ORIGINAL ARTICLE

Impact of the COVID-19 pandemic on hospital emergency departments: results of a survey of departments in 2020 — the Spanish ENCOVUR study

Aitor Alquézar-Arbé[1], Pascual Piñera[2], Javier Jacob[3], Alfonso Martín[4], Sònia Jiménez[5], Pere Llorens[6], Francisco Javier Martín-Sánchez[7], Guillermo Burillo-Putze[8], Eric Jorge García-Lamberechts[7], Juan González del Castillo[7], Miguel Rizzi[1], Teresa Agudo Villa[4], Antoni Haro[3], Natalia Martín Díaz[2], Òscar Miró[5], (en representación de la red de investigación SIESTA)

Objective. To estimate the impact of the coronavirus disease 2019 (COVID-19) pandemic on the organization of Spanish hospital emergency departments (EDs). To explore differences between Spanish autonomous communities or according to hospital size and disease incidence in the area.

Methods. Survey of the heads of 283 EDs in hospitals belonging to or affiliated with Spain's public health service. Respondents evaluated the pandemic's impact on organization, resources, and staff absence from work in March and April 2020. Assessments were for 15-day periods. Results were analyzed overall and by autonomous community, hospital size, and local population incidence rates.

Results. A total of 246 (87%) responses were received. The majority of the EDs organized a triage system, first aid, and observation wards; areas specifically for patients suspected of having COVID-19 were newly set apart. The nursing staff was increased in 83% of the EDs (with no subgroup differences), and 59% increased the number of physicians (especially in large hospitals and locations where the COVID-19 incidence was high). Diagnostic tests for the severe acute respiratory syndrome coronavirus 2 were the resource the EDs missed most: 55% reported that tests were scarce often or very often. Other resources reported to be scarce were FPP2 and FPP3 masks (38% of the EDs), waterproof protective gowns (34%), and space (32%). More than 5% of the physicians, nurses, or other emergency staff were on sick leave 20%, 19%, and 16% of the time. These deficiencies were greatest during the last half of March, except for tests, which were most scarce in the first 15 days. Large hospital EDs less often reported that diagnostic tests were unavailable. In areas where the COVID-19 incidence was higher, the EDs reported higher rates of staff on sick leave. Resource scarcity differed markedly by autonomous community and was not always associated with the incidence of COVID-19 in the population.

Conclusions. The COVID-19 pandemic led to organizational changes in EDs. Certain resources became scarce, and marked differences between autonomous communities were detected.

Keywords: COVID-19. Emergency department. Pandemics. Organizational structure. Quality.

Impacto organizativo de la pandemia COVID-19 de 2020 en los servicios de urgencias hospitalarios españoles: resultados del estudio ENCOVUR

Objetivo. Estimar el impacto del brote pandémico de COVID-19 en diversos aspectos organizativos de los servicios de urgencias hospitalarios (SUH) españoles e investigar si difirió en función de la comunidad autónoma, tamaño del hospital e incidencia local de la pandemia.

Método. Encuesta a los responsables de los 283 SUH españoles de uso público, quienes valoraron el impacto de la pandemia en aspectos organizativos, disponibilidad de recursos, y bajas del personal durante marzo-abril de 2020, diferenciando dicho impacto por quincenas. Los resultados se analizaron en conjunto, por comunidad autónoma, según tamaño del hospital y según incidencia local de la pandemia.

Resultados. Se recibieron 246 encuestas (87% de los SUH españoles). La mayoría de SUH reorganizaron el triaje, primera asistencia y observación y habilitó nuevos espacios específicos para pacientes con sospecha de COVID-19. Un 83% aumentó dotación enfermera (sin diferencias entre grupos) y un 59% la dotación de médicos (más frecuente en hospitales grandes y zonas de alta incidencia). El recurso que más escaseó fue el test diagnóstico de SARS-CoV-2 (55% del tiempo insuficiente con cierta o mucha frecuencia), seguido de mascarillas FPP2-FPP3 (38%), batas impermeables (34%) y espacio asistencial (32%). Hubo más del 5% de médicos/enfermería/otro personal de baja el 20%/19%/16% del tiempo. Estos déficits fueron máximos la segunda quincena de marzo, excepto para los test diagnósticos (primera quincena de marzo). Los SUH de grandes centros tuvieron menos escasez de tests diagnósticos, y los de zonas de alta incidencia pandémica más profesionales de baja. Existieron marcadas diferencias en todas estos déficits entre comunidades autónomas, no siempre concordantes con el grado de afectación pandémica en cada comunidad.

Author affiliation:
[1]Emergency Department, Hospital de la Santa Creu i Sant Pau, Barcelona, Spain
[2]Emergency Department, Hospital General Universitario Reina Sofía, Murcia, Spain.
[3]Emergency Department, Bellvitge University Hospital, L'Hospitalet de Llobregat, Barcelona, Spain.
[4]Emergency Department, Hospital Universitario Severo Ochoa, Leganés, Madrid, Spain.
[5]Emergency Department, Hospital Clínic, IDIBAPS, University of Barcelona, Barcelona, Spain.
[6]Emergency Department, General University Hospital of Alicante, Miguel Hernández University, Elche, Alicante, Institute of Health and Biomedical Research of Alicante (ISABIAL), Spain.
[7]Emergency Department, Hospital Clínico San Carlos, IDISSC, Universidad Complutense, Madrid, Spain.
[8]Emergency Department, University Hospital of the Canary Islands, Tenerife, Spain.

Contribution of the authors:
All the authors have confirmed their authorship of the document of responsibilities of the author, publication agreement and transfer of rights to EMERGENCIAS.

Corresponding author:
Aitor Alquezar
Emergency Department
Hospital de la Santa Creu i Sant Pau Carrer de Sant Quintí, 87
08041 Barcelona, Spain.

E-mail:
aalquezar@santpau.cat

Article information:
Received: 9-8-2020
Accepted: 19-8-2020
Online: 3-9-2020

Editor in charge:
Agustín Julián-Jiménez

Conclusiones. La pandemia COVID-19 generó cambios estructurales en los SUH, que sufrieron una escasez considerable en ciertos recursos, con diferencias marcadas entre comunidades autónomas.

Palabras clave: COVID-19. Servicio de urgencias. Pandemia. Organización. Calidad.marked differences between autonomous communities were detected.

Introduction

In December 2019, a new coronavirus, SARS-CoV-2 (severe acute respiratory syndrome coronavirus 2), was identified as the cause of a group of pneumonia cases in Wuhan, a city in China's Hubei Province[1]. The World Health Organization (WHO) named this new disease COVID-19 and on March 11, 2020, declared it a pandemic. In Spain, COVID-19 affected intensely during the months of March and April 2020, and it is estimated that, during the first wave of contagion, around 5% of the population was infected[2], representing more than 2 million people living in Spain. However, seroprevalence in the different provinces varied considerably, with seroprevalences below 1% in Huelva, Ourense, Las Palmas de Gran Canaria and Melilla, and above 12% in Albacete, Cuenca or Soria[2]. Overall, this pandemic has posed the most important challenge to the National Health System in modern times. Various articles published so far have emphasized the most outstanding healthcare aspects in the field of primary care and hospital care generated by this first wave of pandemic involvement[3-6]. However, in many cases these are partial views of certain geographical areas, which may differ from what has been observed in others, partly because of the different territorial impact of the pandemic, partly because in Spain health care competencies are transferred to the communities and the organization of care provision is consequently not homogeneous.

In this healthcare scenario, and although there are no official data, it is estimated that more than 10% of individuals infected with SARS-CoV-2 visited a hospital emergency department (ED) between March and April 2020. This avalanche of patients, together with the inherent characteristics of the disease itself, generated great stress in the organization of care in these services which included, among many other aspects, the redefinition of spaces and care circuits, the reorganization of human resources and the provision of essential resources to be able to offer quality and safe care for both the user and the emergency care professional. However, beyond the work carried out by some hospitals or groups of hospitals and which has essentially focused on describing the clinical characteristics of patients diagnosed with COVID-19[7,8], the real impact that the COVID-19 pandemic had in the EDs in Spain has not been quantified until now. The main objective of the present study was to cover this information gap. Specifically, the impact of the COVID-19 pandemic in the EDs in terms of organization (structural and human resources) and resource availability (personal protective equipment -PPE-, SARS-CoV-2 detection tests and sick leaves of emergency personnel) was investigated and whether it differed depending on the size of the hospital, the local incidence of the pandemic and the autonomous community.

