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CLINICAL RESEARCH:

Factors Associated with the Perception of Prehospital Internship Training of Dental and Other Health Sciences Students in the COVID-19 Context

Factores asociados a la percepción de la formación en prácticas prehospitalarias de los estudiantes de odontología y otras ciencias de la salud en el contexto COVID-19

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ABSTRACT: During the COVID-19 pandemic, pre-internship training of Health Sciences students took on an essential role. The shift to virtual practices and a project-based learning approach brought challenges, but also opened doors for adaptation and learning in a constantly evolving healthcare landscape. To determine the factors associated with the perception of Peruvian health sciences students during the period of isolation due to the COVID-19 pandemic regarding their training prior to hospital internship. A Cross-sectional analytical study was performed. Students from professional schools of health sciences who entered the hospital internship 2022 and students from the year prior to the internship from a Peruvian public university were evaluated. Data collection was performed with a 49-question questionnaire. Female participants were more prevalent with 384 (70.98%) students while the medical career had the highest participation with 152 respondents (28.1%) followed by the dental career with 134 (24.77%). In the adjusted logistic regression model no influence of associated factors on students' perception of their preparedness for hospital internship in the isolation period due to the COVID-19 pandemic was found. Peruvian Health Sciences students self-perceive themselves prepared for hospital internship in Comprehensive Care, Prevention, Collaboration and Self-Learning, but less so in Practical Skills, Understanding Science, Interpersonal Skills and Confidence.

KEYWORDS: COVID-19; Dental students; Medical education; Perception.

RESUMEN: Durante la pandemia de COVID-19, la formación previa a las prácticas de los estudiantes de Ciencias de la Salud adquirió un papel esencial. El cambio a prácticas virtuales y a un enfoque de aprendizaje basado en proyectos trajo consigo retos, pero también abrió puertas para la adaptación y el aprendizaje en un panorama sanitario en constante evolución. Determinar los factores asociados a la percepción de los estudiantes peruanos de Ciencias de la Salud durante el periodo de aislamiento por la pandemia de COVID-19 sobre su formación previa a las prácticas hospitalarias. Se realizó un estudio analítico transversal. Se evaluaron estudiantes de las escuelas profesionales de ciencias de la salud que ingresaron al internado hospitalario 2022 y estudiantes del año anterior al internado de una universidad pública peruana. La recolección de datos se realizó con un cuestionario de 49 preguntas. El sexo femenino tuvo mayor prevalencia con 384 (70.98%) estudiantes, mientras que la carrera de medicina tuvo la mayor participación con 152 encuestados (28.1%), seguida de la carrera de odontología con 134 (24.77%). En el modelo de regresión logística ajustado no se encontró influencia de los factores asociados en la percepción de los estudiantes sobre su preparación para el internado hospitalario en el periodo de aislamiento por la pandemia de COVID-19. Los estudiantes peruanos de Ciencias de la Salud se auto perciben preparados para el internado hospitalario en Atención Integral, Prevención, Colaboración y Autoaprendizaje, pero menos en Habilidades Prácticas, Comprensión de la Ciencia, Habilidades Interpersonales y Confianza.

PALABRAS CLAVE: COVID-19; Estudiantes de odontología; Educación médica; Percepción.

INTRODUCTION

The accelerated transmission of SARS-Cov-2 worldwide influenced most countries to implement measures of social distancing and isolation, because of which detrimental effects were observed in all sectors of society (1, 2). Thus, the educational sector was affected by the interruption of face-to-face activities (3), mainly medical and other health sciences schools' programs, due to the increased risk of infection as part of clinical practices (4).

In order to continue with educational activities, schools of Health Sciences programs had to adopt solutions such as the extended use of e-learning. This modality represented a great challenge but also opportunities, especially in low-income countries. Where it is possible to maximize teaching resources and reach larger audiences (5), although there are often large digital divides between high and low-income countries, which hinders the proper implementation of this type of learning (6).

Studies carried out in the United Kingdom7 and Mexico8 show the favorable impact of adapting medical education activities to e-learning systems in preparing students for programs equivalent to hospital internships. On the other hand, several authors state that undergraduate students should be prepared for hospital internship in eight areas: interpersonal and communication skills; confidence; collaboration and teamwork; practical skills and patient management; understanding of science; prevention; comprehensive care; and self-directed learning (9-11).

