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Nursing students' experience and training in healthcare aid during the COVID-19 pandemic in Spain

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Background: During the COVID-19 pandemic health crisis, in some countries such as Spain, nursing students have offered to provide health assistance, but the role they have played, their degree of preparedness to face the situation, and what must be improved in their training to be ready for these situations is unknown.

Objective: Describe the experience and perceptions of students of the Nursing university degree during their participation as health support in the COVID-19 health crisis in Spain.

Design: We conducted a cross-sectional survey study.

Method: 503 students enrolled in the 4th course of the Nursing degree in Spain during the months of March and April 2020. An online questionnaire was developed, based on a pilot study and distributed through the Nursing Association, students' unions and students' associations. Variables were used to describe their participation, degree of preparedness and training needs to determine how to improve training through descriptive statistics, as well as nonparametric tests to analyse the relationship between training and degree of preparedness nursing students. Results are reported according to the STROBE Statement.

Results: 73.2% (368) of students offered to participate in healthcare aid, of which 225 were actively involved. 27.8% carried out nursing tasks without supervision, and 47.7% assisted COVID-19 patients as any other nurse. Only 3.4% felt very prepared to work in the field of intensive care, finding that those students who perceived a higher degree of preparedness had received previous training in personal protective equipment and mechanical ventilation ($p < 0.005$). The highest scores for training activities that may improve their preparedness were simulations to improve levels of anxiety and stress when managing critical patients, simulation in ventilatory support and mandatory practices in services where ventilators are used.

Conclusions: Although three out of four students were willing to provide health assistance, they recognise that they were not specially prepared in the field of intensive care and demand training with simulation to improve anxiety and stress levels in the management of critical patients and simulation in ventilatory support.

Relevance to clinical practice: Students have been vital resources for our health system and society when they have been needed. It is now up to us, both teachers and

health authorities, to share their efforts by implementing the necessary improvements in training and safety measures not only because these affects the health and safety of the patient, but because they will be essential parts in future pandemics.

KEYWORDS
COVID-19, nursing, simulation training, students

1 | INTRODUCTION

Following the declaration by the World Health Organization (WHO) of Coronavirus Disease Pandemic (COVID-19) on 11 March 2020, much of the world has faced one of its biggest health challenges (World Health Organization2020).

In Spain, as of 6 June 2020, a total of 27,135 deaths have been recorded, 11,604 persons admitted to intensive care units, and 124,302 hospital admissions (Ministerio de Sanidad España. Centro de Coordinación de alertas y emergencias sanitarias, 2020). The Carlos III Institute of Health (ISCIII) through the National Epidemiological Surveillance Network (RENAVE), publishes the report on the situation of COVID-19 among health staff in Spain weekly. As of May 29, 2020, 40,961 cases and 52 deaths were of health workers, accounting for 24.1% of all confirmed cases of COVID-19, considering health workers as a heterogeneous group of hospital, health centres and/or social-health centres workers (Instituto de Salud Carlos III, 2020).

2 | BACKGROUND

In the 22 to 28 March week, the epidemiological peak of hospital admissions was reached at around 4,000 daily admissions, which resulted in the healthcare collapse of many Spanish hospitals (Instituto de Salud Carlos III, n.d.) This same phenomenon was repeated in other parts of the world (WHO, 2020; Xiong & Peng, 2020). The different Spanish hospitals progressively adapted and transformed their units of other specialties into COVID-19 units and created from scratch COVID-19 units to attend to the needs of the high number of patients with this disease. However, as the epidemic progressed in Spain, human resources to care for these patients became insufficient (Instituto de Salud Carlos III, 2020). In view of this unprecedented situation, the Government of Spain published a ministerial order in the Official State Gazette (BOE) of 15 March 2020 (Ministerio de Sanidad de España, 2020), providing that students of nursing and medicine degrees could join in to work always as 'support or under the supervision of a professional'. This also occurred in other countries in a similar way (Jackson et al., 2020; Swift et al., 2020).

