

Original Article

## An Assessment of the Hospitals' Preparedness to Encounter the Coronavirus Disease (COVID-19): The Cases of Greece and Cyprus

**Aris Yfantis, RN, MSc, PhD (c)**

Quality Assurance and Continuing Education Unit, General Hospital of Lamia, Greece

**Petros Galanis, RN, MPH, PhD**

Center for Health Services Management and Evaluation, Faculty of Nursing, National and Kapodistrian University of Athens, Greece

**Ioannis Leontiou, RN, MA, PhD(c)**

Senior Nursing Officer. Accident and Emergency Department. Nicosia General Hospital, Cyprus

**Evangelia Meimeti, RN, MSc, PhD**

Training Coordinator for the Nursing Specialty "Public Health / Community Nursing" in Central and Western Macedonia, 3rd Regional Health Authority of Macedonia, Greece

**Ioannis Moisoglou, RN, MSc, PhD**

Deputy Head, Quality Assurance and Continuing Education Unit, General Hospital of Lamia, Greece

**Correspondence:** Moisoglou Ioannis. RN, MSc, PhD. Deputy Head. Quality Assurance and Continuing Education Unit, General Hospital of Lamia, Greece. E-mail address: giannismois@gmail.com

### Abstract

**Background:** The pandemic spreading and consequences on the population demand that hospitals are prepared to provide quality healthcare services.

**Aims:** To assess the preparedness of hospitals of Greece and Cyprus to cope with any pandemic, and specifically, the Coronavirus Disease (COVID-19).

**Methodology:** A cross-sectional online study was conducted nationwide from 22<sup>nd</sup> April to 10<sup>th</sup> May 2020. A google-form questionnaire was handed out online through a social media to the nursing staff of both public and private hospitals.

**Results:** A total of 624 nurses participated. The majority of the participants were tertiary education graduates (88.5%) and worked in hospital referral centers for COVID-19 (47.6%). The nursing staff in Greece was more familiar with the process of ventilating a patient with a mask and an Ambu bag ( $p=0.02$ ) and the process of intubating a patient ( $p<0.001$ ). The hospitals of Cyprus presented higher percentage in providing the contingency plan for dealing with the COVID-19 pandemic in printed form in the nursing departments ( $p=0.04$ ). Private hospitals (44.2%) possessed more sufficient quantities of personal protective equipment in comparison to public hospitals (22.1%) ( $p=0.001$ ). The mean personal assessment of the overall quality of the services regarding the treatment of suspected/confirmed patients of COVID-19, the mean satisfaction from work during the pandemic of COVID-19 and the mean personal assessment of safety while treating suspected/confirmed patients of COVID-19 were higher in the hospital referral centers ( $p<0.001$  respectively).

**Conclusions:** The present study revealed the moderate levels of hospitals' preparedness in Greece and Cyprus to cope with the COVID-19 pandemic.

**Keywords:** Coronavirus Disease, COVID-19, hospital preparedness, pandemic

## Introduction

Although pandemics are quite rare, they can spread very quickly and have significantly unpleasant consequences on the population. These two characteristics turn pandemics into an emergency matter of public health. Healthcare systems all around the world should be adequately prepared in order to, on the one hand, control the pandemic spreading and, on the other hand, provide high-quality healthcare services to the patients who will need hospitalization.

Regarding the pandemic of SARS-COV-2, until the 9<sup>th</sup> of September 2020, 27,468,565 cases have been confirmed, including 896,146 deaths (WHO, 2020b). It is estimated that around 1 in every 5 people who are infected with SARS-COV-2 develops difficulty in breathing and requires hospital care (WHO, 2020a). In a recent study in Mexico the percentage of confirmed patients of COVID-19 that required hospitalization was 34.8% (Giannouchos *et al.*, 2020). In a study among 5,700 hospitalized patients with COVID-19 in the New York City Area, 373 patients (14.2%) were treated in the Intensive Care Unit (ICU) (Richardson *et al.*, 2020). Also, a percentage of these patients have at least one comorbidity, which makes their hospitalization even more demanding. Consequently, the pandemics' spread speed, the need for hospital care and specifically the need for a percentage of the patients to be hospitalized in the ICU demand that healthcare organizations must be prepared in a timely manner.

