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ORIGINAL

Clinical simulation in the development of clinical competencies and meaningful learning in medical students in Cajamarca - Peru 2025

Simulación clínica en el desarrollo de competencias clínicas y aprendizaje significativo en estudiantes de medicina en Cajamarca - Perú 2025

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ABSTRACT

Introduction: clinical simulation (CS) improves medical training, especially in Latin American countries, and stands out in the post-pandemic context as a key educational tool in Peru.
Method: quantitative study carried out with 122 medical students from the National University of Cajamarca, using validated questionnaires to evaluate clinical competencies and meaningful learning.
Results: the majority of students are between 22 and 23 years old, with female predominance (54,1 %). The results show that clinical simulation has a regular perception (45,9 %) in quality and resources. Clinical competencies present regular levels of knowledge (48,4 %), skills (49,2 %) and attitudes (47,5 %), highlighting the need to integrate theory and practice. Significant learning shows a good level of knowledge (40,2 %) but deficiencies in motivation (37,7 %). Positive correlations were found between clinical simulation, clinical competencies and significant learning (Rho = 0,661 to 0,698), with no differences according to sex, age or academic year.
Discussion: despite the benefits, SC faces limitations in infrastructure and methodology, and its effectiveness depends on better integrating theory and practice into training programs.
Conclusion: clinical simulation improves medical education, but its effectiveness depends on better integration, teacher training, and hands-on approach.

Keywords: Clinical Simulation; Clinical Competencies; Meaningful Learning; Medical Students; Medical Education; Teaching Methods.

RESUMEN

Introducción: la simulación clínica (SC) mejora la formación médica, especialmente en países de América Latina, y se destaca en el contexto post-pandemia como una herramienta educativa clave en Perú.
Método: estudio cuantitativo realizado con 122 estudiantes de Medicina de la Universidad Nacional de Cajamarca, utilizando cuestionarios validados para evaluar competencias clínicas y aprendizaje significativo.
Resultados: la mayoría de los estudiantes tiene entre 22 y 23 años, con predominancia femenina (54,1 %). Los resultados muestran que la simulación clínica tiene una percepción regular (45,9 %) en calidad y recursos. Las competencias clínicas presentan niveles regulares en conocimientos (48,4 %), destrezas (49,2 %) y actitudes (47,5 %), destacándose la necesidad de integrar teoría y práctica. El aprendizaje significativo muestra buen nivel en conocimientos (40,2 %) pero deficiencias en motivación (37,7 %). Se hallaron correlaciones positivas

entre simulación clínica, competencias clínicas y aprendizaje significativo (Rho = 0,661 a 0,698), sin diferencias según sexo, edad o año académico.
Discusión: a pesar de los beneficios, la SC enfrenta limitaciones en infraestructura y metodología, y su efectividad depende de integrar mejor teoría y práctica en los programas de formación.
Conclusión: la simulación clínica mejora la educación médica, pero su eficacia depende de una mejor integración, capacitación docente y enfoque práctico.

Palabras clave*:* Simulación Clínica; Competencias Clínicas; Aprendizaje Significativo; Estudiantes de Medicina; Educación Médica; Métodos Didácticos.

INTRODUCTION

Clinical simulation (CS) is a learning and training tactic that involves recreating scenarios with trained actors or robots simulating possible diseases to acquire quality medical care through practice.[1,2,3] CS originated from simulators such as mannequins for cardiopulmonary resuscitation. In addition, the report "To err is Human: Building a Safer Health System" was the first to demonstrate the importance of using simulators in healthcare, concluding that human error is one of the most significant causes of patient complications, leading in many cases to death.[4] Then, in 1997, the first SC laboratory was established in Spain, expanding to university and hospital centers and becoming a fundamental tool in healthcare organizations.[5] Consequently, according to Olleta et al.[1] the use of SC and publications on SC have grown considerably in recent years.

