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Clinical Learning Environments in Medical Specialty Residences at a Third Level of Care

Ambientes clínicos de aprendizaje en residencias de especialidades médicas en una institución de tercer nivel de atención

Ambientes de aprendizagem clínica em residências de especialidades médicas em terceiro nível de assistência

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ABSTRACT

The clinical learning environment (CLE) has long been a focus of research and improvement efforts in medical education. **Aim**: To evaluate the CLE of a hospital site. **Materials and methods:** Observational, cross-sectional, analytical, prospective study using the ACA-UNAM-MEX instrument. Variables included were age, sex, year of residency, marital status and specialty. Measures of central tendency and measures of dispersion, Fisher's exact test for differences, Kendall's tau b for correlation and bivariate logistic regression were applied to clarify predictor variables. **Results**: 135 responses were obtained, with an average age of 28.72 years. For 79.3% interpersonal relationships (IR) were very restrictive, for 78.5% educational programs and their implementation (PE&I) were very restrictive, for 95.6% institutional culture (IC) was very restrictive and for 91.1% service dynamics (SD) was very restrictive. There were statistically significant differences between SD and gender ($p = 0.02$), SD and specialty ($p = 0.002$), IC and specialty ($p = 0.013$), EP and academic year ($p = 0.202$). When Kendall's tau b was applied, low negative correlations were found for most variables. Bivariate logistic regression found that marital status ($p = 0.010$ and year of residency ($p = 0.000$) predicted the perception of a more restrictive environment ($p \leq 0.05$). **Conclusion**: It appears that the ACAs assessed are in restrictive ranges.

Keywords
environments; learning; medical education; clinical skills; work environment.

RESUMEN

Durante mucho tiempo, el ambiente clínico de aprendizaje (ACA) ha sido un foco de investigación y esfuerzos de mejora en la educación médica. **Objetivo:** Evaluar los ACA de una sede hospitalaria. **Materiales y métodos:** Estudio observacional, transversal, analítico, prospectivo con el instrumento ACA-UNAM-MEX. Se incluyeron variables de edad, sexo, año de residencia, estado civil y especialidad. Se aplicaron medidas de tendencia central y medidas de dispersión, prueba exacta de Fisher para diferencias, tau b de Kendall para correlación y regresión logística bivariada para aclarar variables predictoras. **Resultados:** Se obtuvieron 135 respuestas, con una edad promedio de 28,72 años. Para el 79,3% las relaciones interpersonales (RI) eran muy restrictivas, para el 78,5% los programas educativos y su implementación (PEyI) eran muy restrictivos, para el 95,6% la cultura institucional (CI) era muy restrictiva y para el 91,1% la dinámica de servicio (DS) era muy restrictiva. Hubo diferencias estadísticamente significativas entre DS y sexo ($p = 0,02$), DS y especialidad ($p = 0,002$), CI y especialidad ($p = 0,013$), PE y año académico ($p = 0,202$). Al aplicar tau b de Kendall se encontraron correlaciones bajas negativas en la mayoría de las variables. La regresión logística bivariada encontró que estado civil ($p = 0,010$ y año de residencia ($p = 0,000$) predecían la percepción de un ambiente más restrictivo ($p \leq 0,05$). **Conclusión:** Aparentemente, los ACA evaluados se encuentran en rangos restrictivos. Hubo diferencias estadísticamente significativas en DS y sexo, DS y especialidad, CI y especialidad, así como PE y año académico.

Palabras clave

ambientes; aprendizaje; educación médica; habilidades clínicas; ambiente de trabajo.