**Theoretical Framework:** The present study was guided by the conceptual framework proposed by Donabedian (Donabedian, 1988). According to Donabedian, there are two fundamental prerequisites in order to provide quality care and achieve the best outcomes for the hospitalized patients. The first prerequisite demands an appropriate structure and the second the implementation of the processes. Any interventions, whether they are on the structure or the processes, can positively affect the outcome of the patient's hospitalization. In the case of the pandemic of SARS-COV-2, the structure can include specialized nursing departments and ICU for patients with COVID-19, adequately equipped, staffed with health professionals, adequacy of personal protective equipment (PPE) and programs of continuing education for the staff. As for the processes,

these include the establishment of protocols of early identification of suspected cases of patients with COVID-19, operation plans for the safe management of cases inside the hospital, treatment protocols or recommendations and protocols of proper use of the PPE. To this end, international organizations have published operation plans, in order to help the healthcare services handle the suspected and confirmed cases of COVID-19 infection in the best possible way (ECDC, 2020; CDC, 2020b; 2020a).

Greece is one of the countries that took measures on time to restrict the pandemic of SARS-COV-2. More specifically, regarding the hospital care, the measures can be summarized as follows: 13 hospitals in all 7 Health Districts were defined as hospital referral centers. Nursing departments and ICU exclusively for suspected or confirmed patients with COVID-19 were created within the hospital referral centers. However, a small percentage of patients were admitted to other hospitals with special nursing wards. More healthcare professionals were hired in order to sufficiently staff the Emergency Departments (ED), the nursing wards and the ICUs for suspected or confirmed patients with COVID-19. All scheduled surgeries were canceled all over the country as well as the appointments in the outpatients (The European Observatory on Health Systems and Policies, 2020b).

Regarding Cyprus, the General Hospital of Ammochostos was designated as a hospital referral center for patients with COVID-19. At the same time, hospital wards and short-term hospitalization wards for suspected or confirmed cases of COVID-19 infection were appointed to all General Hospitals of all districts. Patients who needed hospitalization in High-dependency Units or Intensive Care Units were referred to Nicosia General Hospital or Limassol General Hospital (The European Observatory on Health Systems and Policies, 2020a). The purpose of this study was for the nursing staff to assess the preparedness of hospitals of Greece and Cyprus to cope with a pandemic, and specifically the SARS-COV-2. The sub-target was to assess the quality and safety of the hospitals' services regarding the treatment of suspected or confirmed cases with COVID-19.

## Methodology

**Design and Setting:** A cross-sectional online study was conducted nationwide in Greece and

Cyprus from 22<sup>nd</sup> April to 10<sup>th</sup> May 2020. A google-form questionnaire was handed out online through a social media platform to the nursing staff of both public and private hospitals. Although handing out an online questionnaire sets some restrictions, it also provides significant advantages during a pandemic. More specifically, the process of requesting permission from the hospitals' administrations to hand out questionnaires in print form would be very time consuming and the researchers required the nursing staff's opinion on providing their services at the time of the pandemic. Also, due to the nursing staff's workload and the security measures regarding the transmission of the SARS-COV-2, it would be impossible to gain access to the nursing wards and ICUs of suspected/confirmed cases with COVID-19. A total of 624 completed questionnaires was gathered and analyzed.

**Instrument:** The questionnaire included questions regarding the establishment of an operation plan to cope with a pandemic in hospitals before that of SARS-COV-2 and nursing departments, the conduction of drills to treat cases in the event of a pandemic and to train the personnel on the use of PPE and patient care. More specifically, regarding the pandemic of SARS-COV-2, the participants were asked if there was an operation plan and printed forms on the host process and hospitalization of suspected or confirmed cases of patients with COVID-19 infection designed for their department. The participants were also asked on the sufficiency of PPE and antiseptics and whether they had been trained to use them properly. They were also asked whether they had been trained to ventilate, intubate and defibrillate patients, after the SARS-COV-2 pandemic broke out. The questionnaire included two questions regarding the safety of the provided healthcare services in relation to the quality and quantity of the nursing staff. There were 3 questions to evaluate the overall quality of the services provided by the hospitals regarding the treatment of suspected/confirmed cases of COVID-19, the nursing staff's satisfaction levels from work while suspected/confirmed cases of COVID-19 were hospitalized, and their feelings of security when treating suspected/confirmed cases of COVID-19 infection in relation to the hospital's resources (staffing, training, PPE, consumables, medical equipment). A 5-point Likert scale was used to

answer these 3 questions (from 1=bad/non-existing to 5=excellent/very much). The participants were also asked whether they were provided psychological support from a psychiatrist or a psychologist.

