity was examined through the item-level content validity index (I-CVI) and scale-level content validity index average method (S-CVI/Ave). The indexes are considered acceptable with an I-CVI value of 1 for a panel with ≤ 5 members and an S-CVI/Ave ≥ 0.90 (18). The internal construct validity was established through the item-to-

tal correlation (ITC). The items with corrected ITC values between 0.30 and 0.80 that did not cause $\geq 10\%$ drop in the calculated Cronbach's alpha in both scales if the item is deleted were retained (19).

To assess the construct validity an exploratory factor analysis (EFA) using the principal component analysis (PCA) with varimax rotation was calculated. The factor with an Eigenvalue greater than 1 and factor loading of greater than 0.30 was determined for construct validity. Kaiser-Meyer-Olkin (KMO) was calculated to determine the adequacy of the sample size (KMO value ≥ 0.60) and the Bartlett's test of sphericity for the adequacy of the model factor ($P < 0.05$) (20,21).

To compare the means, one-way analyses of variance with post hoc Tukey HSD were performed. P-values less than 0.05 were considered significant (22).

The statistical analyses were conducted utilizing the statistical software, SPSS version 26.0.0.0.

RESULTS

Participants had on average 3.93 OSCEs performed (min = 1, max. 5, SD = 1.571) and 64.58% (n = 62) of the participants performed five. The average overall score for the QSS-CS was 79.32 (min = 37, max = 105, SD = 13.88) and for the BSPQ-OSCE it was 33.46 (min = 16, max = 42, SD = 4.616). (Table 1).

Psychometric Properties QSS-CS

Reliability evidence: The instrument obtained a Cronbach's alpha of 0.942 indicating excellent internal consistency reliability of the scale. This implies that QSS-CS was capable of measuring quality and satisfaction survey of clinical simulation.

Validity evidence: Excellent content validity was obtained through the I-CVI and S-CVI/Ave calculation. A value of 1 was obtained for both. This implies that the items and the overall scale represent all aspects of quality and satisfaction survey of clinical simulation.

The 15 items were entered in a PCA with varimax rotation (Table 2) The measure for the Kaiser-Meyer-Olkin test of sample adequacy was 0.907, with a significant result in Bartlett's test of sphericity (< 0.001). The value for KMO index signified that the sample size was adequate for factor analysis, while the Bartlett's test of sphericity indicated that the factor model was appropriate. The communalities range from 0.356 to 0.817. These values generated a drop of less than 0.74% of Cronbach's alpha if each item

is removed (for all 15 items). All items were retained. The PCA revealed a single factor with a cumulative contribution rate of 57,17%. This implies that the scale measures the quality and satisfaction of clinical simulation construct adequately.

Psychometric Properties BSPQ-OSCE

Reliability evidence: The instrument obtained a Cronbach's alpha of 0.810 indicating excellent internal consistency reliability of the scale. This implies that BSPQ-OSCE was capable of measuring perception of the quality of objective structured clinical examination.

Validity evidence: Excellent content validity was obtained through the I-CVI and S-CVI/AVE calculation. A value of 1 was obtained for both. This implies that the items and the overall scale represent all aspects of perception of the quality of objective structured clinical examination.

The 6 items were entered in a PCA with varimax rotation (Table 3). The measure for the Kaiser-Meyer-Olkin test of sample adequacy was 0.801, with a significant result in Bartlett's test of sphericity (< 0.001). The value for KMO index signified that the sample size was adequate for factor analysis, while the Bartlett's test of sphericity indicated that the factor model was appropriate. The communalities range from 0.325 to 0.701. These values generated a drop of less than 7,65% of Cronbach's alpha if each item is removed (for all 6 items). All items were retained. The PCA revealed a single factor with a cumulative contribution rate of 53,09%. This implies that the scale measures the perception of the quality of objective structured clinical examination construct adequately.

Bivariate Analyses

When comparing group means, there are no statistically significant differences for QSS-CS and neither for BSPQ-OSCE (Table 4).

DISCUSSION

Both instruments obtained acceptable psychometric properties in all statistical tests to which they were subjected. The results show acceptable reliability values through Cronbach's alpha calculated. In turn, the calculated content and construct validity reports acceptable values. Both instruments meet the objectives of to assess the experience of clinical simulation and the quality of the implementation of an OSCE in undergraduate nursing students, respectively.

The results obtained for QSS-CS are similar to those

obtained in the research by Astudillo Araya et al. (14) this reported a Cronbach's alpha of 0.887, our study reported 0.907. Cronbach's alpha is the most reported measure of internal consistency in psychometric studies. Instruments that obtain high Cronbach's alpha values have higher levels of reliability and higher measurement accuracy (16,17). In the case of the BSPQ-OSCE, an alpha of 0.810 was obtained, which confirms its usefulness for the purpose for which it was created in this research.

The validity of the instruments was assessed through construct and content validity, in both cases an EFA and theoretical relationship testing were carried out. In the case of I-CVI and S-CVI/AVE, acceptable values were obtained for both scales, which is interpreted as excellent content validity. Content validity was not described in previous research (14). It can also be interpreted that each item of each instrument has a theoretical approach to the objectives they assess. In other matters, both instruments obtained a single-factor scale with a computed cumulative contribution rate of 57.17% (QSS-CS) y 53.09% (BSPQ-OSCE) and with factor loadings within an acceptable range. A cumulative contribution rate above 50% and sufficient factor loadings have been reported as indicators of good construct validity (23). It was reported in previous QSS-CS research that three components explained 51.27% of the total variance (14).