However, this student collaboration has gone beyond healthcare support, as the lack of resources has put students with no working experience in the front line. Unions point out that though this is not a widespread practice, there are public and private hospitals with

> **What does this paper contribute to the wider global clinical community?**
>
> - After the declaration of the Alarm status in Spain caused by the COVID-19 Pandemic, and the collapse of the health system, the government of Spain issued a ministerial order for the incorporation of medical and nursing students as health support.
> - However, this collaboration has gone beyond what had been planned and has placed students with little experience on the front line of battle. There is currently no publication describing the role of nursing students during this pandemic.
> - This manuscript describes the experience of nursing students in Spain in their participation as a healthcare aid during the COVID-19 Pandemic. The relationship between the degree of preparedness received in different areas of care and their prior training, as well as the main suggestions to improve their training in the face of new pandemics or outbreaks, is studied.
> - Although three out of four students were willing to provide healthcare assistance, they recognise not feeling specially prepared in the field of intensive care and demand training with simulation in this field.

students in emergency services and intensive care units being subject to unnecessary stress and devastating emotional shock (ABC España, 2020; Radio Televion Española, 2020; Redacción Médica, 2020). On the other hand, other authors have observed that healthcare professionals who treat patients with COVID-19 present an increased risk of mental health problems such as anxiety, depression, insomnia and stress (Liu et al., 2020).

There is currently no publication describing the role of nursing and medical students in this pandemic. In Spain, a brief study was conducted on the knowledge and attitudes of 102 nursing and medical students on COVID-19 and their potential participation (Cervera-Gasch et al., 2020), where 63.0% said they did not feel prepared.

For this reason, it is considered relevant to describe the experience of Nursing university students during the COVID-19 health crisis in Spain, as well as their degree of preparedness and what type

of training improvements may be proposed to improve their training in the face of new waves of this pandemic.

3 | METHODS

3.1 | Design and selection of subjects under study

Cross-sectional observational study on students enrolled in the 4th year of the Nursing Degree in Spain, between 25 April and 15 May 2020. There were no exclusion criteria.

3.2 | Sources of information

For data collection, an anonymous online self-administered questionnaire was used containing 34 items (4 open questions and 30 closed questions) about sociodemographic characteristics, training characteristics, their participation in healthcare aid, perceived degree of preparedness to carry out their care work, and training needs to improve their professional competence.

The questionnaire had been previously piloted on a sample of 20 students, from which the main training needs that were declared to improve professional competence were extracted. Based on these data, the items and responses of the final questionnaire were created. This questionnaire was completely anonymous and distributed through the Nursing Association, students' unions and student organisations of Spain. The dissemination of the questionnaires was carried out through social media (Facebook, Twitter, and Instagram) and through the association's webpage (http://aeee.org. es/). Students, who voluntarily participated in this study, did it by voluntarily filling in the questionnaire. Before starting to fill in the questionnaire, students had to read a fact sheet on the study, its objectives, etc., and give their consent to participate by ticking a box designed for that purpose. An email address was put at their service to answer all the questions raised during the completion of the questionnaire. A non-probabilistic convenience sampling strategy was used due to movement restrictions between the geographical areas during the study period and because of the lack of a students census for each university, which hindered the option of carrying out cluster and randomised sampling, respectively. The following variables were collected:

Sociodemographic variables included age, sex, university to which they belonged and province. Training variables included previous clinical rotations in special units (ICU, Resuscitation, Surgical, Emergencies), university and clinical training in personal protective equipment (PPE) and mechanical ventilation. As variables related to the degree of preparedness, 4 Likert-type questions were included for Hospitalisation, Primary Care, Emergencies and ICU areas. Variables related to their participation included participation in healthcare aid, reasons for non-participation, service where they participated, work carried out, contact with patients infected by COVID-19 and duration of their care work.