**Data Analysis:** Continuous variables are presented as absolute (n) and relative (%) frequencies, while categorical variables are presented as mean and standard deviation. The independent variables were the demographic and professional characteristics and the dependent variables were the nursing staff's knowledge and the hospitals' preparedness to cope with a pandemic, and more specifically the SARS-COV-2. The chi-square test was used to check if two categorical variables are related, whereas the chi-square trend test was used to check if a categorical variable and an ordinal are related. The t-test was used to check if a qualitative that followed a normal distribution and a dichotomous variable were related. A total knowledge score was calculated adding the answers in the four knowledge questions with higher scores indicating increased knowledge. In this case the backward stepwise multiple linear regression was used. Regarding the multiple linear regression the coefficients b (coefficients beta), the respective 95% confidence intervals and the p-values are presented. The statistical significance was 0.05. Statistical analysis was performed with the Statistical Package for Social Sciences software (IBM Corp. Released 2012. IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp).

## Results

**Demographic and work-related characteristics:** The sample included 624 nurses from Greece and Cyprus. There were more female participants in Greece than in Cyprus (81.8% and 64.2% respectively). The mean age of the Greek nurses was higher (42.3 years old and 37.2 respectively). In addition, the graduates of tertiary education in Greece were more than in Cyprus (91.1% and 80.1% respectively). On the contrary, more Cypriots were graduates of nursing specialty (41.1% as opposed to 28.5% Greeks) and more Cypriots had completed a post-graduate diploma (60.9% as opposed to 47.4%). More nurses in Greece (50.1%) worked in hospital reference centers for COVID-19 than in Cyprus (39.7%). Participants' demographic and work characteristics are presented in Table 1.

**Table 1. Demographic and job characteristics of the participants (n=624)**

Characteristics	Greece		Cyprus		P value
	N	%	N	%	
Sex					<b>&lt;0.001<sup>a</sup></b>
Female	387	81.8	97	64.2	
Male	86	18.2	54	35.8	
Age <sup>b</sup>	42.3	8.4	37.2	7.3	<b>&lt;0.001<sup>c</sup></b>
Educational Level					<b>&lt;0.001<sup>a</sup></b>
Tertiary Education	431	91.1	121	80.1	
Diploma (2 years studies)	42	8.9	30	19.9	
Nursing Specialty					<b>0.004<sup>a</sup></b>
Yes	135	28.5	62	41.1	
No	338	71.5	89	58.9	
Post-graduate Degree					<b>0.004<sup>a</sup></b>
Yes	224	47.4	92	60.9	
No	249	52.6	59	39.1	
PhD					0.8 <sup>a</sup>
Yes	25	5.3	9	6.0	
No	448	94.7	142	94.0	
Department					0.1 <sup>a</sup>
Emergency	80	16.9	39	25.8	
ICU/Units of Increased Care	98	20.7	24	15.9	
General	192	40.6	57	37.7	
Dialysis	45	9.5	10	6.6	
Surgery	58	12.3	21	13.9	
Type of Hospital					0.3 <sup>a</sup>
Public	356	75.3	123	81.5	
Teaching	82	17.3	20	13.2	
Private	35	7.4	8	5.3	
Job Type					0.4 <sup>a</sup>
Permanent	415	87.7	136	90.1	
Supplementary	58	12.3	15	9.9	
Employed at Hospital Referral Centers for COVID-19					<b>0.03<sup>a</sup></b>
Yes	237	50.1	60	39.7	
No	236	49.9	91	60.3	
Work Experience <sup>b</sup>	17.3	9.2	14.1	7.4	<b>&lt;0.001<sup>c</sup></b>

<sup>a</sup>  $\chi^2$  test <sup>b</sup> mean, standard deviation <sup>c</sup> t-test