Inadequate preparation during the transition period from the classroom to the health center can generate effects at the personal level of the students, and if generalized, at the level of the

health system (11). At the individual level, it can cause high levels of stress, emotional disturbance and even depression. With these alterations. physical disorders such as sweating, chills, lack of concentration and even anger may occur (12). In addition, it can adversely affect the quality of health services. Therefore, the objective of the present study was to determine the factors associated with the perception of Peruvian health sciences students during the period of isolation due to the COVID-19 pandemic regarding their training prior to hospital internship.

MATERIALS AND METHODS

DESIGN

The study was of analytical and cross-sectional design. The research evaluated all students of the academic programs of a) Human Medicine, b) Nursing, c) Obstetrics, d) Nutrition. e) Dentistry, f) Rehabilitation therapies, g) Radio-imaging, h) Laboratory and pathological anatomy. and i) Psychology of the Universidad Nacional Federico Villarreal, Lima-Peru (UNFV); who entered the hospital internship in the year 2022 and those students of the year prior to the internship. The sample (n=541) students were calculated using the estimation formula of a proportion through the Stata 15 program Stata 15® (College Station. Texas 77845 USA) with an Alpha of 0.05 and a Beta of 0.8. The manuscript was written following the guidelines of STROBE (The Strengthening the Reporting of Observational Studies in Epidemiology).

PROCEDURES

The selection criteria were a) Students of the academic programs of human medicine, nursing, obstetrics, nutrition, dentistry, rehabilitation therapies, radio-imaging, laboratory and pathological anatomy and psychology of the UNFV; who entered the hospital internship 2022 and those who were studying the year prior to the internship. b) Enrolled in the academic period 2021-II. c) Over 18 years of age of both sexes. The exclusion criteria were a) Students who did not accept to participate voluntarily in the study.

VARIABLES

The instrument used for data collection was a self-administered, anonymous questionnaire, applied in virtual format using Microsoft Forms. The validated Preparation for Hospital Practice Questionnaire (PHPQ), taken from the study by Hill *et al*. (1998), was used, with Cronbach's alpha coefficients of its eight subscales ranging from 0.78 to 0.88 (9) Yu *et al*. (2021) validated the Chinese version of the questionnaire, applied after the COVID-19 pandemic education, obtaining an overall Cronbach's alpha of 0.94 (11). The questionnaire consisted of 49 questions. with a first segment of closed and polytomous questions consisting of 05 questions on sociodemographic influencing factors (age, sex, marital status, region of origin and employment status), and three questions to identify the professional school to which the student belongs, the year of the hospital internship (2022 or 2023) and the changes made in their clinical or hospital practicum rotations during the COVID-19 pandemic isolation period. The second segment of the questionnaire was composed of the 41 items of the PHPQ, on a 6-point Likert scale, which aimed to determine the perceptions of Health Sciences students about their preparation for the hospital internship. Considering the following dimensions: 1) interpersonal and communication skills (4 items), 2) confidence (6 items), 3) collaboration and teamwork (4 items), 4) practical skills and patient management (5 items), 5) understanding of science (4 items), 6) prevention (6 items), 7) comprehensive care (6 items), and 8) self-directed learning (6 items). The online electronic questionnaire was distributed via email to all students enrolled in semester 2021-II in UNFV health sciences programs who entered the 2022 hospital internship and those

from the previous year. Participants provided informed consent and a record of their willingness to participate was obtained by answering the initial "yes/no" question. Finally, the perception variable was measured numerically (Likert scale), while the other sociodemographic variables were measured categorically on an ordinal scale.

PROCESSING

A descriptive analysis was performed using frequencies and percentages of the categorical variables. Normality was assessed using the Kolgomorov-Smirnov test. Finally, multivariate analysis will be performed by logistic regression through Odds Ratio (OR), to identify predictor factors. The dependent variable was the perception of pre-internship training in Health Sciences students during COVID-19 and the independent variables were Gender, Age, Marital Status, Professional School, Year of internship, Changes in clinical or hospital internships, Region of origin, Employment status. A significance level of $p<0.05$ will be used. All statistical analysis will be performed with Stata 15® software (College Station. Texas 77845 USA).

ETHICAL ASPECTS

This study was revised and approved by the Ethics Committee of the Faculty of Medicine of the UNFV, DICTAMEN 06-2022-CIEI.