Method

Studio design

The ENCOVUR study (survey on COVID-19 in EDs, abbreviated in Spanish) is a cross-sectional survey on the organizational impact on EDs of the COVID-19 pandemic. The study scope was all the public EDs in Spain that attended adult patients in the general emergency department, 24 hours a day, every day of the week, during the period from March 1 to April 30, 2020. The study was designed on the basis of an intention of full inclusion. The source of centers was the National Catalogue of Hospitals of 2019[9]. This catalog contains 924 centers, 323 of which were eliminated because they did not correspond to general hospitals. In addition, 250 private non-charitable unsubsidized hospitals, 65 private non-charitable hospitals, 2 military hospitals and 1 ED that was not open during the study period were excluded. The number of EDs surveyed was 283 (Figure 1).

The authors, members of the SIESTA (Spanish Investigators on Emergengy Situations TeAm) network, developed, in three successive telematic meetings, a survey containing 35 questions structured in 4 sections: 1) organization of structural and human resources, 2) availability of resources (PPE, microbiological tests, personnel), 3) protocols for management of severe patients and resource allocation, and 4) participation in institutional decision-making. In addition, data from emergency department activity were required. All res-

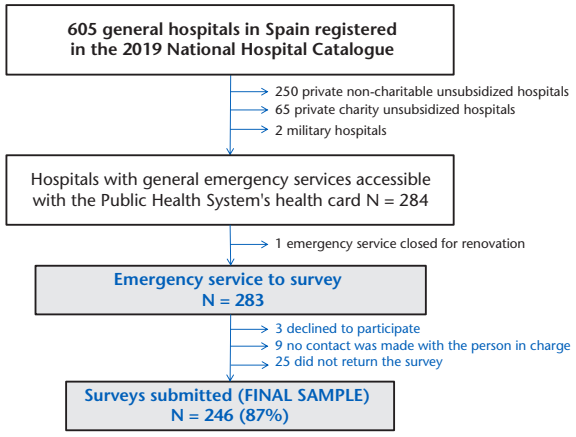

Figure 1. Flowchart of the inclusion of the hospital emergency departments participating in the study.

ponses were categorized and were mandatory, except for those related to ED activity that corresponded to the number of emergencies attended by COVID-19 (clinical or microbiological diagnosis) between March 1 and April 30, 2020 and the total number of emergencies attended in the same period in 2020 and in 2019. The survey was addressed to the head of the ED, following a strategy previously developed by the authors to achieve the maximum number of responses. This strategy consisted of a previous telephone contact to explain the project and to ask for his collaboration. The survey was then sent by e-mail so that it could be completed within a week. The interviews were carried out during the month of June 2020 and there were up to 3 subsequent attempts to contact each responsible person before the center was considered a non-responder.

Variables included

This study analyzes the results of the first two sections of the questionnaire. The information on the structural organizational aspects of the EDs was evaluated with questions aimed at knowing the identification of suspected COVID-19 in triage, the existence of specific areas in first visit and observation of patients with suspected COVID-19, the provision of new structural resources for these patients, as well as an overall assessment of the availability of spaces in the ED during the pandemic. The organizational aspects of human resources were assessed with questions on the number of physicians and nurses, their origin, their mobility and the overall assessment of the adequacy of human resources. On the other hand, regarding the section on resource availability, questions were asked about the availability of SARS-CoV-2 and PPE detection tests (FFP2/FFP3 masks, waterproof gowns, gloves, glasses or face shields), as well as about the number of sick leaves among healthcare personnel, distinguishing between doctors, nurses and other emergency personnel. For many of the estimates, it was requested that these be done on a bi-weekly basis: March 1-15, March 16-31, April 1-15, and April 16-30. Later, to know the global impact, the assessments of all the periods were combined and the relative value corresponding to each case was obtained.

In order to compare different behaviors according to the size of the hospital, the centers were grouped according to their number of beds (< 200 beds, 200-500 beds, > 500 beds). For the comparison based on the local impact of the pandemic, two strategies were followed: First, the impact of the pandemic on the center was considered based on the provincial seroprevalence of SARS-CoV-22 and categorized as low (< 3% seropositive), medium (3-10%), and high (> 10%); second, the impact was studied as a function of the percentage of patients diagnosed as COVID-19 by each ED, categorized as low (< 5% COVID diagnoses), medium (515%), and high (> 15%). Finally, and for strictly descriptive purposes, the data are presented by community, although in this case no statistical comparisons were made given the high number of units to be compared (17 communities and 2 autonomous cities) and that in many cases the number of centers per unit would be very low.

Ethical considerations

Given the characteristics of the study (a survey of healthcare personnel without patient participation), the study was not assessed by a Clinical Research Ethics Committee. The confidentiality of individual data was guaranteed and their verbal approval to participate in the study was requested. The data were analyzed and interpreted by the authors. In no case were the particular actions of the EDs analyzed, and all the considerations presented in the article are made from the perspective of the whole ED.

Statistical analysis

Qualitative variables are expressed as absolute values and percentages, and comparisons were conducted with the chi-square test (linear trend for those categories with ordinal meaning). For the analysis of the temporal evolution of the estimates, a continuous and progressive score was assigned to each one of the assessments (for example, in the assessment of care space a 0 was assigned if there was no problem of care space, a 1 if the space was sufficient most of the time, a 2 if the space was insufficient with certain frequency, and a 3 if the space was insufficient most of the time) and the mean and standard deviation (SD) of that score was found for each period. The analysis of the two-way variance for repeated measurements was used to know if there was a difference between periods and to see if there was a different time behavior according to the different groups of EDs previously defined, which was evaluated by means of the interaction between the time variable and the group variable. It was accepted that significant differences existed when the value of p was < 0.05. All statistical processing was done using the SPSS Statistics V26 program (IBM, Armonk, New York, USA).

Results

A total of 246 (87%) out of the 283 EDs identified in Spain that met the inclusion criteria participated in the study (Figure 1). Table 1 shows by autonomous community the general characteristics of the hospitals that made up the sample and the centers that finally completed the survey. The participation was higher than 70% in 16 of the 17 autonomous communities and in the 2 autonomous cities (Ceuta and Melilla). Of the 37 centers that did not respond to the survey, 26 (70%) corresponded to small centers (< 200 beds).

The characteristics of the participating centers were: 1) regarding hospital size, 98 (40%) were small (< 200 beds), 83 (34%) medium (200-500 beds), and 65

Table 1. General characteristics of the hospitals that constituted the universe to which the survey was directed and the sample of those who finally answered the survey

Autonomous Community	Scope	Sample (% of responses)	% regarding the EDs of the sample
Andalusia	56	43 (77)	17.5
Catalonia	53	52 (98)	20.7
C. Valenciana	26	25 (96)	10.6
C. of Madrid	25	23 (92)	9.3
Castilla y León	15	15 (100)	6.1
Galicia	15	13 (87)	5.3
Castilla La Mancha	14	10 (71)	4.1
Aragon	10	9 (90)	3.7
Canary Islands	12	9 (75)	3.7
Basque Country	12	9 (75)	3.7
Murcia region	9	9 (100)	3.7
Balearic Islands	7	7 (100)	2.8
Principality of Asturias	9	7 (78)	2.8
Extremadura	8	6 (75)	2.4
C. Foral de Navarra	3	3 (100)	1.2
Cantabria	4	2 (50)	0.8
La Rioja	2	2 (100)	0.8
AC of Ceuta and Melilla	2	2 (100)	0.8
Total	**283**	**246 (87)**	**100**

EDs: hospital emergency departments; C: Community; AC: Autonomous City.

(26%) large (> 500 beds); 2) regarding provincial seroprevalence of SARS-CoV-2 infection, in 145 EDs (59%) it was low (< 3%), in 67 (27%) it was medium (3-10%), and in 34 (14%) it was high (> 10%); and 3) in terms of the impact of the pandemic on the ED, in 41 (21%) it was low (< 5% patients diagnosed with COVID-19), in 66 (34%) it was medium (5-15%) and in 87 (45%) it was high (> 15%) (52 EDs did not report the number of COVID-19 diagnoses made during the study period and could not be assessed based on this classification).