**Table 2. Nursing staffs' knowledge**

Characteristics	Greece		Cyprus		P value <sup>a</sup>
	N	%	N	%	
0.8 <sup>a</sup>					
Are you aware that gloves, surgical masks, FFP2 and FFP3 masks, face shield, safety goggles, foot covers, the caps and the special uniform are called Personal Protective Equipment (PPE)?					
Yes	459	97.0	147	97.4	
No	14	3.0	4	2.6	
Are you familiar with the process of ventilating a patient with a face mask and an Ambu bag (equipment, steps, avoiding to get infected)?					
Yes	338	71.5	92	60.9	<b>0.02<sup>a</sup></b>
No	135	28.5	59	39.1	
Are you familiar with the process of intubating a patient (equipment, steps, avoiding to get infected)?					
Yes	361	76.3	92	60.9	<b>&lt;0.001<sup>a</sup></b>
No	112	23.7	59	39.1	
Do you know how to defibrillate a patient?					
Yes	403	85.2	130	86.1	<b>0.8<sup>a</sup></b>
No	70	14.8	21	13.9	

<sup>a</sup>=  $\chi^2$  test

**Table 3.** Statistically significant relations between the demographic and job characteristics of the nursing staff and rating of knowledge

Characteristics	Co-efficient b	95% confidence interval for b	P value
Greece compared to Cyprus	0.3	0.1 to 0.5	0.004
Age	-0.02	-0.05 to -0.001	0.048

**Table 4.** The nursing staffs' responses on the hospitals' preparedness to cope with pandemics and specifically the COVID-19 pandemic

Question	Greece		Cyprus		P value
	N	%	N	%	
<0.001 <sup>a</sup>					
Does your hospital have a contingency plan to cope with pandemics, compiled by the hospital's infections committee or the committee for emergencies?					
Yes	270	57.1	55	36.4	
No	63	13.3	47	31.1	
I don't know	140	29.6	49	32.5	
If the hospital has a contingency plan for pandemics, have you been notified about it in writing?					
Yes	152	32.1	32	21.2	<b>0.02<sup>a</sup></b>
No	256	54.1	88	58.3	

I don't know	65	13.7	31	20.5	
Has your hospital or your department performed a drill on treating cases in the event of a pandemic?					<b>&lt;0.001<sup>a</sup></b>
Yes	185	39.1	25	16.6	
No	288	60.9	126	83.4	
Have you been demonstrated, in the past, before the pandemic of the new coronavirus (COVID-19) how to properly use the personal protective equipment?					0.9 <sup>a</sup>
Yes	194	41.0	61	40.4	
No	279	59.0	90	59.6	
In our department there is a print form of the COVID-19 pandemic contingency plan, in order to be immediately informed on the algorithm for the treatment of such cases.					<b>0.04<sup>a</sup></b>
Yes	286	60.5	105	69.5	
No	187	39.5	46	30.5	
In my department there is a print form of the host process and hospitalization of suspected or confirmed cases of COVID-19 infection, designed especially for my department.					0.3 <sup>a</sup>
Yes	271	57.3	97	64.2	
No	159	33.6	44	29.1	
I don't know	43	9.1	10	6.6	
Regarding the personal protective equipment in my department:					0.2 <sup>a</sup>
There is an abundance, enough to cover future needs.	122	25.8	27	17.9	
There is enough now, but I doubt it will cover the next shifts.	243	51.4	90	59.6	
There isn't enough available to use during my shift.	86	1.2	28	18.5	
I don't know	22	4.7	6	4.0	
Regarding the hand sanitizers and surface and objects disinfectants in my department:					<b>0.01<sup>a</sup></b>
There is an abundance, enough to cover future needs.	153	32.3	56	37.1	
There are enough now, but I doubt they will cover the next shifts.	241	51.0	80	53.0	
There aren't enough available to use during my shift.	66	14.0	7	4.6	
I don't know.	13	2.7	8	5.3	
In your hospital, after the new coronavirus (COVID-19) pandemic's breakout, have you been demonstrated how to properly use the personal protective equipment?					0.3 <sup>a</sup>
Yes	385	81.4	114	75.5	
No	69	14.6	28	18.5	
I don't know	19	4.0	9	6.0	
In your hospital, after the new coronavirus (COVID-19) pandemic's breakout, have you been given classes on patient ventilation, intubation, and defibrillation?					<b>0.01<sup>a</sup></b>
Yes	160	33.8	31	20.5	
No	243	51.4	93	61.6	
I don't know	70	14.8	27	17.9	