3.3 | Statistical analysis used

First, a descriptive analysis was performed using absolute and relative frequencies for categorical variables, mean with standard deviation (SD) for the quantitative variables with normal distribution, and median (Md) with interquartile range (IQR) for ordinal variables. Then, a bivariate analysis was performed using the Kruskal–Wallis nonparametric test between prior PPE training and mechanical ventilation and the degree of preparedness to assist COVID-19 patients. To assess which type of training resulted in a higher degree of preparedness, median scores and mean ranks were compared, so the higher the score, the higher the degree of preparedness. All calculations were performed using the SPSS 24.0 programme.

3.4 | Research Ethics

This study was approved by the Ethics Committee of the General Nursing Council. Students who decided to participate had to sign an ad hoc informed consent by clicking an online space designated for the purpose. The completion of the questionnaire was voluntary and anonymous.

The study methods were compliant with the STROBE (STrengthening the Reporting of OBservational studies in Epidemiology) checklist. (Data S1).

4 | RESULTS

4.1 | Characteristics of the study sample

A total of 503 nursing students from all over Spain participated. The mean age was 22.7 years (SD = 3.18), with 89.4% (433) of women. 49.3% (248) had performed clinical practices in intensive care units, 41.6% (209) had received training in PPE at university, and 36.6% (184) had received it in their hospitals of residency. As for training in mechanical ventilation, 82.5% (315) had received any training at university, and 60.4% (304) had received it in their hospitals of residency either. The training characteristics are presented in more detail in Table 1. The distribution of students by university and province can be found in Tables S1 and S2.

4.2 | Degree of preparedness and participation in healthcare during the pandemic

Students were then asked about their degree of preparedness for caring for COVID-19 patients in different fields. The area in which students felt least prepared was critical care, where only 3.4% (17) expressed feeling very prepared, followed by emergency services' nurses with 4.6% (23), primary care with 8.7% (44) and finally hospitalisation wards with 12.5% (63). Likert-type responses can be found in Table 2.

TABLE 1 Characteristics of the study subjects

Variable	n (%) n = 503
Age years (Mean ±SD)	22.7 (3.18)
Sex	
Male	70 (13.9)
Female	433 (89.4)
Previous clinical rotations	
Intensive Care Unit	248 (49.3)
Resuscitation Service	151 (30.0)
Surgery Service	281 (55.9)
Emergency Service	293 (58.3)
PPE training at university	
No	294 (58.4)
Yes, but only theoretical	161 (32.0)
Yes, and with simulation	48 (9.5)
PPE training in the hospital of residency	
No	319 (63.4)
Yes, but only theoretical	85 (16.9)
Yes, and with simulation	99 (19.7)
Mechanical ventilation training at university	
No	88 (17.5)
Yes, but only theoretical	260 (51.7)
Yes, and with simulation	155 (30.8)
Mechanical ventilation training in the hospital of residency	
No	199 (39.6)
Yes, but only theoretical	87 (17.3)
Yes, and with simulation	217 (43.1)

As for their participation, 73.8% of students who completed the questionnaire offered to participate in healthcare aid, and 44.7% finally participated in it (225). The most common support destination was admissions wards in 54.7% (123) of cases, followed by UCIs with 20.4% (46). The mean duration of the aid was 42.1 days (SD = 13.7), during which 27.8% stated to have performed usual nursing tasks (medication administration, peripheral pathway channelling, etc.) without supervision from another professional, and 47.7% (98) cared for patients with COVID-19 without supervision as any other nurse. Finally, 51.9% (122) stated not to be satisfied with the salary and safety conditions during their work (Table 2).

4.3 | Relationship between training and degree of preparedness

The next step was to determine whether the students' perceived degree of preparedness was related to the training they had received in terms of PPE and mechanical ventilation for the different areas of care. On the one hand, a statistically significant association was found

TABLE 2 Degree of preparedness and healthcare aid participation among Nursing students