RESULTS

Of the 541 participating students, 384 (70.98%) were found to be female participants, while only 157 (29.02%) were male. The most prevalent age group was 21 to 24 years old with 296 (54.71%) participants. The academic program with the most representatives was Human Medicine with 152 (28.1%), followed by Dentistry with 134 (24.77%). The majority 514 (95.01%) of the participants were single, 232 (42.88%) participants are doing the hospital internship in 2022, while 309 (57.12%) will do it in 2023, 407 (75.23%) of the respondents reported that their internships were changed to a virtual modality, 102 (18.85%) that they were postponed. while only 32 (5.91%) mentioned that they were cancelled. Finally. 325 (60.07%) of the respondents only study, while 216 (39.93%) study and work (Table 1).

Regarding interpersonal skills, the lowest mean was 3.92 for item 22 which sought to measure students' perception of their readiness to work with terminally ill patients. In relation to confidence, the lowest mean was 3.92 for item 2 which sought to measure students' perception of their preparedness to cope with stress caused by their work. Regarding collaboration, the highest means were for the items assessing the perception on the appreciation of the importance of group dynamics in working in a team environment and the perception on being sensitive to the needs of collaborating staff. Regarding practical skills and patient management, the lowest mean was 3.68 for item 7 which sought to measure students' perception of their preparedness to handle most emergencies in their area. In relation to understanding science, the lowest mean was 3.87 for item 12 which sought to measure students' perception of their preparedness to justify the uses of medications based on their mechanisms of action. Regarding prevention, the lowest mean was 3.8 for item 13 which sought to measure students' perception of their readiness to take a drug and alcohol history in an initial consultation. Regarding comprehensive care, the lowest mean was 4.11 for item 1 which sought to measure students' perception of their readiness to assess the impact of family factors on illness. In relation to self-directed learning, the lowest mean was 4.3 for item 23 which sought to measure students' perception of their readiness to evaluate their educational experience (Table 2).

In the adjusted logistic regression model, sex was not a predictor factor, as it showed no influence for a different perception of students on their readiness for hospital internship in the isolation period by COVID-19 (OR of 0.99, CI=0.51-1.91), similarly with age (highest OR was 2.88, CI=0.23-36.6), neither on marital status (0.64, CI=0.13-3.21), nor on Professional School (highest OR=4.66, CI=0.55-39.4), nor on year of internship (OR=0.86, CI=0.45-1.65). No influence was found on the students' perception of the changes that occurred in their clinical or hospital internships (highest OR=1.43, CI=0.45-4.53), nor on the region of origin (highest OR=0.73, CI=0.08-6.34), nor on the employment status (OR=1.27, CI=0.66-2.45) (Table 3).

Table 1. Sociodemographic and academic characteristics of undergraduate health sciences students in the year prior to hospital internship.

Sociodemographic and academic characteristics		n	%
Gender	Male	157	29.02
	Female	384	70.98
Age			
	17 - 20	22	4.07
	21 - 24	296	54.71
	25 - 28	159	29.39
	29 - 32	44	8.13
	33 or more	20	3.7
Marital Status			
	Single	514	95.01
	Married	12	2.22
	Widowed	0	0
	Divorced	1	0.18
	Cohabitant	14	2.59
Professional School			
	Human Medicine	152	28.1
	Nursing	80	14.79
	Obstetrics	31	5.73
	Nutrition	69	12.75
	Dentistry	134	24.77
	Rehabilitation Therapies	35	6.47
	Radioimaging	17	3.14
	Laboratory and Pathological Anatomy	12	2.22
	Psychology	11	2.03
Year of internship			
	2022	232	42.88
	2023	309	57.12
Changes in clinical or hospital internships			
	Cancellation	32	5.91
	Postponement	102	18.85
	Change to virtual modality	407	75.23
Region of origin			
	Coast	439	81.15
	Highlands	92	17.01
	Jungle	10	1.85
Employment status	Study only	325	60.07
	Study and work	216	39.93

Table 2. Descriptive statistics of perception of preparedness for hospitalization during COVID-19 pandemic isolation.