Do you think that the cleaning personnel of your department is adequately trained to properly disinfect the nursing wards for suspected or confirmed cases of COVID-19 infection, as well as to properly dispose waste?					<b>0.01<sup>a</sup></b>
Yes	194	41.0	49	32.5	
No	209	44.2	87	57.6	
I don't know	70	14.8	15	9.9	
Do you think there is enough nursing staff in your department so that both you and the patients will be safe while you are treating them?					0.2 <sup>b</sup>
More than enough	23	4.9	6	4.0	
Satisfactory enough	141	29.8	38	25.2	
Quite enough	168	35.5	53	35.1	
Hardly enough	57	12.1	23	15.2	
Not enough	84	17.8	31	20.5	
Do you think your department's nursing staff is qualified enough (work experience, education, specialty) so that both you and the patients will be safe while you are treating them?					0.3 <sup>b</sup>
More than enough	35	7.4	10	6.6	
Satisfactory enough	167	35.3	61	40.4	
Quite enough	163	34.5	53	35.1	
Hardly enough	60	12.7	15	9.9	
Not enough	48	10.1	12	7.9	
Does your service provide you with psychological support by specialists (psychiatrist, psychologist)?					0.1 <sup>a</sup>
Yes	102	21.6	44	29.1	
No	307	64.9	91	60.3	
I don't know	64	13.5	16	10.6	
How would you rate the quality of your hospital's services regarding the treatment of suspected/confirmed cases of the new coronavirus (COVID-19)? <sup>c</sup>	3.3	1	3.2	1	0.2 <sup>d</sup>
How satisfied are you from your job during the hospitalization of suspected/confirmed patients of the new coronavirus (COVID-19)? <sup>c</sup>	3.2	1.1	3.1	1.1	0.1 <sup>d</sup>
Based on your hospital's resources (staffing, education, personal protective equipment, consumables, medical equipment), how safe do you feel when treating suspected/confirmed cases of the new coronavirus (COVID-19)? <sup>c</sup>	3.0	1.1	3.0	1.0	0.9 <sup>d</sup>

<sup>a</sup>=  $\chi^2$  test <sup>b</sup>=  $\chi^2$  trend test <sup>c</sup>= mean price, standard deviation <sup>d</sup>= t-test

**Knowledge of Personal Protective Equipment and Patient Care:**

The knowledge of the nursing staff is presented in Table 2. The nurses in Greece were more acquainted with the procedures of patient ventilation with a mask and an Ambu bag ( $p=0.02$ ) and intubation ( $p<0.001$ ). The use of multiple linear regression revealed the statistically significant relevance between the demographic and professional characteristics of the nursing staff (Table 3). The Greek nurses were more educated than the Cypriots ( $p=0.004$ ) whereas the younger the nurses, the more educated ( $p=0.048$ ).

**Hospitals' Preparedness and Quality of the Care Provided:**

The nursing staff's answers regarding the hospitals' preparedness both for pandemics, and specifically the SARS-COV-2, are presented in Table 4. The majority of the Greek hospitals had a contingency plan to cope with a pandemic, which was designed by the hospital's infections committee or the committee for emergencies ( $p<0.001$ ) and a contingency plan to cope with a pandemic in print form ( $p=0.02$ ). In addition, the hospitals of Greece had performed more drills on treating patients in the event of a pandemic ( $p<0.001$ ) and more training on ventilation, intubation and defibrillation of a patient at the hospital after the appearance of SARS-COV-2 ( $p=0.01$ ). On the other hand, the hospitals of Cyprus had a contingency plan for the pandemic of SARS-COV-2 in print at the work department ( $p=0.04$ ) and hand sanitizers and surface and objects disinfectants in sufficient quantities ( $p=0.01$ ). Teaching (63.7%) and private hospitals (65.1%) were more frequently found to have a contingency plan to cope with a pandemic in comparison to public hospitals (48.4%) ( $p=0.02$ ). Moreover, teaching (34.3%) and private hospitals (53.5%) were more frequently found to have a contingency plan to cope with a pandemic in print, compared to public hospitals (26.3%) ( $p=0.003$ ).

Private hospitals (44.2%) were found to more frequently possess sufficient quantities of PPE in comparison to public hospitals (22.1%) and teaching hospitals (23.5%) ( $p=0.001$ ). Furthermore, private hospitals (65.1%) were found to more frequently possess sufficient quantities of hand sanitizers and surface and objects disinfectants in comparison to the public (32.4%) and teaching hospitals (25.5%) ( $p<0.001$ ). Public (82.3%) and teaching hospitals (82.4%) hosted classes on the proper use of the

PPE in the hospital after the break out of the SARS-COV-2 in comparison to private hospitals (48.8%) ( $p<0.001$ ). Also, the public (23%) and teaching hospitals (32.4%) provided psychological support by specialists in a higher percentage than private hospitals (7%) ( $p=0.002$ ).