Global statistics show a significant increase in the use of medical simulation in Latin America, especially in centers in Chile, Brazil, and Mexico, where 84 % of centers are university-based, 71 % are medium-sized (54 % with fewer than 10 instructors), and 75 % of instructors have taken the CS training course.[6] In Switzerland, responses were obtained from 96 % of pediatric hospitals, of which 66,6 % used SC in educational training.[7] On the other hand, in the context of the COVID-19 pandemic, a study was conducted in the area of Internal Medicine in Medellín, Colombia, where a greater number of students indicated better acquisition of technical skills through face-to-face simulation than virtual simulation and reported greater mastery mainly in the following areas: CPR (89,5 % vs. 47,6 %), stroke approach (86,7 % vs. 61,9 %), and AMI (85,7 % vs. 65,7 %).[8] In Peru, there is a lack of growth in hospital infrastructure, and health centers struggle to meet the high demand from medical students. Therefore, SC is presented as a solution for academic training.[3,9]

Meaningful learning plays a fundamental role in enabling students and residents to acquire knowledge and minimize errors with real patients.[3] Albert Bandura's vicarious or imitative learning is the most accurate for medical education, as it is based on the ability to acquire knowledge, attitudes, and skills by observing others. However, this remains a topic of debate.[10] In addition, teaching models in the health sciences promote effective learning through techniques such as problem-based learning, evidence-based medical practice, the flipped classroom, case-based learning, and SC.[11] Furthermore, simulation-based learning has been shown not only to improve the skills of all participants significantly but also to lead to the retention of these skills up to one year after the intervention.[12,13]

The concept of competence encompasses a set of abilities, knowledge, and skills necessary for thriving in professional education and training. In this sense, the development of competencies facilitates the teaching and learning process, allowing individuals to acquire knowledge, abilities, and skills easily. This, in turn, enables them to put the acquired competencies into practice, solving the various situations that arise in reality.[14] On the other hand, the development of competencies has enabled significant progress in medical education, as it has successfully linked work needs and requirements with medical education, creating a more comprehensive educational model.[15]

The use of technologies, including specialized software, virtual platforms, and clinical simulation, is revolutionizing health sciences education. These tools enable students to encounter realistic scenarios in a controlled environment, providing them with the opportunity to practice and refine procedures before interacting with actual patients.[16] This change addresses the growing need to shift away from traditional educational methods that fail to meet the demands of the 21st century.[17] Although technological advances have redefined many areas, approaches based on memorization —a strategy typical of industrial-era educational models —still prevail in medical education. Clinical simulation, on the other hand, offers a dynamic and efficient alternative, facilitating practical learning focused on the development of essential skills for professional practice.

In this context, the following research question was formulated: Is there a significant correlation between clinical simulation in the development of clinical skills and meaningful learning? For this reason, the overall objective of this article is to determine whether clinical simulation is related to the improvement of clinical skills and meaningful learning in medical students at a university in Cajamarca, Peru, in 2025. Likewise, to ascertain the levels of clinical simulation, clinical skills, and meaningful learning by dimension among medical students at a faculty in Cajamarca in 2025. Finally, to establish other personal characteristics that influence

clinical simulation, clinical skills, and meaningful learning in medical students at a professional academic school in Cajamarca, 2025. The following hypotheses accompanied this objective: a) Null: there is no correlation between clinical simulation and the improvement of clinical skills and meaningful learning in medical students at a faculty in Cajamarca, 2025; b) Alternative: there is a correlation between clinical simulation and the improvement of clinical skills and meaningful learning in medical students at a faculty in Cajamarca, 2025.

METHOD

This research examines the impact of clinical simulation as a fundamental educational tool for enhancing clinical skills and fostering meaningful learning in medical students. This technique provides a safe and controlled environment where students can practice real-life situations, thereby improving both their practical skills and theoretical understanding. Students who lack access to this methodology face significant limitations in their training before interacting with real patients, which can impact their professional preparation.