Variable	n (%)
You feel prepared to work with COVID−19 patients in the field of critical care	n = 503
Not at all	114 (22.7)
Little	165 (32.8)
Neutral	139 (27.6)
Quite	68 (13.5)
Very	17 (3.4)
You feel prepared to work with COVID−19 patients in the field of hospitalisation	n = 503
Not at all	19 (3.8)
Little	41 (8.2)
Neutral	160 (31.8)
Quite	220 (43.7)
Very	63 (12.5)
You feel prepared to work with COVID−19 patients in the field of emergencies	n = 503
Not at all	83 (16.5)
Little	126 (25.0)
Neutral	**152 (30.2)**
Quite	119 (23.7)
Very	23 (4.6)
You feel prepared to work with COVID−19 patients in the field of Primary Care	n = 503
Not at all	22 (4.4)
Little	54 (10.7)
Neutral	161 (32.0)
Quite	222 (44.1)
Very	44 (8.7)
During the crisis, you have offered for healthcare aid	n = 503
Yes	368 (73.2)
No	135 (26.8)
Reason for not participating (multiple answer)	n = 135
Fear of getting infected	17 (12.5)
Fear of infecting the family	56 (41.5)
I don't feel prepared	46 (34.1)
Other reasons	69 (51.1)
Service in which healthcare has been offered	n = 225
Resuscitation	6 (11.1)
Emergencies	25 (5.0)
Hospitalisation	123 (54.7)

(Continues)

TABLE 2 (Continued)

Variable	n (%)
Nursing homes	22 (9.8)
Primary care	3 (1.3)
ICU	46 (20.4)
During healthcare aid, you have carried out nursing tasks (medication administration, peripheral pathway channelling, catheterisation, etc.)	n = 261
No	24 (4.8)
Yes, but under the supervision of a professional	78 (15.5)
Yes, and without supervision, as any other nurse	140 (27.8)
During healthcare aid, you have assisted COVID−19 patients	n = 263
No	82 (16.3)
Yes, but under the supervision of a professional	60 (25.0)
Yes, and without supervision, as any other nurse	98 (47.7)
Satisfaction with the working conditions (both safety and economical) of the healthcare aid contract	n = 235
No	122 (51.9)
Yes	113 (48.1)
Duration of healthcare aid; days (mean ±SD)	42.1 (13.7)

Bold value indicates statistically significant.

between the training received at the hospital level and the degree of preparedness in all areas. However, the training received at university is only associated with a greater perception of preparedness in the case of PPE in primary care and in the intensive care area.

On the other hand, the only area of care where a statistically significant association was found between the type of training received at university and at the hospital of residency regarding both PPE and mechanical ventilation was in the field of intensive care. As can be seen, the median scores were higher in the training with simulation (Md=3), as compared to exclusively theoretical training or lack of training (Md=2), in the four valued aspects in this area. This difference can also be seen when comparing the mean ranks of the different categories. Generally, the mean ranks of the degree of preparedness when the training has been received with simulation have been higher in almost all areas of training, as compared to exclusively theoretical training, and these, in turn, higher than with lack of training (Table 3).

4.4 | Areas of improvement

Finally, students were asked, based on their responses during the pilot study, to indicate the degree of importance of enhancing

certain teaching actions to improve students' training in the face of a new possible wave of the pandemic. These stated, with the highest median scores (5 points, very important), that simulations should be improved or enhanced to improve anxiety and stress levels in the management of critical patients; also simulation in ventilatory support; and the realisation of mandatory practices in services where ventilators exist (Table 4).

5 | DISCUSSION

In order to describe the participation of nursing students and their training needs during the COVID-19 pandemic in Spain, an online questionnaire was published that was answered by 503 students of the 4th year of the Nursing degree.

In our sample, 73.0% of the students offered to participate during the health emergency, and almost half of them participated in direct care. Regarding this last point, there are currently no official volunteering participation figures. However, in a study performed on nursing students where they were involved in participating in a potential influenza pandemic, 67.9% stated they would participate as volunteers, and so, the authors were alerting to the need to create recruitment protocols already in 2010 (Yonge et al., 2010).