The hospital referral centers (55.9%) possessed in a higher percentage a contingency plan to treat a pandemic in comparison to non-referral centers (48.6%) ( $p=0.01$ ) and had more frequently performed a drill regarding the management of cases during a pandemic (41.4% as opposed to 26.6%,  $p<0.001$ ). The hospital referral centers (87.9%) hosted classes on the proper use of PPE in the hospital after the breakout of SARS-COV-2 in comparison to non-referral centers (72.8%) ( $p<0.001$ ). They also hosted classes on ventilation, intubation and defibrillation of a patient in the hospital after the breakout of SARS-COV-2 (38.4% as opposed to 23.5%,  $p<0.001$ ). The mean satisfaction of the overall quality of the hospital services regarding the treatment of suspected/confirmed cases of COVID-19, the mean satisfaction from work during the pandemic of COVID-19 and the mean personal assessment of safety while treating suspected/confirmed cases of COVID-19 were higher at the hospital referral centers ( $p<0.001$  in all the cases).

**Discussion**

The present study revealed the high level of the nursing staff's knowledge regarding patient care and the use of PPE. Greeks and younger nurses possessed more knowledge in comparison to Cypriots. A study conducted on healthcare professionals before the SARS-CoV-2 pandemic in Greece revealed the high levels of awareness of the professionals regarding the SARS-CoV-2, the means of spread and the preventive practices that must be followed (Papagiannis *et al.*, 2020). A satisfactory level of awareness of healthcare professionals and students was also revealed by other similar studies (Ahmed *et al.*, 2020; Gallè *et al.*, 2020; Zhang *et al.*, 2020).

Regarding the contingency plan for a pandemic in the hospitals of the present study, 52% of the participants confirmed there was one, whereas specifically for the pandemic of SARS-COV-2 the majority confirmed that the plan was available in print form in their departments as well as the host process and the hospitalization process of confirmed or suspected cases of

COVID-19 infection, specially designed for their department of work. Such plans consist an excellent guide for the timely identification of COVID-19 cases and their safe management in the hospital and the hospital unit, thus preventing possible contamination in other patients and the personnel. The treatment of patients with COVID-19 infection does not only include the visit in the ED and the hospitalization in a specifically designed department. It can also include imaging tests, surgical intervention, dialysis, pediatric assessment or labor. Consequently, patients may need to be transferred to different departments and have contact with many healthcare professionals. Therefore, hospital preparation should include all departments (Bhangu *et al.*, 2020; Carenzo *et al.*, 2020; Mossa-Basha *et al.*, 2020).

A significant 72% of the participants expressed concerns about the future abundance of PPE. The majority of them was also concerned about the abundance of hand sanitizers and surface disinfectants in their department. The radical spread of the pandemic around the world and the increased number of patients that required hospitalization created an immense and imperative need for PPE. The findings of the present study are consistent with the findings of an online study that was conducted, during the same period, among 1007 healthcare professionals in the UK. According to the findings of this study, 2/3 of the respondents were of the view that there was not enough PPE available (Iqbal and Chaudhuri, 2020). At the same time, the Royal College of Nursing (RCN) developed and distributed an online survey to all RCN members exploring respondents' experiences of PPE across all settings in health and social care. About 60% of the participants were concerned for the supply for their next shift or reported that there was not enough for them to use during their current shift (Royal College of Nursing, 2020). The nursing staff of the United States reported similar deficiencies in PPE. The results of the National Nurses United's (NNU's) survey from more than 21,200 nurses from 50 States plus Washington D.C. and three territories showed that 87% of hospital nurses reused at least one piece of single-use PPE, which consists a dangerous practice that can increase the exposure to SARS-CoV-2 between nurses, other staff, and patients. Also, according to NNU's survey, 27% of nurses reported having exposed

skin or clothing when caring for suspected or confirmed COVID-19 patients (National Nurses United, 2020).