In regards to the structural organizational aspects of the EDs (Table 2), most EDs reorganized triage, first aid, observation area and provided new spaces for patients with suspected COVID-19, with no influence on the size or incidence of the pandemic. Space problems occurred with some or high frequency during 32% of the time in March and April 2020, and this was more frequent in the EDs of medium or small hospitals and in those areas with higher incidence of the pandemic.

Concerning the organizational aspects of human resources (Table 2), it should be noted that 83% of the EDs increased the number of nurses, without differences in three groups of EDs, and 59% increased the number of doctors, which is more frequent in EDs of large centers and which had a high COVID-19 incidence. Human resource problems occurred with some or high frequency during 25% of the time of the period studied, and this was more frequent in the EDs of provinces with high impact of the pandemic (40% of the time) than in those with medium (24%) and low impact (22%).

Regarding the availability of diagnostic resources and PPE (Table 2), the SARS-CoV-2 diagnostic test was the resource with the greatest shortage (55% of the time it was insufficient with some or a lot of frequency), followed by FPP2-FPP3 masks (38%), waterproof gowns (34%), goggles/facemasks (16%) and gloves (5%). Overall, the EDs of large centers had fewer shortages of diagnostic tests (deficit only 34% of the time) and the EDs of provinces with low impact of the pandemic had fewer shortages of gloves (deficit 3% of the time).

The number of discharges and home isolation of ED personnel was greater than 5% of the professionals during 20% of the time for medical personnel, 19% of the time for nursing personnel, and 16% of the time for other health personnel (Table 2). Overall, time with a high percentage of sick leaves among emergency personnel was greater the larger the facility and the greater the provincial and local impact of the pandemic.

Figure 2 summarizes the degree of availability or deficit of all the previously mentioned resources for the entire period studied.

The temporal evolution by fortnight of the availability of care space, human resources, test for the detection of SARS-CoV-2 and FPP2-FPP3 masks differed significantly and is shown in Figure 3. During the third and fourth fortnight, a progressive improvement of the four parameters analyzed was observed ($p < 0.05$). This fact was more marked for healthcare spaces and human resources in those areas with greater provincial impact of the pandemic ($p < 0.001$), while the shortage of diagnostic tests was lower and improved more rapidly in the EDs of large centers ($p = 0.02$).

The impact of the pandemic in the different autonomous communities on the availability of healthcare space and human resources, as well as tests for the detection of SARS-CoV-2 and FPP2-FPP3 masks, is shown in Figure 4. The EDs of two communities, Extremadura and Madrid, had a shortage (with some frequency or most of the time) of all these resources for more than 40% of the time analyzed (March and April 2020).

The temporal evolution by fortnight of the personnel sick leaves shows significant variations throughout the period, with the fortnight of greatest difficulty always being from March 16 to 31 (Figure 5).

These difficulties over time were different and greater, as the provincial impact of the pandemic increased, but did not differ based on the local impact of the pandemic or the size of the ED facility.

The incidence of sick leave of emergency personnel was different in different communities (Figure 6). The difficulties of the Community of Madrid, Castilla-La Mancha, the Balearic Islands and Catalonia stand out, where more than 20% of the time there was a percentage of more than 5% of professionals in the three categories of sick leave. In contrast, in the Canary Islands and Andalusia this situation occurred for less than 5% of the time studied for the three categories.

Finally, Figure 7 shows how shortages in all aspects analyzed in this study were not always consistent with the degree to which each community was affected by the pandemic. In general, those communities with high

Table 2. Assessment of structural and human resource organizational aspects, availability of diagnostic and protection resources and casualties registered in Spanish hospital emergency services personnel, and comparison according to hospital size and impact of the pandemic (in the province and in the center itself)

	All hospitals		Size of hospital (number of beds)				Pandemic impact on the province (% seroprevalence)				Pandemic hospital impact (% COVID diagnosed in the ED)			
	N = 246 n (%)	No data n (%)	Small (< 200) N = 98 n (%)	Medium (200-500) N = 83 n (%)	Large (> 500) N = 65 n (%)	p*	Small (< 3%) N = 145 n (%)	Medium (3-10%) N = 67 n (%)	High (> 10%) N = 34 n (%)	p*	Small (< 5%) N = 41 n (%)	Medium (5-15%) N = 66 n (%)	High (> 15%) N = 87 n (%)	p*
Structural organizational aspects														
Suspected COVID-19 was identified in triage	245 (99.6)	0 (0)	98 (100)	83 (100)	64 (98.5)	0.16	145 (100)	66 (98.5)	34 (100)	0.53	41 (100)	66 (100)	86 (98.9)	0.33
A specific area was designated for the first visit	236 (96.3)	1 (0.4)	92 (94.8)	80 (96.4)	64 (98.5)	0.23	140 (97.2)	65 (97.0)	31 (91.2)	0.16	39 (95.1)	62 (95.4)	83 (95.4)	0.95
A specific area of observation was assigned	206 (84.8)	3 (1.2)	76 (79.2)	72 (86.7)	58 (90.6)	0.04	123 (85.4)	54 (83.1)	29 (85.3)	0.85	34 (82.9)	53 (81.5)	76 (87.4)	0.42
New structural resources were made available	195 (79.6)	1 (0.4)	75 (76.5)	69 (84.1)	51 (78.5)	0.66	112 (77.8)	54 (80.6)	29 (85.3)	0.32	30 (73.2)	50 (75.8)	73 (83.9)	0.13
Overall assessment of space availability in the emergency department during the pandemic**		2 (0.2)				< 0.001				< 0.001				0.04
There were no space problems	295 (30.0)		94 (24.0)	87 (26.4)	114 (43.8)		207 (35.7)	59 (22.2)	29 (21.3)		54 (32.9)	96 (36.4)	102 (29.5)	
Enough most of the time	376 (38.3)		169 (43.1)	126 (38.2)	81 (31.2)		235 (40.5)	104 (39.1)	37 /27.2)		67 (40.9)	93 (35.2)	128 (37.0)	
Insufficient with some degree of frequency	178 (18.1)		64 (16.3)	71 (21.5)	43 (16.5)		92 (15.9)	51 (19.2)	35 (25.7)		25 (15.2)	50 (18.9)	58 (16.8)	
Insufficient most of the time	133 (13.5)		65 (16.6)	46 (13.9)	22 (8.5)		46 (7.9)	52 (19.5)	35 (25.7)		18 (11.0)	25 (9.5)	58 (16.8)	
Organizational aspects of human resources														
The number of doctors was increased		0 (0)				0.02				< 0.001				0.29
Yes, sufficiently	111 (45.1)		37 (37.8)	37 (44.6)	37 (56.9)		51 (35.2)	43 (64.2)	17 (50.0)		14 (34.1)	35 (53.0)	41 (47.1)	
Yes, Insufficiently	35 (14.2)		14 (14.3)	13 (15.7)	8 (12.3)		16 (11.0)	6 (9.0)	13 (38.2)		8 (19.5)	6 (9.1)	14 (16.1)	
No	100 (40.7)		47 (48.0)	33 (39.8)	20 (30.8)		78 (53.8)	18 (26.9)	4 (11.8)		19 (46.3)	25 (37.9)	32 (36.8)	
External physicians joined the emergency department		0 (0)				0.005				< 0.001				0.02
Yes (own hospital and new hires)	30 (12.2)		6 (6.1)	11 (13.3)	13 (20.0)		5 (3.4)	15 (22.4)	10 (29.4)		1 (2.4)	8 (12.1)	13 (14.9)	
Yes (own hospital)	92 (37.4)		34 (42.4)	35 (42.2)	23 (35.4)		46 (35.8)	28 (41.8)	18 (52.9)		19 (46.3)	15 (22.2)	41 (47.1)	
No	124 (50.4)		58 (59.2)	37 (44.6)	29 (44.6)		94 (64.8)	24 (35.8)	6 (17.6)		21 (51.2)	43 (65.2)	33 (37.9)	
The number of nurses was increased		1 (0.4)				0.06				0.31				0.61
Yes, sufficiently	162 (66.1)		61 (62.2)	53 (64.6)	48 (73.8)		95 (65.5)	46 (69.7)	21 (61.8)		27 (65.9)	46 (69.7)	55 (63.2)	
Yes, Insufficiently	48 (16.9)		19 (19.4)	17 (20.7)	12 (18.5)		23 (15.9)	14 (21.2)	11 (32.1)		5 (12.2)	10 (15.2)	22 (25.3)	
No	35 (14.3)		18 (18.4)	12 (14.6)	5 (7.7)		27 (18.6)	6 (9.1)	2 (5.9)		9 (22.0)	10 (15.2)	10 (11.5)	
External physicians joined the emergency department		6 (2.4)				0.21				< 0.001				0.007
Yes (own hospital and new hires)	45 (18.8)		14 (14.4)	16 (20.5)	15 (23.1)		18 (12.6)	13 (20.3)	14 (42.4)		6 (15.0)	8 (12.3)	23 (27.1)	
Yes (own hospital)	139 (57.9)		58 (59.8)	47 (60.3)	34 (52.3)		82 (57.3)	40 (62.5)	17 (51.5)		21 (52.5)	37 (56.9)	51 (60.0)	
No	56 (23.3)		25 (25.8)	15 (19.2)	16 (24.6)		43 (30.1)	11 (17.2)	2 (6.1)		13 (32.5)	20 (30.8)	11 (12.9)	
Relocation of emergency personnel to other areas		1 (0.4)				0.51				0.11				0.67
No	180 (73.5)		70 (72.2)	60 (72.3)	50 (76.9)		104 (72.2)	52 (77.6)	24 (70.6)		26 (63.4)	52 (78.8)	59 (68.6)	
Yes (own hospital)	47 /19.2)		19 (19.6)	19 (22.9)	9 (13.8)		32 (22.2)	12 (17.9)	3 (8.8)		12 (29.3)	10 (15.2)	18 (20.9)	
Yes (outside the hospital)	5 (2.0)		1 (1.0)	0 (0)	4 (6.2)		4 (2.8)	0 (0)	1 (2.9)		1 (2.4)	2 (3.0)	2 (2.3)	
Yes (own hospital and outside the hospital)	13 (5.3)		7 (7.2)	4 (4.8)	2 (3.1)		4 (2.8)	3 (4.5)	6 (17.6)		2 (4.9)	2 (3.0)	7 (8.1)	
Overall assessment of resource availability humans in the emergency department during the pandemic**		2 (0.2)				0.18				< 0.001				0.27
No personnel problems	329 (33.5)		126 (32.1)	104 (31.5)	99 (38.1)		211 (36.4)	56 (41.2)	25 (18.4)		53 (32.3)	112 (42.4)	107 (30.9)	
Enough most of the time	408 (41.5)		173 (44.1)	119 (36.1)	116 (44.6)		242 (41.7)	110 (41.4)	56 (41.2)		70 (42.7)	98 (37.1)	152 (43.9)	
Insufficient with some degree of frequency	162 (16.5)		67 (17.1)	66 (20.0)	29 (11.2)		89 (15.3)	42 (15.8)	31 (22.8)		32 (19.5)	36 (13.6)	56 (16.2)	
Insufficient most of the time	83 (8.5)		26 (6.6)	41 (12.4)	16 (6.2)		38 (6.6)	21 (7.9)	24 (17.6)		9 (5.5)	18 (13.6)	31 (9.0)	