The present study adopts a quantitative approach, which is ideal for objectively evaluating the relationships and differences between the selected variables.[18,19] It is classified as basic research, as it seeks to expand knowledge about the contribution of clinical simulation to meaningful learning.[18] The design used is non-experimental, since the variables were not intentionally altered but analyzed in their natural state.[20] Likewise, the study is analytical and cross-sectional, which allowed information to be collected at a specific moment and enabled detailed comparisons to be made between the evaluated groups.[21,22]

The population consisted of 179 students in their 4th, 5th, and 6th years of human medicine at the National University of Cajamarca (UNC). As this was a non-probabilistic study, convenience sampling was employed, establishing a 95 % confidence level and a 5 % margin of error, which resulted in a sample of 122 participants.

Two structured questionnaires were designed and used for data collection. The first, focused on clinical simulation and the development of clinical skills, consisted of 18 items aimed at measuring problem-solving, decision-making, and theoretical-practical integration in simulated contexts. The second questionnaire, focused on meaningful learning, consisted of 15 items that assessed the depth of knowledge acquired in theoretical and practical aspects.

Both questionnaires were designed and distributed using the Google Forms platform, which facilitated the collection of responses in an efficient and accessible manner for participants. The data collection methods facilitated the effective implementation of the research method by utilizing appropriate resources.[23] The digitization of the process ensured the privacy and confidentiality of the data.

The questionnaires were validated using expert criteria, following the principles proposed by Muñoz[24], who defines validity as the ability of the instrument to measure the variables of interest accurately. Three professionals from the educational and medical fields reviewed and approved both instruments, ensuring their relevance, reliability, and consistency.

The measurement scale used is a Likert scale, which allows attitudes to be measured and different points of view to be identified in response to the various questions presented.[25]

Descriptive and inferential statistical tools were used for data analysis. Descriptive statistics allowed the information obtained to be summarized and organized clearly, while inferential statistics were used to formulate conclusions and establish significant relationships between the variables studied. The data were processed using SPSS v.29.0.2.0 software, which facilitated both the generation of statistics and the interpretation of the results.

RESULTS

First, the descriptive results for the variables are presented, addressing each of their dimensions to analyze their behavior within the studied context. Subsequently, statistical analysis is performed, including correlation analysis using Spearman's rank correlation method, to identify the relationships between the variables.

Regarding the personal characteristics of the students (table 1), it is observed that the majority are between 22 and 23 years old (45,9 %), followed by those under 22 years old (36,1 %). Women predominate, constituting 54,1 % of the sample, while men represent 45,9 %. Regarding the academic year, 42,6 % of students are in their 4th year, 30,3 % in their 5th year, and 27 % in their 6th year.

In the distribution of the clinical simulation (table 2), 45,9 % of students rated it as fair, 30,3 % perceived it as poor, and only 23,8 % considered it good. Clinical skills showed similar results, with 50,0 % of students rating them as fair, 30,3 % as inadequate, and only 19,7 % as good. As for meaningful learning, the majority also rated it as fair (46,7 %), followed by 30,3 % who rated it as poor and 23,0 % who rated it as good.

In the specific dimensions of each variable (table 3), in the clinical simulation section, the quality and teaching methodology were rated as fair by 45,9 % of students; in terms of scenario design and use of resources, 45,1 % also rated it as fair, although a slightly higher proportion (23,0 %) rated it as good compared to teaching methodology. On the other hand, in clinical competencies, the dimensions of knowledge, skills, and attitudes were rated as fair by 48,4 %, 49,2 %, and 47,5 % of students, respectively. Regarding meaningful learning, the dimension of prior knowledge received the best evaluation, with 40,2 % of students rating it positively. In terms

of skills, 42,6 % rated it as fair, and in attitudes, 37,7 % rated it as poor.