According to the findings of the present study, 66.7% of the participants evaluated the nursing staffing of their department from medium to insufficient to provide care safely for both the staff and the patients. Regarding the personnel's skill mix, have the participants evaluated it from quite sufficient to exceptionally sufficient. This difference can be explained by the fact that in Greece the recruitment of supplementary personnel (with a term contract) to cover the needs due to COVID-19 consisted of university graduate nurses, not assistant nurses (2-year studies). Our findings are consistent with international studies that have revealed the hospitals' understaffing on nurses and have related it to the quality and safety of the healthcare services provided (Lasater *et al.*, 2020; Padula and Davidson, 2020; Moisoglou *et al.*, 2019). Studies have also shown the importance of the nursing staff's qualitative characteristics to provide quality services. The education level and work experience consist of important assets for the nursing staff (Sloane *et al.*, 2018; You *et al.*, 2013; Moradi, Maghaminejad and Azizi-Fini, 2014).

**Limitations:** The distribution of on-line questionnaires, although it ensures speed and immediacy, it also sets some limitations. The distribution of the survey online, and especially through social media, allows only the users of such media to complete the questionnaires.

**Conclusions:** The speed of a pandemic spread does not allow much time to prepare healthcare organizations to cover the needs for patient care. The adequate nursing staffing and the staff's training, the establishment of specialized departments for pandemic patients, the contingent plans and protocols to treat such patients and the abundance of PPE are fundamental prerequisites to safely provide quality healthcare services. The present study revealed the moderate levels of hospitals preparedness in Greece and Cyprus to cope with the COVID-19 pandemic and the need for hospitalization. The important points were the establishment of a contingent plan to treat COVID-19 patients and a procedure of managing patients established especially for the nursing departments. The study also revealed the nurses'

high level of knowledge regarding patient care. Some problems regarding the quantity and quality of the nursing staff and the abundance of PPE and antiseptics were also revealed. The pandemic is still here and the hospitals must be fully prepared. The results of the present study provide information to the decision-makers on health policies during the pandemic.