(Continue)

Table 2. Assessment of structural and human resource organizational aspects, availability of diagnostic and protection resources and casualties registered in Spanish hospital emergency services personnel, and comparison according to hospital size and impact of the pandemic (in the province and in the center itself) (Continuation)

	All hospitals		Size of hospital (number of beds)				Pandemic impact on the province (% seroprevalence)				Pandemic hospital impact (% COVID diagnosed in the ED)			
	N = 246 n (%)	No data n (%)	Small (< 200) N = 98 n (%)	Medium (200-500) N = 83 n (%)	Large (> 500) N = 65 n (%)	p*	Small (< 3%) N = 145 n (%)	Medium (3-10%) N = 67 n (%)	High (> 10%) N = 34 n (%)	p*	Small (< 5%) N = 41 n (%)	Medium (5-15%) N = 66 n (%)	High (> 15%) N = 87 n (%)	p*
Testing for SARS-CoV-2														
Overall assessment of test availability diagnoses of SARS-CoV-2 infection**		14 (1.4)				< 0.001				0.50				0.80
There were no diagnostic test problems	192 (19.8)		41 (10.7)	60 (18.4)	91 (35.0)		124 (21.7)	49 (18.4)	19 (14.4)		28 (17.1)	57 (22.3)	61 (17.6)	
Enough most of the time	249 (25.7)		86 (22.4)	82 (25.1)	81 (31.2)		143 (25.0)	65 (24.4)	41 (31.1)		40 (24.4)	65 (25.4)	96 (27.7)	
Insufficient with some degree of frequency	231 (23.8)		100 (26.0)	79 (24.2)	52 (20.0)		125 (30.5)	71 (26.7)	35 (26.5)		38 (23.2)	65 (25.4)	75 (21.7)	
Insufficient most of the time	298 (30.7)		157 (40.9)	105 (32.2)	36 (13.8)		180 (31.5)	81 (30.5)	37 (28.0)		58 (35.4)	69 (27.0)	114 (32.9)	
Personal protective equipment														
Availability of FFP2-FFP3 masks**		6 (0.6)				0.89				0.18				0.11
There were no problems with FFP2-FFP3 masks	78 (30.0)		107 (27.3)	71 (21.8)	78 (30.0)		148 (25.7)	76 (28.6)	32 (23.5)		33 (20.6)	75 (28.4)	95 (27.5)	
Enough most of the time	351 (35.9)		146 (37.2)	123 (37.7)	82 (31.5)		218 (37.8)	87 (32.7)	46 (33.8)		57 (35.5)	90 (34.1)	125 (36.1)	
Insufficient with some degree of frequency	192 (19.6)		69 (17.6)	67 (20.6)	56 (21.5)		112 (19.4)	56 (21.1)	24 (17.6)		32 (20.2)	59 (22.3)	62 (17.9)	
Insufficient most of the time	179 (18.3)		70 (17.9)	65 (19.9)	44 (16.9)		98 (17.0)	47 (17.7)	34 (25.0)		38 (23.8)	40 (15.2)	64 (18.5)	
Availability of waterproof gowns**.		10 (0.0)				0.49				0.13				0.75
There were no problems with waterproof suits	308 (31.6)		131 (33.8)	91 (27.9)	86 (33.1)		177 (30.7)	91 (34.7)	40 (29.4)		46 (29.5)	82 (31.1)	101 (29.2)	
Enough most of the time	329 (33.8)		135 (34.8)	108 (33.1)	86 (33.1)		201 (34.9)	89 (34.0)	39 (28.7)		55 (35.3)	94 (35.6)	118 (34.1)	
Insufficient with some degree of frequency	189 (18.5)		66 (17.0)	75 (23.0)	48 (18.5)		124 (15.3)	42 (16.0)	23 (16.9)		26 (16.7)	56 (21.2)	68 (19.7)	
Insufficient most of the time	148 (15.2)		56 (14.4)	52 (16.0)	40 (15.4)		74 (12.8)	40 (15.3)	34 (25.0)		29 (18.6)	32 (12.1)	59 (17.1)	
Availability of gloves**		3 (0.3)				0.13				0.001				0.65
There were no glove problems	663 (67.5)		276 (70.4)	213 (64.5)	174 (67.2)		406 (70.0)	171 (64.3)	86 (63.7)		104 (63.4)	175 (66.3)	236 (68.2)	
Enough most of the time	265 (29.5)		104 (26.5)	94 (28.5)	67 (25.9)		158 (27.2)	73 (27.4)	34 (25.2)		58 (35.4)	74 (28.0)	81 (23.4)	
Insufficient with some degree of frequency	47 (4.8)		9 (2.3)	20 (6.1)	18 (6.9)		14 (2.4)	20 (7.5)	13 (9.6)		2 (1.2)	12 (4.5)	27 (7.8)	
Insufficient most of the time	6 (0.6)		3 (0.8)	3 (0.9)	0 (0)		2 (0.3)	2 (0.8)	2 (1.5)		0 (0)	3 (1.1)	2 (0.6)	
Availability of glasses or face shields**		2 (0.2)				0.15				0.56				0.50
No problems with glasses or face shields 532	532 (54.2)		217 (55.4)	181 (54.8)	134 (51.5)		323 (55.7)	138 (51.9)	71 (52.2)		87 (53.0)	144 (51.2)	177 (51.2)	
Enough most of the time	297 (30.2)		125 (31.9)	96 (29.1)	76 (29.2)		163 (28.1)	95 (35.7)	39 (28.7)		56 (34.1)	80 (30.3)	107 (30.9)	
Insufficient with some degree of frequency	100 (10.2)		31 (7.9)	30 (9.1)	39 (15.0)		60 (10.3)	23 (8.6)	17 (12.5)		8 (4.9)	27 (10.2)	44 (12.7)	
Insufficient most of the time	53 (5.4)		19 (4.8)	23 (7.0)	11 (4.2)		34 (5.9)	10 (3.9)	9 (6.6)		13 (7.9)	13 (4.9)	18 (5.2)	
Leave and home isolation of personnel														
Overall assessment of the number of doctor's leaves**		1 (0.1)				0.10				< 0.001				< 0.001
Very low (< 1%)	549 (61.9)		242 (61.9)	162 (48.8)	145 (55.8)		397 (68.4)	122 (45.5)	30 (22.2)		130 (79.3)	153 (58.0)	151 (43.4)	
Low (1-5%)	242 (23.5)		73 (18.7)	108 (32.5)	61 (23.5)		131 (22.6)	80 (29.9)	31 (23.0)		21 (12.8)	55 (20.8)	108 (31.0)	
Moderate (6-10%)	99 (10.1)		45 (11.5)	32 (9.6)	22 (8.5)		40 (6.9)	29 (10.8)	30 (22.2)		6 (3.7)	35 (13.3)	35 (10.1)	
High (> 10%)	93 (9.5)		31 (7.9)	30 (9.0)	32 (12.3)		12 (2.1)	37 (32.6)	44 (32.6)		7 (4.3)	21 (8.0)	54 (15.5)	
Overall assessment of the number of nursing leaves**		36 (3.7)				0.003				< 0.001				< 0.001
Very low (< 1%)	428 (45.1)		201 (52.9)	127 (40.2)	100 (39.7)		315 (54.7)	98 (39.5)	15 (15.1)		96 (59.6)	117 (45.7)	130 (38.8)	
Low (1-5%)	341 (36.0)		117 (40.5)	128 (40.5)	96 (38.1)		213 (37.0)	89 (36.9)	39 (31.5)		48 (29.8)	100 (39.1)	115 (34.3)	
Moderate (6-10%)	108 (11.4)		39 (12.3)	39 (12.3)	33 (13.1)		37 (6.4)	35 (14.1)	36 (29.0)		12 (7.5)	26 (10.2)	45 (13.4)	
High (> 10%)	71 (7.5)		22 (7.0)	22 (7.0)	23 (9.1)		11 (1.9)	26 (10.5)	24 (27.4)		5 (3.1)	13 (13.4)	45 (13.4)	
Overall assessment of the number of casualties of the rest of health personnel**		92 (9.3)				0.80				< 0.001				< 0.001
Very low (< 1%)	470 (52.7)		203 (56.5)	141 (47.0)	126 (54.1)		337 (60.6)	113 (48.7)	20 (19.2)		106 (64.6)	130 (55.1)	138 (44.4)	
Low (1-5%)	278 (31.2)		101 (28.1)	105 (35.0)	72 (30.9)		166 (29.9)	81 (34.9)	31 (29.8)		45 (55.1)	76 (32.2)	102 (32.8)	
Moderate (6-10%)	107 (12.0)		38 (10.6)	40 (13.3)	29 (12.4)		43 (7.7)	26 (11.2)	38 (36.5)		11 (6.7)	25 (10.6)	46 (14.8)	
High (> 10%)	37 (4.1)		17 (4.7)	14 (4.7)	6 (2.6)		10 (1.8)	12 (5.2)	15 (14.4)		2 (1.2)	5 (2.1)	25 (8.0)	