RESUMO

O ambiente de aprendizagem clínica (CLE) tem sido há muito tempo o foco de pesquisas e esforços de aprimoramento na educação médica. **Objetivo**: Avaliar o CLE de uma unidade hospitalar. **Materiais e métodos:** Estudo observacional, transversal, analítico e prospectivo usando o instrumento ACA-UNAM-MEX. As variáveis incluídas foram idade, sexo, ano de residência, estado civil e especialidade. Medidas de tendência central e medidas de dispersão, teste exato de Fisher para diferenças, tau b de Kendall para correlação e regressão logística bivariada foram aplicados para esclarecer as variáveis preditoras. **Resultados**: Foram obtidas 135 respostas, com uma média de idade de 28,72 anos. Para 79,3%, as relações interpessoais (RI) eram muito restritivas, para 78,5%, os programas educacionais e sua implementação (PE&I) eram muito restritivos, para 95,6%, a cultura institucional (CI) era muito restritiva e para 91,1%, a dinâmica do serviço (SD) era muito restritiva. Houve diferenças estatisticamente significativas entre DP e gênero ($p = 0,02$), DP e especialidade ($p = 0,002$), CI e especialidade ($p = 0,013$), EP e ano acadêmico ($p = 0,202$). Quando o tau b de Kendall foi aplicado, foram encontradas correlações negativas baixas para a maioria das variáveis. A regressão logística bivariada constatou que o estado civil ($p = 0,010$ e o ano de residência ($p = 0,000$) previam a percepção de um ambiente mais restritivo ($p \leq 0,05$). **Conclusão**: Parece que os ACAs avaliados estão em faixas restritivas.

Palavras-chave

ambientes; aprendizado; educação médica; habilidades clínicas; ambiente de trabalho.

Introduction

The clinical learning environment (CLE) is defined as residents' perceptions of both formal and informal features of education and refers more specifically to perceptions of common practices and procedures in clinical departments, as well as the quality of relationships between residents and their teachers, supervisors, and the institution (1-3).

These environments are very independent and different in each institutional health system, according to Frenk et al. (4), Feletti and Clarke (5), and Pololi and Price (6), who mention that, in clinical practice, skills, knowledge, values and attitudes are consolidated in real work situations, and ACAs are different from one another. Not all clinical settings are positive or conducive to an environment of confrontation between theoretical and practical knowledge.

The topic of CLE is at the forefront of discussions by educators, accreditors, educational organizations, and healthcare professionals, and has long been a focus of research and improvement efforts in medical education (7). A suboptimal ACA has been associated with poor-quality patient care and adverse learning outcomes (8,9).

The current climate of financially constrained and understaffed healthcare systems has increased pressure and expectations, with negative effects on trainees' well-being. Increased demand for care and the quest for improvements in numerical indicators for "better" clinical productivity have negatively affected the time available for educational activities (9,10) and have contributed to increased levels of stress, depersonalization, and emotional exhaustion in doctors in training, and in their teachers. This,

in turn, has added to the negative effect on the working and learning climate of the trainees and their trainers (10).

Currently, some instruments have been structured to evaluate the perception of learning environments, for example, the Dundee Ready Education Environment Measure Scale, one of the most widely used questionnaires worldwide, validated in Mexico for use in undergraduate doctors (11), or the Postgraduate Hospital Educational Environment Measure (PHEEM), for medical residencies, translated into different languages (12). However, a group of researchers at the National Autonomous University of Mexico (UNAM), led by Dr. Alicia Hamui Sutton, created and validated the ACA-UNAM instrument for postgraduate studies in the Mexican population (13). The latter is the instrument we applied to a sample of resident doctors at our hospital.

Types of learning environments

By 1991, Lave and Wenger radically and importantly reframed our conception of learning by emphasizing the whole person, and by seeing the agent, the activity, and the world as mutually constitutive. These authors argued that learning had overlooked its social character by excellence and proposed that learning is a process of participation in communities of practice that is at first legitimately peripheral but gradually increases in engagement and complexity. They conceive that learning is a collective and relational process involving the co-participation of newcomers with more experienced ones (14).

Learning is an integral part of generative social practice in the lived world. Lave and Wenger envisaged the theory of situated, existential, or experiential learning. Learning in non-formal educational settings testifies to how learning in the work environment has its particular characteristics (14). On the other hand, Engestrom referred to the term expansive learning as the environment where the active, constant, and committed participation of the learner is generated; in contrast, the restrictive environment reduces this possibility.