In relation to clinical simulation and clinical competencies (table 4), it was found that 91,9 % of students who rated the simulation as poor also rated their clinical competencies at the same level. On the other hand, among those who considered the simulation to be good, 75,0 % rated their clinical competencies as good. Similarly, the relationship between clinical simulation and meaningful learning (table 5) showed that 91,9 % of those who perceived the simulation as poor rated meaningful learning at the same level. In contrast, 67,9 % of students who rated the simulation as good also considered meaningful learning to be good.

Statistical analysis using Spearman's Rho coefficient (table 6) showed a moderate and significant relationship between clinical simulation and clinical skills (Spearman's Rho = 0,661, p < 0,001). Likewise, a mild and significant correlation was found between clinical simulation and meaningful learning (Spearman's Rho = 0,679, p < 0,001). Therefore, the alternative hypothesis that there is a correlation between clinical simulation and the improvement of clinical competencies and meaningful learning in medical students at a faculty in Cajamarca in 2025 is accepted.

In the results of the relationship between personal characteristics, clinical simulation, and meaningful learning (table 7), it was observed that gender did not show significant differences in any of the evaluated variables. Regarding age, no significant differences were found in the perception of clinical simulation among students under 22 years of age, those between 22 and 23 years of age, and those over 23 years of age. Most young students rated the simulation as fair, but the distribution did not show a significant difference in terms of age. For clinical competencies and meaningful learning, no significant differences were observed in relation to gender or age. However, the distribution by academic year showed slight variability in clinical simulation, with 37,9 % of sixth-year students rating the simulation as good, compared to 27,6 % of fourth-year students and 34,5 % of fifth-year students. In terms of meaningful learning, 39,3 % of fifth-year students rated it as good, with the second-highest percentage being sixth-year students (32,1 %), while only 28,6 % of fourth-year students rated it the same way.

Table 1. Distribution of personal characteristics among medical students in Cajamarca, Peru, 2025

Characteristic	Parameters	Frequency	Percentage
Age	<22	44	36,1
	22-23	56	45,9
	>23	22	18,0
	Total	122	100,0
Gender	Female	66	54,1
	Male	56	45,9
	Total	122	100,0
Academic year	4	52	42,6
	5	37	30,3
	6	33	27,0
	Total	122	100,0

Table 2. Distribution of clinical simulation, clinical skills, and meaningful learning by level among medical students in Cajamarca, Peru, 2025

Variable	Level	Frequency	Percentage
Clinical simulation	Poor	37	30,3
	Fair	56	45,9
	Good	29	23,8
	Total	122	100,0
Clinical skills	Poor	37	30,3
	Fair	61	50,0
	Good	24	19,7
	Total	122	100,0
Meaningful learning	Poor	37	30,3
	Fair	57	46,7
	Good	28	23,0
	Total	122	100,0

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Table 3. Distribution of clinical simulation, clinical competencies, and meaningful learning by dimensions and levels in medical students in Cajamarca, Peru, 2025

Variable	Dimensions	Level	Frequency	Percentage
Clinical simulation	Perception of teaching quality and methodology	Poor	44	36,1
		Fair	56	45,9
		Good	22	18,0
		Total	122	100,0
	Assessment of the scenario, resources, and non-technical elements	Poor	39	32
		Fair	55	45,1
		Good	28	23,0
		Total	122	100,0
Clinical skills	Knowledge	Poor	37	30,3
		Fair	59	48,4
		Good	26	21,3
		Total	122	100,0
	Skills	Poor	36	29,5
		Regular	60	49,2
		Good	26	21,3
		Total	122	100,0
	Attitudes	Poor	39	32,0
		Average	58	47,5
		Good	25	20,5
		Total	122	100,0
Meaningful learning	Knowledge	Poor	36	29,5
		Fair	37	30,3
		Good	49	40,2
		Total	122	100,0
	Skills	Poor	39	32,0
		Average	52	42,6
		Good	31	25,4
		Total	122	100,0
	Attitudes	Poor	46	37,7
		Average	44	36,1
		Good	32	26,2
		Total	122	100,0