*Linear trend p-value.

**The estimates made for each of the four partial periods of 2020 have been added up and valued individually (March 1-15, March 16-31, April 1-15, April 16-30), so the total possible estimates made are 984 (246 x 4 = 984).

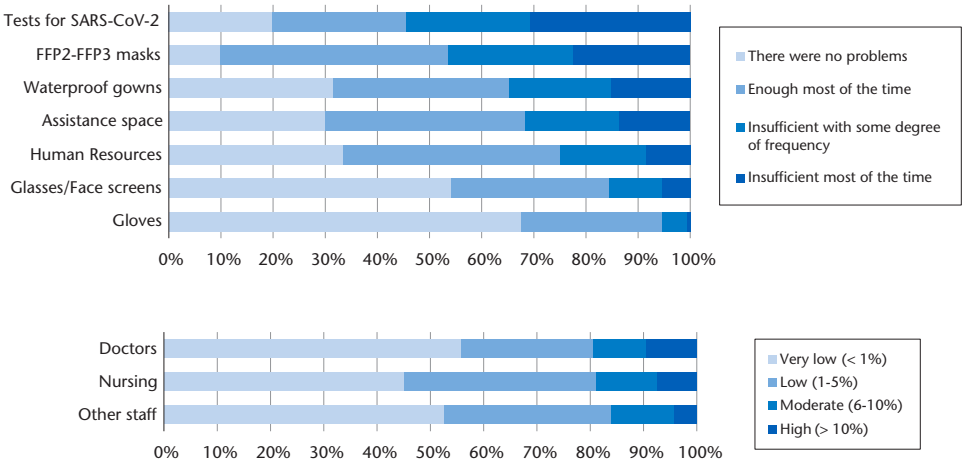

Figure 2. Assessment of the global impact of the COVID-19 pandemic on the availability of resources and staff leaves in Spanish hospital emergency departments in the period March to April 2020.

SARS-CoV-2 seroprevalence were more likely to be under-resourced in their EDs, although the under-testing of SARS-CoV-2 for more than 50% of the pandemic period in low seroprevalence communities is noteworthy. On the other hand, the Autonomous Communities with the highest seroprevalence were those with the highest number of sick leaves among emergency personnel.

Discussion

The ENCOVUR study is the first to evaluate the organizational impact of the COVID-19 pandemic of 2020 in Spanish EDs. The main findings we want to highlight are four. First, there were generalized organizational changes for attending patients with suspected COVID-19. Second, during most of the pandemic wave, numerous deficits were detected in aspects essential for quality and safe care, among which the SARS-CoV-2 diagnostic test and the FFP2-FFP3 masks stand out. Significantly, most deficits were greatest during the second half of March 2020, except for the tests that peaked at the beginning of the pandemic wave. Third, there were differences in some of these deficits; thus, healthcare space and diagnostic tests were more scarce the smaller the hospital, while human resource shortages and ED worker leaves were greater in the EDs with the greater provincial and local impact of the pandemic. And fourth, differences in these deficits were observed among the EDs of the different autonomous communities, not always in line with the impact of the pandemic on that community.

Organizational changes occur frequently in the EDs in order to respond to the most diverse circumstances, and they are undoubtedly the most dynamic hospital services in this sense. Influenza epidemics[11,12], lack of hospital beds[13], the establishment of specific circuits or units[14,15], the implementation of care codes[16] or the implementation of triage systems[12,17] are just some examples of this tradition in the EDs. It is not surprising, then, that the vast majority of EDs immediately restructured their triage, first aid and observation spaces to attend patients with suspected COVID-19. It is striking how in nearly 80% of cases new care spaces were made available, a circumstance that is not easy in the day-to-day work of the EDs when they are overwhelmed during periods of increased care activity that leads to their saturation[18,19]. These measures were probably partly responsible for the fact that, during this first pandemic wave, the healthcare space was not one of the greatest problems in the EDs.

The initial lack of serological testing, especially at the beginning of the pandemic, forced many diagnostic and therapeutic decisions and admission decisions based exclusively on the clinic, as some previous studies have already shown[7]. It was especially important in small and medium sized centers. To this deficit it is necessary to consider the added difficulty of time to obtain results, initially limited to a few reference laboratories[20]. Among the PPEs, the FFP2-FFP3 masks stood out for their deficit. In general, all elements of PPE were in some degree deficient, in relation to a difficult supply in a global international market that was not always accessed in a unified and fast way[21], and were critical during the second half of March 2020. Similarly, staff leaves were high during this period. It should be emphasized that not all leaves were due to illness, and some of them (not differentiated in this study) were due to the need for isolation of exposed personnel. Probably many aspects converged here so that in some environments the percentage of these leaves was high, such as the lack of PPE and the difficulty to make an accurate diagnosis based on detection test of SARS-CoV-2.