In a clinical setting, learning is fundamental to the training of healthcare professionals. Simulation can prepare trainees for the CLE; however, there is no comparison to the learning that comes from managing patients in a real clinical setting. In addition, many healthcare systems depend on the service that trainees provide to patients, and removing them from teaching institutions can have a negative impact on patient care (15). Therefore, an effective and supportive CLE is important for the quality and safety of patient care, for the health and well-being of medical staff, and for the learning and socialization of trainees into the profession. Studies from North America have shown that the quality of the learning environment that provided the context for the training predicted the better quality of the training (16,17).

Therefore, efforts to improve CLE not only have a positive impact on the environments where students learn and participate in patient care (18,19). Dr. Alicia Hamui Sutton, creator of the ACA-UNAM instrument, conducted a study of CLEs with 4189 physicians through an online survey conducted in 2012, published in 2014, and found that one of the dimensions with great impact is service dynamics (SD), defined as the space favorable for the generation of ideas and new proposals, since it encourages creative and scientific problem solving and coincides with those found in a 2010 study on the teaching-learning process of resident physicians in the Unified Plan for Medical Specializations (20).

Material y methods

An observational, cross-sectional, analytical, prospective study was carried out with the application of the ACA-UNAM-MEX instrument, with 28 items, divided into four dimensions: interpersonal relationships (IR), educational program and its implementation (PE&I), institutional culture (IC), and SD, which we empirically related to the teaching-labor factors. The survey was applied

anonymously and voluntarily after signing a letter of informed consent, collecting the variables age, sex, year of residency, marital status, and specialty of the resident physicians of the hospital of specialties No. 2, belonging to the headquarters, located in Cd. Obregón (Sonora, Mexico), between October and December 2022. The responses to the instrument were processed using the Likert scale and SPSS *software*.

The ACA-UNAM-MEX is described quantitatively in Table 1, where the reference values are indicated to classify a learning climate ranging from very expansive to very restrictive, passing through the categories expansive and restrictive. The higher the score, the more restrictive the learning climate.

Table 1
Categorization scale considering the stated values of the instrument ACA-UNAM-MEX (21)

Scale	Values
Very expansive	1-1.50
Expansive	1.51-2
Restrictive	2.01-2,50
Very restrictive	2.51-4

The dimensions that occur in CLEs can support the practice of the hidden curriculum, and these can include IR, in which individuals interact in the social context, where specifically there is division of work, communication, collaboration, and conflict mediation. There are PE&I that guide educational strategies with a didactic structure, methods, technologies, and evaluations, with the aim of acquiring knowledge in the order of thinking and practice. On the other hand, IC refers to norms, rules, schemes, ideologies, and practices, that have only the empirical basis of customs and practices based on shared beliefs in an already established system. These traits can either facilitate or hinder change for a better development of human resources in learning, where hierarchies and power roles are played out that diminish or promote a better learning-working environment or climate. Here, the sense of ethics and respect can be lost. In SD, very particular organizations are established in academic and practical activities, where daily contact between health staff and patients is generated, where visits, handovers of guards through supervision, etc. are carried out (21-23).

After applying the instrument, variables such as age, sex, grade, and specialty were taken into account, as well as the responses to the survey and questionnaire. We set as our main objective to evaluate the CLEs at our hospital site as well as their differences. The study was reported according to the Strengthening the Reporting of Observational Studies in Epidemiology (Strobe) checklist (24).

Statistical analysis

Measures of central tendency were applied, with averages, mean, median, and mode, as well as measures of dispersion, such as standard deviation, range, and variance. For quantitative analysis, measures of central tendency and measures of dispersion were applied. For inferential analysis, Pearson's chi-square or Fisher's exact test were applied. To assess the differences between the qualitative variables and the outcome of the instrument, we applied bivariate logistic regression, seeking to clarify which variables may be predictors of the perception of a restrictive FOC, so we dichotomized the results of the instrument into restrictive or expansive. We used the social science statistical package SPSS, version 24 for Windows, and assembled them into graphs and tables for interpretation.