Although students' participation in this pandemic was designed to be under the supervision of another professional, a high percentage of them worked as any other nurse and in direct contact with infected patients. It is therefore necessary to recognise and value nursing students' aid in these moments and to be aware of the risks they have faced without having a consolidated degree or training, as also happens with medical students (Representatives of the STARSurg Collaborative & EuroSurg Collaborative, 2020) and residents without having completed their specialty (Legido-Quigley et al., 2020). This experience may also have an impact on their mental health as has happened in other pandemics, among which we may highlight Severe Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS), where health workers suffered from high stress related to the high risk of infection, stigmatisation, lack of staff and uncertainty (Lee et al., 2018; Maunder et al., 2003; Swift et al., 2020). In fact, during this pandemic, Chinese students who were outside their country have already suffered isolation and stigmatisation for being considered potential carriers (Zhai & Du, 2020). All this is joined by the low salary these students have received, that is between 900 euros and 1,200 euros (monthly income without taxes) depending on whether they were Nursing and/or Medical students, with precarious contracts that do not assure them whether they will be renewed or how long they will continue working (El Español, 2020).

On the other hand, students who had participated in training experiences for the management of PPE and mechanical ventilation felt more prepared to assist patients with COVID-19, especially in the area of critical care. In addition, simulation training presented better scores with respect to the degree of preparedness than exclusively theoretical training. These results are in line with several meta-analyses

TABLE 3 Relationship between PPE and mechanical ventilation training and perceived degree of preparedness to work with COVID-19 patients

| Training | Degree of preparedness to work with Covid–19 patients (Likert-type scale 1–5) in: | | | | | | | | | | | |
| | Primary care | | | Hospitalisation ward | | | Emergencies | | | Intensive care | | |
	Md (IQR)	Mean rank	p value	Md (IQR)	Mean rank	p value	Md (IQR)	Mean rank	p value	Md (IQR)	Mean rank	p value
PPE training at university			**<0.001**			0.164			0.060			**0.018**
No (n = 294)	3 (1)	230.65		4 (1)	247.66		3 (2)	239.60		2 (2)	238.52	
Yes, but only theoretical (n = 161)	4 (1)	276.41		4 (1)	249.32		3 (2)	271.41		2 (1)	264.59	
Yes, and with simulation (n = 48)	4 (1)	302.02		4 (1)	287.57		3 (2)	262.85		3 (2)	292.35	
PPE training in the hospital of residency			**0.002**			**0.002**			**0.022**			**0.003**
No (n = 319)	3 (1)	239.40		4 (1)	236.44		3 (1)	238.80		2 (2)	236.98	
Yes, but only theoretical (n = 85)	4 (1)	249.29		4 (1)	267.99		3 (2)	275.15		2 (1)	264.05	
Yes, and with simulation (n = 99)	4 (1)	294.93		4 (1)	288.42		3 (2)	274.66		3 (2)	290.05	
Mechanical ventilation training at university			0.225			0.127			0.140			**<0.001**
No (n = 88)	3 (1)	229.92		3 (1)	233.55		3 (1)	229.85		2 (2)	205.83	
Yes, but only theoretical (n = 260)	4 (1)	254.47		4 (1)	248.29		3 (2)	250.62		2 (1)	246.37	
Yes, and with simulation (n = 155)	4 (1)	260.39		4 (1)	268.70		3 (2)	266.90		3 (2)	287.66	
Mechanical ventilation training in the hospital of residence			**0.009**			**0.008**			**0.019**			**<0.001**
No (n = 199)	3 (1)	229.53		3 (1)	231.09		3 (1)	230.92		2 (2)	206.05	
Yes, but only theoretical (n = 87)	4 (1)	257.51		4 (1)	249.05		3 (2)	256.59		2 (2)	239.73	
Yes, and with simulation (n = 217)	4 (1)	270.40		4 (1)	272.36		3 (2)	269.49		3 (2)	299.06	

Abbreviations: IQR: interquartile range; Md: median.

Bold value indicates statistically significant.