Table 4. Distribution of the relationship between clinical simulation and clinical competencies by level in medical students in Cajamarca, Peru, 2025

Clinical competencies										
N		Poor		Fair		Good		Total		p-value
		%	N	%	N	%	N	%		
Clinical simulation	Poor	34	91,9	3	4,9	0	0,0	37	30,3	0,000
	Fair	3	8,1	35	57,4	18	75,0	56	45,9	
	Good	0	0,0	23	37,7	6	25,0	29	23,8	
	Total	37	100,0	61	100,0	24	100,0	122	100,0	

Table 5. Distribution of the relationship between clinical simulation and meaningful learning by level among medical students in Cajamarca, Peru, 2025

Meaningful learning										
N		Poor		Fair		Good		Total		p-value
		%	N	%	N	%	N	%		
Clinical simulation	Poor	34	91,9	3	4,9	0	0,0	37	30,3	0,000
	Fair	3	8,1	34	59,6	19	67,9	56	45,9	
	Good	0	0,0	20	35,1	9	32,1	29	23,8	
	Total	37	100,0	57	100,0	28	100,0	122	100,0	

Table 6. Correlation between clinical simulation, clinical competencies, and meaningful learning in medical students in Cajamarca, Peru, 2025, using Spearman's Rho coefficient

Correlations			Clinical simulation	Clinical competencies	Meaningful learning
Spearman's Rho	Clinical simulation	Correlation coefficient	1,000	0,661	0,679
		Sig. (bilateral)		0,000	0,000
		N	122	122	122

Table 7. Distribution of personal characteristics that may influence clinical simulation, clinical skills, and meaningful learning in medical students in Cajamarca, Peru, 2025

Variable	Personal characteristics	Categories	Poor		Average		Good		Total		p-value
			N	%	N	%	N	%	N	%	
Clinical simulation	Gender	Female	20	54,1	29	51,8	17	58,6	66	54,1	0,835
		Male	17	45,9	27	48,2	12	41,4	56	45,9	
		Total	37	100,0	56	100,0	29	100,0	122	100,0	
	Academic year	4	19	51,4	25	44,6	8	27,6	52	42,6	0,331
		5	9	24,3	18	32,1	10	34,5	37	30,3	
		6	9	24,3	13	23,2	11	37,9	33	27,0	
		Total	37	100,0	56	100,0	29	100,0	122	100,0	
	Age	<22	17	45,9	20	35,7	7	24,1	44	36,1	0,124
		22-23	17	45,9	22	39,3	17	58,6	56	45,9	
		>23	3	8,1	14	25,0	5	17,2	22	18,0	
		Total	37	100,0	56	100,0	29	100,0	122	100,0	
Clinical skills	Gender	Female	22	59,5	32	52,5	12	50,0	66	54,1	0,720
		Male	15	40,5	29	47,5	12	50,0	56	45,9	
		Total	37	100,0	61	100,0	24	100,0	122	100,0	
	Academic year	4	18	48,6	25	41,0	9	37,5	52	42,6	0,572
		5	8	21,6	19	31,1	10	41,7	37	30,3	
		6	11	29,7	17	27,9	5	20,8	33	27,0	
		Total	37	100,0	61	100,0	24	100,0	122	100,0	
	Age	<22	15	40,5	23	37,7	6	25,0	44	36,1	0,161
		22-23	19	51,4	27	44,3	10	41,7	56	45,9	
		>23	3	8,1	11	18,0	8	33,3	22	18,0	
		Total	37	100,0	61	100,0	24	100,0	122	100,0	
Meaningful learning	Gender	Female	22	59,5	27	47,4	17	60,7	66	54,1	0,375
		Male	15	40,5	30	52,6	11	39,3	56	49,5	
		Total	37	100,0	57	100,0	28	100,0	122	100,0	
	Academic year	4	19	51,4	25	43,9	8	28,6	52	42,6	0,265
		5	7	18,9	19	33,3	11	39,3	37	30,3	
		6	11	29,7	13	22,8	9	32,1	33	27,0	
		Total	37	100,0	57	100,0	28	100,0	122	100,0	
	Age	<22	16	43,2	21	36,8	7	25,0	44	36,1	0,266
		22-23	18	48,6	23	40,4	15	53,6	56	45,9	
		>23	3	8,1	13	22,8	6	21,4	22	18,0	
		Total	37	100,0	57	100,0	28	100,0	122	100,0	