Our finding of increased ED leaves from areas with high pandemic incidence was expected. However, a shortage of care spaces or diagnostic tests in smaller hospitals may not be as expected. In relation to the former, structural conditions in some EDs are suboptimal at baseline, as some recent studies have shown[22,23]. This means that their capacity to adapt is lower, and that

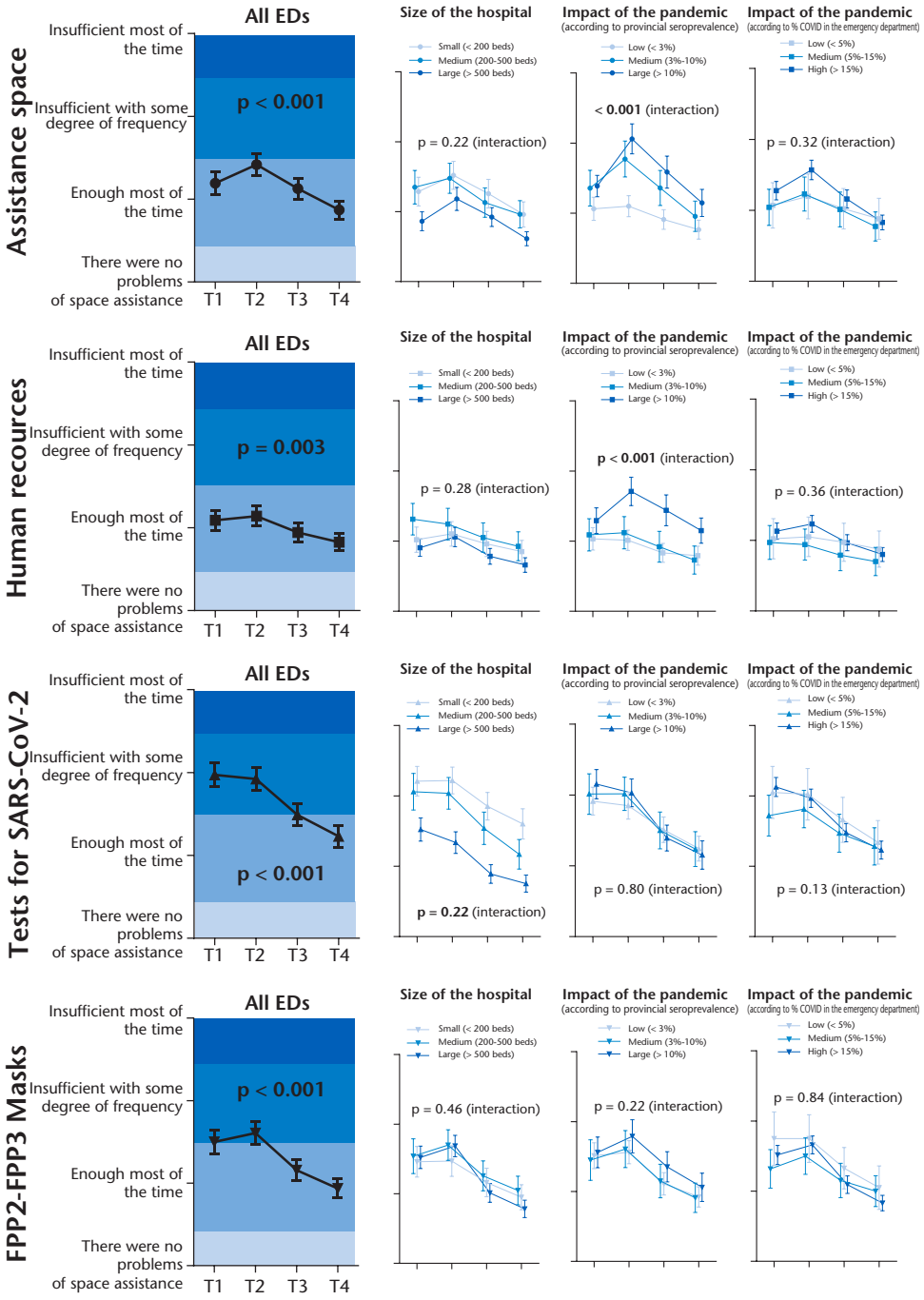

Figure 3. Evolution of the temporary effect of the COVID-19 pandemic on the availability of the main resources of the Spanish hospital emergency services evaluated in this study. T1: 1-15 March 2020; T2: 16-31 March 2020; T3: 1-15 April 2020; T4: 16-30 April 2020.

the smaller the center, the more compromised it is. On the other hand, the perception of a greater deficit of tests in small hospitals could be due to the sum of an insufficient number of tests and a very long response time from the reference laboratories, always outside the hospital itself. This is an element that should be studied in detail with a view to future epidemic waves, in order to ensure that the response to the citizen, in these and other aspects, does not differ according to the size of the hospital visited.

Finally, the impact of the COVID-19 pandemic on EDs was very different depending on the Autonomous Community. The management of the healthcare system at the autonomous community level means that the organizational models may differ significantly, and this heterogeneity may be partly to blame for the differen-

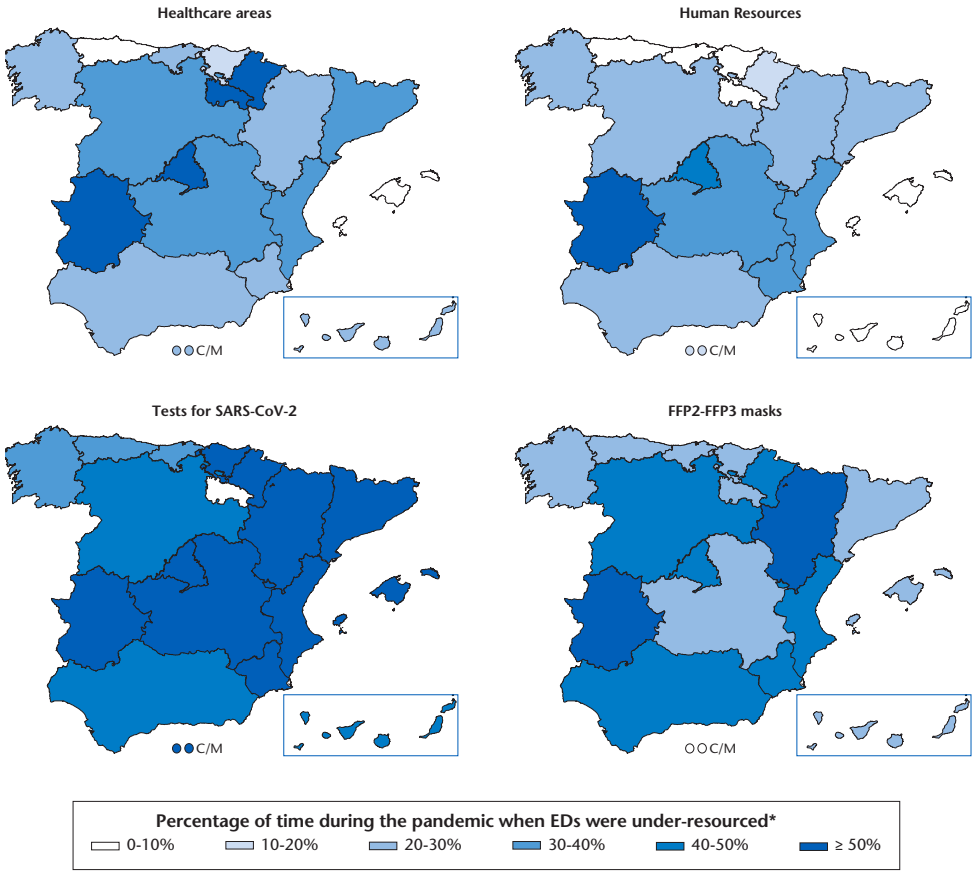

Figure 4. Impact of the pandemic on healthcare areas and human resources in hospital emergency departments in the different Spanish autonomous communities. C/M: Ceuta and Melilla. *Includes insufficient resources with some degree of frequency or most of the time.

ces observed, despite the fact that the single command and state coordination imposed by the State of Emergency tried to minimize it.