Bivariate analysis showed that there were no statistically significant differences in relation to the number of OSCEs performed. These findings theoretically support the assumption that the perception achieved by students is not biased by previous experience in the case of the BSPQ-OSCE and in the case of the QSS-CS the perception of simulation quality is not modified by more or less exposure to clinical simulation or assessments.

This research has certain limitations. The first has to do with the particular sample with which the psychometric properties of the instruments were explored. Therefore, future research should be conducted with undergraduate nursing students at different levels, postgraduate students and students from other health disciplines who use the OSCE as evaluative instruments in their educational plans and programmes. Second, only EFA was applied, so a confirmatory factor analysis is suggested to corroborate the findings of the results of this research. Third, some methods were used to establish validity and reliability, but it is suggested that other methods be explored in future research. But regardless of

these limitations, the study is a great effort to build evidence of the quality of clinical simulation programmes and centres.

CONCLUSION

Both instruments show high levels of validity and reliability for the context of students to whom they were administered. The capability of the instruments to measure the quality and perception of clinical and quality simulation of an OSCE in the described context is an important tool for the evaluation of clinical simulation programmes and centres.

Having these validated instrument inputs ensures data collection for future decision making.

It is suggested to further explore the phenomenon within the multidimensional evaluation of clinical simulation programmes and centres. In this way, to build evidence of the continuous quality assurance process.

ACKNOWLEDGMENT

The authors thank the management team of the School of Nursing of the Faculty of Health and Dentistry (FACSO - UDP) and the Centre for Medical Education and Clinical Simulation of the Faculty of Medicine of Universidad Diego Portales for their efforts in the process.

Table 1. Distribution of participants by number of OSCE taken. Mean, standard deviation, minimum, maximum by Global scores for scales (n=96)

Number of OSCE taken	n	Percentage
1	14	14,58%
2	10	10,42%
3	7	7,29%
4	3	3,13%
5	62	64,58%
Total	96	100%

Scales	n	Global Score			
		Mean	SD	Minimum	Maximum
QSS-CS	96	79,32 ±	13,88	37	105
BSPQ-OSCE	96	33,46 ±	4,616	16	42

Table 2. Items mean, factor loadings, corrected item-total correlations and Cronbach's alpha if item deleted for the QSS-CS (n-96)

Scale items	Mean	SD	Factor Loading	Corrected item-total correlation	Cronbach's alpha if item is deleted
4. Simulation helps develop critical thinking and decision making.	5,14 ±	1,319	0,797	0,817	0,935
15. In general, the experience with clinical simulation has been satisfactory.	5,09 ±	1,257	0,766	0,809	0,935
3. Experience with simulation has improved my technical skills.	4,82 ±	1,436	0,781	0,773	0,936
12. The simulation encourages communication among team members.	5,31 ±	1,300	0,829	0,785	0,936
14. Interaction with simulation has improved my clinical competence.	5,18 ±	1,240	0,814	0,798	0,936
6. The experience with the simulator has increased my trust and confidence.	4,68 ±	1,483	0,773	0,751	0,937
8. The simulation activities have motivated me to learn.	5,46 ±	1,230	0,652	0,745	0,937
13. Clinical simulation helps prioritize nursing actions.	5,46 ±	1,075	0,785	0,747	0,937
1. Simulation is a useful teaching method for learning.	5,60 ±	1,285	0,629	0,706	0,938
7. Simulation has helped me integrate theory and practice.	5,26 ±	1,172	0,730	0,724	0,938
11. Teacher training is adequate.	5,68 ±	1,138	0,792	0,718	0,938
2. The scenarios where the simulation takes place are realistic.	5,16 ±	1,191	0,572	0,659	0,939
5. The simulated cases are adapted to my theoretical knowledge.	5,39 ±	0,899	0,526	0,627	0,940
10. The duration of the cases is adequate.	5,31 ±	1,039	0,695	0,576	0,941
9. In simulation, it is useful to review what has been done by detecting errors (debriefing)	5,79 ±	1,472	0,762	0,356	0,948

Table 3. Items mean, factor loadings, corrected item-total correlations and Cronbach's α if item deleted BSPQ-OSCE (n=96)

Scale items	Mean	SD	Factor Loading	Corrected item-total correlation	Cronbach's α if item is deleted
3. Role of the evaluators.	5,31 $\pm$ 1,225		0,835	0,701	0,748
2. Quantity of inputs used.	5,43 $\pm$ 1,083		0,808	0,668	0,758
4. Simulated patient role.	5,91 $\pm$ 1,006		0,782	0,643	0,765
5. Helper role	5,78 $\pm$ 1,038		0,726	0,589	0,776
1. Organization of the activity	5,88 $\pm$ 0,886		0,705	0,546	0,787
6. Time assigned by station.	5,16 $\pm$ 1,173		0,446	0,325	0,837

Table 4. Difference in QSS-CS and BSPQ-OSCE by number of OSCE taken and distribution of participants by number of OSCE taken (n=96)

Scales	Number of OSCE taken	Global Score		Statistical test	p
		Means	DS		
QSS-CS	1	86,64 $\pm$	10,987	F = 2,677	0,037
	2	75,80 $\pm$	14,726		
	3	69,86 $\pm$	9,442		
	4	67,67 $\pm$	6,351		
	5	79,87 $\pm$	14,169		
BSPQ-OSCE	1	36,36 $\pm$	3,104	F = 2,212	0,074
	2	31,40 $\pm$	6,467		
	3	32,00 $\pm$	4,123		
	4	32,33 $\pm$	4,041		
	5	33,35 $\pm$	4,450		

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