DISCUSSION

The purpose of this study is to determine whether clinical simulation has a significant correlation with the development of clinical skills and meaningful learning in medical students at a university in Cajamarca, Peru, in 2025. The results obtained reveal a statistically significant relationship between clinical simulation and improvement in clinical competencies and meaningful learning, supporting the alternative hypothesis proposed at the beginning of the research. Additionally, specific levels of progress in the assessed skills and individual factors that may have influenced the results obtained were identified.

The evaluation of the results obtained reveals a moderate relationship between clinical simulation and clinical skills, indicating that as we acquire more experience throughout our academic training, we develop stronger clinical skills, while simultaneously strengthening our clinical simulation skills. On the other hand,

studies conducted by Novoa[26] reveal a strong relationship between these variables; according to him, the health field not only requires an educational process to develop competencies but also a comprehensive evaluation of the competencies acquired. In addition, Juliana da Silva et al.[27] mention that the deficiencies associated with the development of these competencies were due to reviewing only theory and neglecting to develop workshops or clinical practices.

When studying the relationship between clinical simulation and the development of meaningful learning, it is observed that this relationship is moderate; that is, as clinical simulation improves, meaningful learning also tends to improve, but not in all cases. On the contrary, studies conducted by Amaro et al.[28] and Rodríguez et al.[29] yielded results showing a strong, significant relationship between the two variables. This can be explained by the fact that the institution does not currently have a well-implemented and modern clinical simulation program. Furthermore, there is no teacher training in this area, which may influence the students' opinions.

According to the results obtained when evaluating clinical simulation, we found that in the following dimensions: perception of quality and methodology, nearly half of the students were deficient, as medical simulation is not considered an effective aid in reinforcing their knowledge. On the other hand, Garza et al.[30] show that most of their students consider clinical simulation to be very good, as they felt highly motivated to acquire real-world clinical experience. Similarly, Vallejo's[31] study at a university in Colombia emphasizes that the strategy used in the teacher's methodology influences the perception of quality in clinical simulation.

The assessment of the setting, resources, and non-technical elements was perceived as average by slightly less than half and poor by a third of the respondents, which indicates that when taken as an extracurricular course, it does not have the positive impact that would be expected, presenting deficiencies in access, hours taught, and the equipment used in clinical simulation. This is why Dávila[32] notes that incorporating clinical simulation into the curriculum enhances the clinical experience, provided it is planned, implemented, and evaluated. Furthermore, the study by Illesca et al.[33] at the Autonomous University of Chile suggests that having adequate infrastructure, including suitable spaces and accessible resources such as financial support, enhances the student experience.

Regarding the variable of clinical skills, a three-dimensional analysis was conducted, beginning with knowledge, which was found to be at a moderate level among approximately half of the students. This suggests that the students have not yet integrated theoretical and practical knowledge or have not yet adapted to a new learning methodology. According to Martínez et al.[34], who conducted their research at a nursing school at the University of Barcelona, more than three-fifths of students acquire knowledge and develop clinical skills through rapid adaptation to a new training environment. In addition, Carvajal et al.[35], in their study at a higher education institution in the city of Cali, Colombia, indicate that despite the high acceptance of clinical simulation, there is a deficiency due to a gap between learning in simulation and the application of knowledge and skills in a real environment.