The ENCOVUR study has some limitations. First, the results are based solely on the opinion of the person in charge of the ED and not on that of a sample of professionals working in the ED. It is known that the opinion of both groups may not always coincide[24]. We chose this option because the survey referred mostly to issues known to the person in charge and because it also allowed us to define exactly the scope of the survey. This allows us to avoid the bias of overestimating the results of certain centers where there is a greater number of responses when the survey is open to all professionals. Second, we opted for a qualitative assessment of the aspects surveyed and not a score on a quantitative visual-analogical scale. This made it necessary to give quantitative values to the qualitative estimates, even though the categories may not be equidistant. However, this resulted in a more homogeneous interpretation of the ratings given by all respondents. Third, full recruitment of the entire population was not achieved. However, participation was very high and most non-responding centers were small (< 200 beds). Therefore, we consider that the results obtained are reliable and representative of the situation experienced in the ED during the pandemic. Fourth, the provincial impact of seroprevalence by SARS-CoV-2 has been based on data published in a single previous work, but it is the best source of information available at this time.

Despite these limitations, the ENCOVUR study provides a very close picture of the reality experienced during the first pandemic wave of COVID-19 in Spanish EDs, and we believe that the information can be useful for the preparation and response of future pandemic waves that may occur. It allows us to conclude that the first pandemic wave of COVID-19 in Spain generated organizational changes in the EDs, which suffered a considerable deficit in certain resources (especially PPE and SARS-CoV-2 tests), and that there were marked differences depending on aspects of the center, the provincial and local impact of the pandemic, and between autonomous communities. Differences among communities did not always match the impact of the pandemic on each specific community.

Conflicting interests: The authors declare no conflict of interest in the conduct of this study.

Financing: The authors declare the non-existence of funding in relation to this article.

Ethical responsibilities: All authors have confirmed the maintenance of confidentiality and respect for patients' rights in the author's responsibilities document, publication agreement and assignment of rights to EMERGENCIAS.

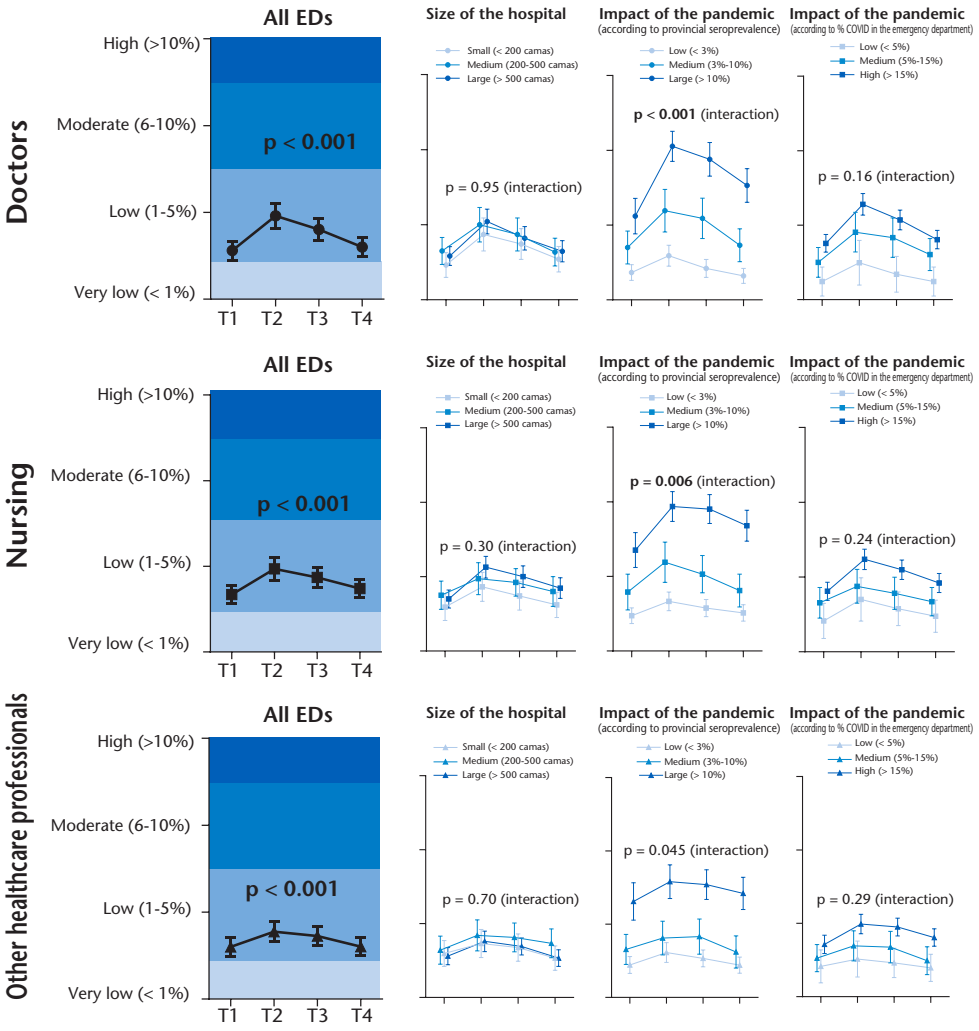

Figure 5. Evolution of the temporary effect of the COVID-19 pandemic on the casualties of Spanish hospital emergency service personnel. T1: 1-15 March 2020; T2: 16-31 March 2020; T3: 1-15 April 2020; T4: 16-30 April 2020.

Article not commissioned by the Editorial Committee and with external peer review.

Addendum

The SIESTA network is formed by the following researchers and centers: *Management Committee:* Òscar Miró, Sònia Jiménez (H. Clínic, Barcelona), Juan González del Castillo, Francisco Javier Martín-Sánchez, Eric Jorge GarcíaLamberechts (H. Clínico San Carlos, Madrid), Pere Llorens (H. General de Alicante), Guillermo Burillo Putze (H. Universitario de Canarias, Tenerife), Alfonso Martín (H. Universitario Severo Ochoa de Leganés, Madrid), Pascual Piñera Salmerón (H. General Universitario Reina Sofía, Murcia), Aitor AlquézarArbé (H. de la Santa Creu i Sant Pau, Barcelona), Javier Jacob (H. Universitario de Bellvitge, L'Hospitalet de Llobregat).
Participating centers: 1. University Hospital Doctor Peset Aleixandre of Valencia: María Luisa López Grima, Mª Ángeles Juan Gómez. 2.- University Hospital and Polytechnic La Fe of Valencia: Javier Millán, Leticia Serrano Lázaro. 3.- General University Hospital of Alicante: Francisca Molina, Tamara García. 4.- University Hospital Clinic of Valencia: José Noceda. 5.- Arnau de Vilanova Hospital of Valencia: María José Cano Cano, Rosa Sorando Serra. 6.- Hospital Francesc de Borja de Gandía, Valencia: María José Fortuny Bayarri, Francisco José Salvador Suárez. 7.- University General Hospital of Elche, Alicante: Matilde González Tejera. 8.- Hospital Marina Baixa de Villajoyosa, Alicante: Verónica Galán Nicolás, Andrea Estrada Herrera. 9.- Hospital Virgen de los Lirios, Alcoy Alicante: Napoleón Meléndez, Patricia Borrás Albero. 10.- Hospital Vinalopó University of Elche (Alicante): Julio Armas Castro, Esther Ruescas Escolano. 11.- University Hospital of Torrevieja de Alicante: Fernando Lajara Navarro, Guendolina Fernandez Fernandez. 12.- Hospital Lluis Alcanys from Xativa: Carles Pérez García, Pilar Sánchez Amador. 13.- University Hospital of La Ribera de Valencia: José Vicente Brasó Aznar, José Luis Ruiz López. 14.- Hospital of the Vega Baja Orihuela in Alicante: María Belén Rayos Belda, María Ángeles Murcia Herrero. 15.- University Hospital of Sant Joan Alicante: Elena Díaz Fernández. 16.- Hospital General de Requena de Valencia: Luis Martínez Giménez, Marisa, de Reynoso Rodríguez. Hospital of Lliria de Valencia: Ana Peiró Gómez, Elena Gonzalo Bellver. 18.- Hospital de la Santa Creu i Sant Pau (Barcelona): Josep Guardiola, Isaac García García. 19.- Hospital Clinic (Barcelona): Carlos Cardozo. 20.- Hospital University of Bellvitge de Hospitalet de Llobregat (Barcelona): Ferran Llopis Roca, Antonio Haro-Bosch. 21.- Hospital Germans Trias i Pujol University of Badalona (Barcelona): Neus Robert Boter, Marta Alujas Rovira. 22.- Hospital of Terrassa (Barcelona): Josep Tost. 23.- Hospital del Mar (Barcelona): Alfons Aguirre Tejedo, Isabel Cirera Lorenzo. 24.- University Hospital Joan XXIII (Tarragona): Anna Palau, Ruth Gaya Tur. 25. University Hospital of Girona Dr. Josep Trueta (Girona): Maria Adroher Muñoz, Ester Soy Ferrer. 26.- University Hospital of Vic (Barcelona): Lluís LLauger García. University of Sant Pau i Santa Tecla (Tarragona): Enrique Martín Mojarro, Silvia Flores Quesada. 28.-Sagrada Familia Hospital Clinic (Barcelona): Arturo Huerta. 29.-H. San Carlos Clinic (Madrid): Marcos Fragiel. 30.-H. La Paz University (Madrid): Paloma Romero Gallego Acho, Francisco Marqués González. 31.- University Hospital of the Princess (Madrid): Carmen del Arco Galán, Guillermo Fernández Jiménez. 32.- H. Severo Ochoa de Leganés University (Madrid): Rebeca González González, Teresa Agudo Villa. 33.- H. Rey Juan Carlos University (Madrid): Belén Rodríguez Mi-randa, Verónica Prieto Cabezas. 34.- H. University of Henares