## References

- Ahmed, N. *et al.* (2020). Knowledge, awareness and practice of health care professionals amid sars-cov-2, corona virus disease outbreak. *Pakistan Journal of Medical Sciences*, 36(COVID19-S4), S49–S56.
- Bhangu, A. *et al.* (2020). Global guidance for surgical care during the COVID-19 pandemic. *British Journal of Surgery*, 107(9), 1097–1103.
- Carenzo, L., Costantini E, Greco M F L Barra 1 , Rendiniello V , Mainetti M , Bui R, Zanella A , Grasselli G , Lagioia M , Protti A , Cecconi M (2020). Hospital surge capacity in a tertiary emergency referral centre during the COVID-19 outbreak in Italy. *Anaesthesia*, 75(7), 928–934.
- CDC (2020a). *Guidance for U.S. Healthcare Facilities about Coronavirus (COVID-19) | CDC*. Available at: <https://www.cdc.gov/coronavirus/2019-ncov/hcp/us-healthcare-facilities.html> (Accessed: 2 August 2020).
- CDC (2020b) *Infection Control Guidance for Healthcare Professionals about Coronavirus (COVID-19) | CDC*. Available at: <https://www.cdc.gov/coronavirus/2019-ncov/hcp/infection-control.html> (Accessed: 2 August 2020).
- Donabedian, A. (1988). The Quality of Care: How Can It Be Assessed? *JAMA*, 260(12), 1743–1748.
- ECDC (2020). *Infection prevention and control and preparedness for COVID-19 in healthcare settings - fifth update*. Available at: <https://www.ecdc.europa.eu/en/publications-data/infection-prevention-and-control-and-preparedness-covid-19-healthcare-settings> (Accessed: 13 October 2020).
- Gallè, F. Sabella E.A., Da Molin G., De Giglio O., Caggiano G., Di Onofrio V., Ferracuti s., Montagna M.T., Liguori G., Battista Orsi G., Napoli C. (2020). Understanding Knowledge and Behaviors Related to CoViD–19 Epidemic in Italian Undergraduate Students: The EPICO Study. *International Journal of Environmental Research and Public Health*, 17(10), 3481.
- Giannouchos, TV. Giannouchos T. V., Sussman R.A., Mier J. M., Poulas K., Farsalinos K. (2020). Characteristics and risk factors for COVID-19 diagnosis and adverse outcomes in Mexico: an analysis of 89,756 laboratory–confirmed COVID-19 cases. *European Respiratory Journal*, 2002144. doi: 10.1183/13993003.02144-2020.
- Iqbal, MR., & Chaudhuri, A. (2020). COVID-19: Results of a national survey of United Kingdom healthcare professionals' perceptions of current management strategy – A cross-sectional questionnaire study. *International Journal of Surgery*, 79, 156–161.
- Lasater K.B., Aiken L.A., Sloane D. M., French R., Martin B., Reneau K., Alexander M., McHugh M.D. (2020). Chronic hospital nurse understaffing meets COVID-19: an observational study. *BMJ Quality & Safety*, 0, 1–9.
- Moisoglou I, Galanis P, Meimeti E, Dreliozzi A, Kolovos P, Prezerakos P. (2019). Nursing staff and patients' length of stay. *International Journal of Health Care Quality Assurance*, 32(6), 1004–1012.
- Moradi, T., Maghaminejad, F., & Azizi-Fini, I. (2014). Quality of working life of nurses and its related factors. *Nursing and midwifery studies*, 3(2), e19450.
- Mossa-Basha M., Medverd J., Linnau K.F., Lynch G., Wener M.H., Kicska G., Staiger T., Sahani D.V. (2020). Policies and Guidelines for COVID-19 Preparedness: Experiences from the University of Washington. *Radiology*, 201326. doi: 10.1148/radiol.2020201326.
- National Nurses United (2020). *NNU COVID-19 Employer Preparedness Survey Results | National Nurses United*. Available at: <https://www.nationalnursesunited.org/covid-19-survey> (Accessed: 23 August 2020).
- Padula, WV., & Davidson, P. (2020). Countries with High Registered Nurse (RN) Concentrations Observe Reduced Mortality Rates of Coronavirus Disease 2019 (COVID-19). *SSRN Electronic Journal*. doi: 10.2139/ssrn.3566190.
- Papagiannis, D. MalLi F., Raptis D.G., Papathanassiou I.V., Fradelos E.C., Daniil Z., Rachiotis G., Gourgoulis K.I. (2020). Assessment of Knowledge, Attitudes, and Practices towards New Coronavirus (SARS-CoV-2) of Health Care Professionals in Greece before the Outbreak Period. *International Journal of Environmental Research and Public Health*, 17(14), 4925.
- Richardson, S. Hirsch J.S., Narasimhan M., DO; Crawford J.M., Thomas McGinn T., Davidson K.W. and the Northwell COVID-19 Research Consortium (2020). Presenting Characteristics, Comorbidities, and Outcomes Among 5700 Patients Hospitalized With COVID-19 in the New York City Area. *JAMA*, 323(20), 2052–2059.
- Royal College of Nursing (2020). *Personal Protective Equipment: Use and availability during the COVID-19 pandemic*. London.
- Sloane D.M., Smith H.L., McHugh M.D. Aiken L.H. (2018). Effect of Changes in Hospital Nursing

- Resources on Improvements in Patient Safety and Quality of Care. *Medical Care*, 56(12), 1001–1008.
- The European Observatory on Health Systems and Policies (2020a) *Cyprus*. Available at: <https://www.covid19healthsystem.org/countries/cyprus/countrypage.aspx> (Accessed: 24 August 2020).
- The European Observatory on Health Systems and Policies (2020b) *Greece*. Available at: <https://www.covid19healthsystem.org/countries/greece/countrypage.aspx> (Accessed: 24 August 2020).
- WHO (2020a) *Media Statement: Knowing the risks for COVID-19*. Available at: <https://www.who.int/indonesia/news/detail/08-03-2020-knowing-the-risk-for-covid-19> (Accessed: 2 August 2020).
- WHO (2020b) *WHO Coronavirus Disease (COVID-19) Dashboard*. Available at: <https://covid19.who.int/table> (Accessed: 2 August 2020).
- You L., Aiken L. H., Sloane D.M., Liu K., He G.P., Hu Y., Jiang X.L., Li X.H, Li X.M., Liu H.P., Shang S.M., Kutney-Lee A., Sermeus W. (2013). Hospital nursing, care quality, and patient satisfaction: Cross-sectional surveys of nurses and patients in hospitals in China and Europe. *International Journal of Nursing Studies*, 50(2), 154–161.
- Zhang, M. Zhang M., Zhou M., Tang F., Wang Y., Nie H., Zhang L., You G. (2020). Knowledge, attitude, and practice regarding COVID-19 among healthcare workers in Henan, China. *Journal of Hospital Infection*, 105(2), 183–187.