In terms of skills, we have a moderate assessment in slightly less than half of the students, indicating that students develop only some clinical skills, which suggests that some measures should be taken. For this reason, the study by Gatica et al.[36] conducted on nursing students showed an improvement in self-confidence after taking symptoms and signs in some simulation sessions with patients, which allowed for the reinforcement of technical skills.

On the other hand, in the attitudes dimension, medical students rated themselves as good (one-fifth), fair (half), and poor (one-third). These results show that there is inadequate communication between students and patients. According to Arriagada et al.[37], communication skills, including behaviors that facilitate the exchange of information through active listening, respect, empathy, and authenticity, significantly enhance clinical simulation. Furthermore, these skills are crucial for labor and delivery, as the needs of the pregnant woman must be thoroughly understood.

When evaluating knowledge as a dimension of the variable meaningful learning, it was found that less than half consider themselves to be at a reasonable level, given that currently there are no materials or relevant training available to develop efficient clinical simulation. According to Roa[38], meaningful learning is formed by combining prior knowledge with new knowledge. Likewise, Juguera et al.[39], in a study conducted at a university in Spain, concluded that clinical simulation is an effective method for acquiring adequate clinical knowledge. It is even mentioned that it improves decision-making in a health problem, as it puts what has been learned into practice and offers a more accurate overview.

Most of the population studied considers the teaching elements currently used to be of average quality, and a large percentage even rates them as poor, suggesting that immediate measures are needed to improve the quality in this area. Femiak et al.[40] conducted a study using workshops and concluded that those who employed active teaching methods improved their clinical work and developed superior communication skills. In support of this argument, Salinas[41] points out that by considering the student's autonomy, i.e., their personal learning rhythms and styles, experiential learning is facilitated, allowing them to take an active role in what they need to learn. This is possible by implementing the use of clinical simulation. As Meneses et al.[42] state in

another study, using this tool facilitates active learning by integrating reflective observation (looking), abstract conceptualization (understanding), and experimental practice (applying).

As for the motivation felt by students, they do not feel motivated by teachers or their teaching strategies, but neither can we rule out the fact that new technological tools, such as clinical simulation, have not been implemented in the institution to enable educators to modernize their teaching methods. Thus, Zúñiga et al.[43] found, in their evaluation of motivation after the implementation of haptic simulation in students at a university in Chile, that more than half of the students surveyed reported enhanced motivation in various aspects, including intrinsic orientation and perception of self-efficacy, after using simulators. On the other hand, clinical simulation seems to have a greater effect on reducing anxiety. Segura et al.[44] observed that nearly all students reduced their anxiety levels after participating in simulations more than once, which led to an increase in their motivation.

Personal characteristics such as gender and age were not related to any of the variables; only the academic year showed a particular relationship, but it was not statistically significant, as it is logical that the more advanced the year of study, the greater the mastery of the subjects and, as a result, the more satisfactory the experience with clinical simulation. The same applies to the development of clinical skills and meaningful learning, which is consistent with a study by Padilla et al.[45], which reached similar results.

Therefore, a relationship exists between clinical simulation and the development of clinical skills and meaningful learning, albeit to a moderate degree. Thus, the importance of this study lies in laying the groundwork for implementing improvements in clinical simulation at the university. In addition, it can serve as a basis for future research.

CONCLUSIONS

The findings confirm a moderate relationship between the use of clinical simulation and the development of clinical competencies, as well as meaningful learning. This supports the alternative hypothesis, indicating a relationship between these two variables.

The dimensions of the study variables obtained a moderate level, which suggests that there are some gaps to be filled.

The personal characteristics of the students, such as gender and age, were not related to any of the variables. However, the academic year showed a certain degree of relationship, but it is not statistically significant.

It is recommended that the survey be administered in person and directly, thereby ensuring that the respondents are truly members of the study group and avoiding biased responses.

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