Results

Out of 300 resident physicians, 165 answered the instrument. Of these, 30 were eliminated because they were incorrectly filled out and incomplete, for a total of 135 (45% response rate). Table 2 records the results according to age, sex, marital status, and specialty.

Table 2
Distribution by specialty in 135 medical residents who answered the ACA-UNAM clinical learning environment instrument

Demographic data	n	%
Sex		
Male	75	55.62
Female	60	44.4
Marital status		
Single	103	76
Married	24	18
Unmarried	6	4
Widowed	2	2
Grade of residency		
First	42	31
Second	27	20
Third	36	27
Fourth	30	22
Specialty		
Internal Medicine	34	25.1
Anesthesiology	20	14.8
Cardiology	19	14.0
Radiology	16	11.9
Critical Care Medicine	14	10.4
Traumatology	12	8.9
Otolaryngology	10	7.4
Nephrology	9	6.7
Ophthalmology	1	0.7

Regarding the four dimensions IR, PE&I, IC, and SD that were assessed with the ACA-UNAM instrument, their results are described in Table 3, where the IR dimension was reported as very restrictive (79.3%); the PE&I, as very restrictive (78.5%); the IC, as very restrictive (95.6%), and the SD, as very restrictive (95.6%).

Table 3
Results of the 4 dimensions assessed with the ACAUNAM in 135 resident physicians

Interpersonal relations		
Type of educational environment	**n**	**%**
Very expansive	3	2.2
Expansive	10	7.4
Restrictive	15	11.1
Very restrictive	107	79.3
Educational programs and their implementation		
Very expansive	1	0.7
Expansive	10	7.4
Restrictive	18	13.3
Very restrictive	106	78.5
Institutional culture		
Restrictive	6	4.4
Very restrictive	129	95.6
Service dynamics		
Very expansive	2	1.5
Expansive	10	7.4
Very restrictive	123	91.1

When applying Pearson's chi-squared to see if there are differences between the results of the instrument and the variables, sex, spatiality, degree of residency, and marital status, there were no differences between SD and academic year ($p = 0.95$), SD and marital status ($p = 0.89$), IQ and academic year ($p = 0, 678$), IC and marital status ($p = 0.93$), IC and sex ($p = 0.77$), PE and marital status ($p = 0.465$), EP and sex ($p = 0.49$), EP and specialty ($p = 0.125$), RI and academic year ($p = 0.587$), RI and marital status ($p = 0.97$), IR and sex ($p = 0.95$), IR and specialty ($p = 0.20$) (p-value ≤ 0.05); but there was a statistically significant difference in SD and sex ($p = 0.02$), SD and specialty ($p = 0.002$), IC and specialty ($p = 0.013$), EP and academic year ($p = 0.202$) (p-value ≤ 0.05).

When applying Kendall's Tau-b to see correlation between ordinal qualitative variables such as year of residency and instrument score on perception in the 4 dimensions, a low negative correlation was found with calculated Tau-b of -0.486 with a p-value $= 0.0000$. The correlation between marital status and instrument score was found to be a low positive correlation with Tau-b calculated at $+0.237$ with a p-value $= 0.002$. The correlation between gender and the instrument score was found to be low with Tau-b, calculated at $+0.74$ with a p-value $= 0.33$ and not significant. Between the specialty and the

instrument score, a low negative correlation was found with a calculated Tau-b of −0.26 with a non-significant p-value = 0.68 (p-value ≤ 0.05). When looking for predictor variables for the perception of restrictive clinical environment, bivariate logistic regression was applied and the results were dichotomized into only two (restrictive or expansive). Thus, neither the type of specialty (p = 0.728), nor gender (p = 0.971) are predictors of a restrictive environment; however, the marital status (p = 0.010) and the year of residency (p = 0.000) predicted the perception of a more restrictive environment, with an omnibus test on the coefficients of the model (p = 0.000) with a significance of $p \leq 0.05$.