Dimension	Item	Mean	Standard Desviation
Interpersonal skills			
	20	4.32	1.11
	22	3.92	1.25
	30	4.34	1.09
	36	4.23	1.17
Trust			
	2	3.92	1.26
	3	4.11	1.18
	6	4.08	1.24
	17	4.33	1.13
	26	4.37	1.1
	37	4.4	1.09
Collaboration			
	28	4.6	1.02
	33	4.72	1.02
	40	4.38	1.12
	41	4.45	1.09
Practical skills and patient management			
	4	4.15	1.2
	7	3.68	1.18
	11	4.15	1.15
	25	4.11	1.13
	31	4.4	1.07
Understanding of science			
	8	3.98	1.06
	12	3.87	1.16
	19	4.19	1.07
	29	4.02	1.15
Prevention			
	5	4.27	1.11
	9	4.34	1.03
	13	3.8	1.19
	18	4.9	1.02
	32	4.73	1.07
	34	4.72	1.08

Dimension	Item	Mean	Standard Desviation
Comprehensive care			
	1	4.11	1.16
	15	4.33	1.01
	16	4.65	1.03
	21	4.54	1.03
	24	4.47	1.08
	35	4.93	1.06
	10	4.54	1.02
	14	4.31	1.09
	23	4.3	1.09
	27	4.48	1.06
	38	4.55	1.02
	39	4.61	1.05

Table 3. Factors associated with perceptions of hospital inpatient preparedness during COVID-19 pandemic isolatio.

Associated factors	OR	P	95% CI
Gender			
Male	Ref.		
Female	0.99	0.97	0.51-1.91
Age			
17 - 20	Ref.		
21 - 24	2.08	0.3	0.52-8.23
25 - 28	1.42	0.64	0.33-6.13
29 - 32	2.88	0.27	0.43-19.13
33 or more	2.88	0.42	0.23-36.6
Professional School			
Human Medicine	Ref.		
Nursing	1.85	0.26	0.63-5.41
Obstetrics	4.66	0.16	0.55-39.4
Nutrition	1.17	0.76	0.44-3.11
Dentistry	1.61	0.32	0.64-4.05
Rehabilitation Therapies	1.59	0.51	0.4-6.25
Radioimaging	2.19	0.48	0.25-19.16
Laboratory and Pathological Anatomy	1.85	0.59	0.2-16.7
Psychology	1.57	0.69	0.17-14.36
Internship Year			
2022	Ref.		
2023	0.86	0.65	0.45-1.65
Changes in clinical or hospital internships			
Cancellation	Ref.		
Postponement	1.05	0.94	0.28-3.97
Change to virtual modality	1.43	0.55	0.45-4.53
Region of origin			
Coast	Ref.		
Highlands	1.03	0.94	0.46-2.33
Jungle	0.73	0.78	0.08-6.34
State of employment			
Only studying	Ref.		
Studying and working	1.27	0.47	0.66-2.45

DISCUSSION

In the present study 384 (70.98%) were female participants, while only 157 (29.02%) were male, a proportion like that of the study conducted in Mexico by Servin-Rojas *et al*. (8), which found 61% of respondents to be female, which can be explained by most female students in the academic programs of health sciences at UNFV. It should be noted that, according to the university, hospital internships were changed to a virtual modality, however, only 407 (75.23%) of the respondents reported that their internships were changed to a virtual modality, while 102 (18.85%) stated that they were postponed and 32 (5.91%) that they were cancelled.

The highest means were for items 35 (4.93), 16 (4.65) and 21 (4.54) of the Comprehensive Care dimensions. Similarly, the values were high for items 18 (4.9), 32 (4.73) and 34 (4.72) of the Prevention dimensions. In the Collaboration dimension, they were also high in items 33 (4.72), 28 (4.6) and 41 (4.45). In the Self-Directed Learning dimension, they were also high in items 39 (4.61), 38 (4.55), 10 (4.54) and 27 (4.48). The results are like those of the study by Yu *et al*. (11) conducted in Taiwan, high means are found in the Comprehensive Care dimensions in item 16 (4.65), similarly in Prevention, in items 18 (4.52). 32 (4.54) and 34 (4.19). In the Collaboration dimension, they were also high in item 28 (4.6). In the same sense, in Self-Directed Learning, they were also high in item 38 (4.18) and 10 (4.75).

The lowest means were for items 7 (3.68) of the Practical Skills and Patient Management dimension, which sought to measure students' perception of their preparedness to handle most emergencies in their area. The means were also low for item 12 (3.87) of the Understanding Science dimension, and in items 20 and 22 (3.92) of the Interpersonal Skills and Confidence dimensions, respectively. It is important to mention that in the Prevention dimension, even though most of the items obtained high means above 4. item 13 obtained a low mean of 3.8. which sought to measure the students' perception of their readiness to take a drug and alcohol history in an initial consultation. Similarly, the study by Yu *et al*. (11) found a considerably lower mean on item 7 (2.37) of the Practical skills and patient management dimension. while in the Understanding science dimension, a lower mean of 3.33 for item 12. In the same vein, in the Interpersonal Skills dimension, the values are even lower in items 20 with a mean average of 2.43 and 3.00 for item 22 of the Trust dimension.