TABLE 4 Students' assessment of specific training actions to improve the degree of preparedness to assist COVID-19 patients

| | Not at all | Little | Neutral | Quite | Very | |
| | 1 | 2 | 3 | 4 | 5 | Score Md |
Actions	n (%)	n (%)	n (%)	n (%)	n (%)	(IQR)
Simulations to improve teamwork and communication between professionals	9 (1.8)	15 (3.0)	111 (22.1)	176 (35.0)	192 (38.2)	4 (2)
Simulations to improve communication with patients and families	6 (1.2)	23 (4.6)	109 (21.7)	163 (32.4)	202 (40.2)	4 (2)
Simulations to improve anxiety and stress in managing critical patients	8 (1.6)	18 (3.2)	94 (18.7)	125 (24.9)	260 (51.7)	5 (1)
Mechanical ventilation simulations	7 (1.4)	8 (1.6)	78 (15.5)	96 (19.1)	314 (62.4)	5 (1)
Training in epidemiology	15 (3.0)	50 (9.9)	171 (34.0)	158 (31.4)	109 (21.7)	4 (1)
Training in palliative care	5 (1.0)	16 (3.2)	91 (18.1)	145 (28.8)	246 (48.9)	4 (1)
Relation of compulsory training in services with ventilators	6 (1.2)	8 (1.6)	86 (17.1)	91 (18.1)	312 (62.0)	5 (1)

of clinical trials conducted in both nursing students (Cant & Cooper, 2017; La Cerra et al., 2019) and medical students (Beal et al., 2017), where simulation training has been observed to be one of the best teaching methodologies, especially for skills acquisition.

This result goes in line with the suggestions proposed by students to improve training in the management of patients with COVID-19. Among the areas of teaching improvements proposed by students, simulations to improve anxiety and stress in the management of critical patients, simulation in ventilatory support and the realisation of mandatory practices in services where there are ventilators were highlighted. In this way, students also bring to light the need to better train them in the field of critical care. In Spain, there is no specialist nurse in critical care (Cubel, 2006), and training in this field is carried out by each centre, as well as self-training and the professional experience acquired over the years. During this pandemic, the need to improve this area of care has been highlighted as, although there may be sufficient material resources such as ventilators, their management is highly complex and requires qualified staff that cannot be trained in just days. For this reason, if this apprenticeship were enhanced during the training degree by including mandatory practices and specific simulation workshops, students could be better prepared for new situations alike.

Among the study limitations, a selection bias is possible as non-probabilistic sampling was used and because participation might be conditioned by factors others from the study ones, which are difficult to control. These may include feeling of guilt for not having volunteered in health assistance and how the pandemic has impacted on the family or social environment. It not possible to identify, either, the scope of the questionnaire among the students and the response rate. The reason why the convenience sampling was used is based, on the one hand, on the great geographical dispersion of the students who could potentially participate in the study and, on the other hand, on the most important factor which has been the pandemic moment. Also, we did not have a students census for each university so as to carry out randomised sampling.

Among the strength of the study, it stands out for being the first study describing the experience of nursing students during the COVID-19 pandemic which may serve to guide teaching leaders on the urgent need to adopt students' training suggestions.

6 | CONCLUSIONS

Students have been vital resources for our health system and society when they have been needed. It is now up to us, both teachers and health authorities, to share their workload by implementing the necessary improvements in training and safety measures not only because their health may become affected as well as patient's safety, but also because they will play essential roles in future pandemics.

7 | RELEVANCE TO CLINICAL PRACTICE

Three out of four students were willing to provide healthcare assistance; they recognise not feeling specially prepared in the field of intensive care and demand training with simulation in this field.

The students have demonstrated, in many cases, great participation during the pandemic and, at the same time, have revealed training gaps. This is the moment to improve our training system to successfully train students and future professionals in the management of situations of such impact as is the present pandemic.

CONFLICTS OF INTEREST
No conflict of interest has been declared by the author(s).

AUTHOR CONTRIBUTIONS
All authors had full access to all the data in this study and take responsibility for the integrity of the data and the accuracy of the data analysis. AHM conceived of and designed the study. JRA and AHM supervised data collection and analysis. AMA and CRB collected the

data. JRA, AHM, AMA, JJGI, CRB and JGS analysed and interpreted the data. JRA and AHM wrote the original draft of the manuscript. All authors contributed to reviewing and editing the manuscript.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.