Discussion

Our response rate was just under half of the respondents, a lower response than that found by Hamui Sutton et al. (21), in whose study there was an 88% response rate. Similarly, lower than the response of Zhang et al. with 85% (24) in a sample of nursing students using the Clinical Learning Environment, Supervision, and Teacher Scale instrument.

The age of our respondents was similar to that reported by Hernández-Domínguez et al. (25), with 30 years, and Vera Muñoz et al. (22), with 27. Concerning gender, we presented a higher proportion of males, different from Vera Muñoz et al. (22), with a higher frequency of females, and Medina et al. (26). However, it was similar to Hernández-Domínguez et al. (25), who presented a greater number of men with the PHEEM instrument in Puebla (Mexico) in a sample of resident physicians, and Ruiz González (27), in a hospital in Baja California.

Regarding marital status, single was the most common, similar to that found by Hernández-Domínguez et al. (25), with 70%; Villanueva González et al. (28), with 64%, and Vera Muñoz et al. (22), with 75%. As for medical specialties, we found a higher frequency of internal medicine, different from the study by Hernández-Domínguez et al. (25), where family medicine predominated, and similar to that reported by Vera Muñoz et al. (29), possibly associated with the fact that our hospital is a third level unit, with no core specialties.

On the other hand, in terms of academic grades, we found first-year residents to be the most common, similar to that documented by Vera Muñoz et al. (22,29) and Villanueva González et al. (28), but different from Medina et al. (26) and Ruiz González (27), where third-year residents predominated, and Hernández-Domínguez et al. (25), where the most common were second-year residents.

Overall, all four dimensions were reported as restrictive in our population, different from the findings of Villanueva González et al. (28), where the highest score was for expansive environments, ranging from 40% to 60%. For the different dimensions assessed, all four were perceived as restrictive, with some similarities to what was found by Sutton et al. (13) in their poster presentation at the 2013 medical education conference, in which IR is perceived as restrictive in the internal medicine services of public hospitals, such as Instituto Nacional de Ciencias de la Nutrición, Hospital General de México, Hospital de Especialidades Siglo XXI del IMS, and Hospital Regional Primero de Octubre del ISSTE, with scores on this dimension ranging from 2.6 to 2.34 (30). Overall, this was lower than our results: IR (3.09) and in the internal medicine department (3.11), similar to Ruiz González (27), in Baja California; however, these results contrast with those of a private hospital, such as Centro Médico ABC IAP, where IR scores were expansive (1.79). In summary, the other IQ and SD dimensions in public and private hospitals, according to the results of Sutton et al. (13), were found in expansive scores, unlike ours, where all dimensions were found in restrictive score.

Given these results, we could postulate that hospitals in Mexico City may have more expansive CLEs than those in the provinces, and specifically in the northeastern region of Mexico. When inferential analysis was applied, the variables sex, medical specialty, and SD, together with specialty and academic year with IQ, did show differences. The binary logistic

regression showed that both marital status and academic year predicted the perception of a restrictive CLE.

Conclusions

Our results are similar in the demographic aspects of the population assessed; however, it appears that the CLEs assessed with the ACA-UNAM-MEX instrument at our hospital site are in restrictive ranges, and constitute the dimension that most closely resembles the results of public hospitals in Mexico City, while the other dimensions are more restrictive at our site and other sites in the northwest region of Mexico. The SD and IQ showed differences between the variables sex, specialty, and academic year, although marital status and academic grade seem to predict the perception of a restrictive clinical learning environment.

There are some aspects that limit our results, among them, the low response to the survey and the lack of a probabilistic and randomized selection, which reduced the generalizability of our results. A noteworthy aspect is the fact that there are few published research studies with the ACA-UNAM-MEX instrument, which limited our results to a few thesis papers that were located in university repositories.

Ethical aspects

This work was submitted for evaluation and approval by the Local Research Ethics Committee of our hospital, with institutional registration number R-2022-2602-064 of the Mexican Institute of Social Security.

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Conflicts of interest

The authors declare that they have no conflicts of interest.

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