The results show that students perceive that there are aspects in which they do not feel sufficiently prepared for the hospital internship such as some practical skills and patient management, understanding of science, interpersonal skills, and confidence. The results are compatible with those of the study by Abbasi *et al*. (13) conducted on medical and dental students in Pakistan, who state that virtual teaching is preferred (85%) compared to face-to-face (15%) and has a negative impact (86%) compared to traditional methodology. Similarly. Dost *et al*. (14) in their study conducted on medical students from various universities in the UK, found that students perceived that online education is not as effective as face-to-face with a mean of 1.92 on a Likert scale. So, they do not feel as well prepared to face their profession with a mean of 2.28. In that sense, the results are consistent with those of the study by Servin-Rojas *et al*. (8), conducted in Mexico, in which 97% of respondents in the last year of the medical program considered that the changes due to the pandemic will affect their performance in the hospital internship, with 79% of students from public universities and 82% from private universities feeling that their preparation for the internship has been worse than that of previous generations, while 82% from public universities and 85% from private universities, would repeat the last year of their preparation if possible.

It is important to mention that there are also aspects in which students feel more adequately prepared in aspects such as Comprehensive Care, Collaboration, Prevention or Self-directed Learning, which is compatible with results of studies such as Fatani's (15) conducted in Saudi Arabia, in which medical students found their virtual sessions intellectually challenging with a mean of 4.08 on a Likert scale and that they understand the subjects with a mean of 4.12. The results are also consistent with those of the study by Schlenz *et al*. (16) conducted in Germany, in which 54.3% strongly agreed and 28.6% agreed that the implementation of online teaching in theoretical courses was achieved without losing content and was very positive, agreeing that its implementation should be maintained in the future. Similarly, the results are compatible with those of the study by Baczek *et al*. (17) in which there is no significant difference in the preference between virtual and face-to-face education ($p=0.46$). However; like the results of the present study, online teaching was considered less effective for increasing skills, with means of 2.03 and 4.3 for face-to-face ($p<0.001$); as well as it was also considered less effective for increasing social competencies. with means of 2.03 and 4.3 for face-to-face ($p<0.001$). The results are also congruent with those of the study by Dyrek *et al*. (18) in which a high acceptance was observed, rating virtual teaching as good or very good in conferences by 78.4% and in seminars by 51.2%. while in clinical activities it was rated as poor or very poor by 62.9%.

The research showed that there is no influence of these factors on perception. In contrast, in the study by Schlenz *et al*. (16) they found that semester of study significantly influenced perceptions of management, didactic benefit and motivation ($p<0.001$), while gender only significantly influenced perceptions of didactic benefit ($p<0.010$).

The main strengths of this study were that it provides scientific evidence of the perception of hospital inpatient preparedness in the isolation period for the COVID-19 pandemic, as well as identifying associated factors that influence this perception. Consequently, educational strategies can be established to strengthen students' preparedness in the areas where they perceive they feel less prepared. One of the main limitations was that the sample was not completely representative of health sciences, since it was only carried out in a public university located in Lima, the capital of Peru. In addition, it is necessary to consider that a self-administered questionnaire was applied.

CONCLUSION

It was concluded that Peruvian students in the last year prior to hospital internship, from the different health sciences programs perceive a more adequate preparation for hospital internship in the aspects of Comprehensive care, Prevention, Collaboration and Self-directed learning, while they perceive themselves less prepared in the aspects of Practical skills and patient management. Understanding science, Interpersonal skills, and Confidence. However, no statistically significant influence of all associated factors was found.

CONFLICT OF INTEREST

No conflict of interest.

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AUTHOR CONTRIBUTION STATEMENT

Conceptualization and design: J.A., L.H., A.T., and M.R.
Literature review: L.H., F.M.T. and D.A.T.
Methodology and validation: F.M.T. and D.A.T.
Formal analysis: J.A., F.M.T. and A.T.
Investigation and data collection: M.R. and L.H.
Resources: D.A.T. and L.H.
Data analysis and interpretation: F.M.T., D.A.T., L.H. and J.A.
Writing-review and editing: L.H., D.A.T. and M.R.
Supervision: F.M.T.
Project administration: J.A., F.M.T. and L.H.

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