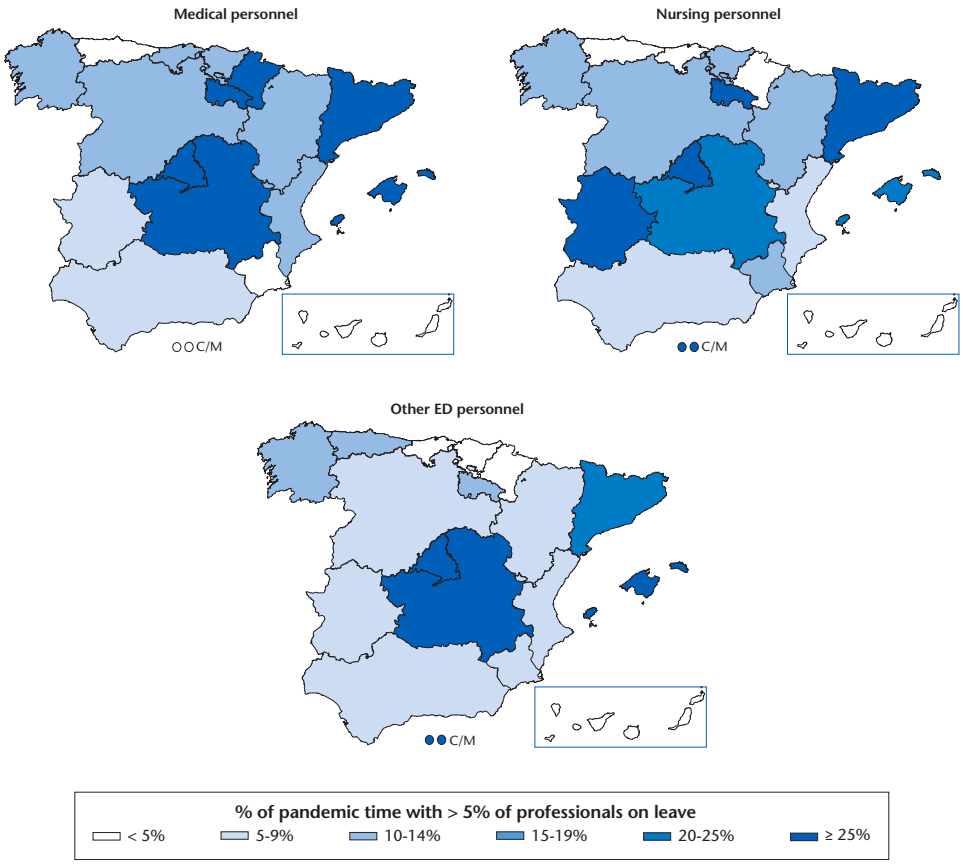

Figure 6. Impact of the pandemic on the number of hospital emergency department personnel leaves in the different Spanish autonomous communities. C/M: Ceuta and Melilla.

(Madrid): Martín Ruiz Grinspan, Patricia Gantes Nieto 351.-University Hospital of Fuenlabrada (Madrid): María Jesús Domínguez, Marta Álvarez Alonso. 36.- University Hospital Infanta Cristina de Parla (Madrid): Juan Carlos Repáraz González, Francisco Javier Teigell Muñoz. 37.-H. El Escorial District (Madrid): Sara Gayoso Martín, Silvia Ortiz Zamorano. 38.-Navarre University Hospital Clinic in Madrid: Nieves López Laguna, María García-Uría. 39.- University Hospital of Salamanca: Ángel García García, Marta Fuentes de Frutos. 40.-University Assistance Complex of León: Begoña Rodríguez Suarez, Mónica Santos Orus. 41.- University Hospital of Burgos: María Pilar López Díez. 42.- University Hospital of Rio Hortega (Valladolid): Pedro Hernansanz Caviedes, Juan Carlos García Calvo. 43.- Soria Healthcare Complex: Fadh Beddar Chaib, Ikram Samira Mohamedi Abdelkader. 44.-H. Regional University of Malaga: Manuel Salido, José Ignacio Valero Roldán. 45.- University Hospital Juan Ramón Jiménez: María José Marchena González, Esther Maldonado Pérez. 46. -H. Costa del Sol of Marbella: Carmen Agüera Urbano, Elisa Delgado Padial. 47.-H. Pedroches Valley of Pozoblanco (Córdoba): Jorge Pedraza García. 48.-H. Virgen del Rocío of Seville: Amparo Fernández de Simón Almela. 49.-University Hospital Complex of A Coruña: Ricardo Calvo López. 50.-H. Lucus Augusti Lugo University Hospital: Juan José López Díaz. 51.-University Hospital Complex of Vigo. H. Álvaro Cunqueiro: María Teresa Maza Vera, Raquel Rodríguez Calveiro. 52.- General University Hospital of Albacete: Francisco Javier Lucas-Imbernón, Francisco Javier Lucas-Galán. 53.-H. Virgen de la Luz (Cuenca): Félix González Martínez, Diana Moya Olmeda. 54.- Nuestra Señora del Prado de Talavera de la Reina Hospital (Toledo): Ricardo Juárez. 55.- University Hospital of the Canary Islands (Tenerife): Patricia Eiroa Hernán-dez, Marcos Expósito Rodríguez. 56.- University Hospital of Gran Canaria Dr. Negrín: José Pavón Monzo, Nayra Cabrera González. 57.- University Hospital of Central Asturias: Pablo Herrero Puente, Desiré María Velarde Herrera. 58.- University Hospital of Cabueñes (Gijón): Ana Patricia Niembro Valdés, Lorena Arboleya Álvarez. 59.-H. Virgen de la Arrixaca University Clinic: Eva Quero Motto, Nuria Tomás García. 60.- University General Hospital Reina Sofía de Murcia: María Consuelo Quesada Martínez. 61.-H. San Pedro de Logroño: Noemí Ruiz de Lobera. 62.-H. Lozano Blesa University Clinic: José María Ferreras Amez, Belén Arribas Entrala.

References

1 Zhu N, Zhang D, Wang W, Li X, Yang B, Song J, et al. A novel coronavirus from patients with pneumonia in China, 2019. N Engl J Med. 2020;382:727-33.
2 Pollán M, Pérez-Gómez B, Pastor-Barriuso R, Oteo J, Hernán MA, Pérez-Olmeda M, et al. Prevalence of SARS-CoV-2 in Spain (ENE-COVID): a nationwide, population-based seroepidemiological study. Lancet. 2020;396:535-44.
3 Llor C, Moragas A. Coronavirus y atención primaria. Aten Primaria. 2020;52:294-6.
4 Hernández-Tejedor A, Munayco Sánchez AJ, Suárez Barrientos A, Pujol Varela I. El reto de una unidad de cuidados intensivos en un recinto ferial. Med Intensiva 2020 (en prensa). DOI: 10.1016/j.medin.2020.04.008
5 González-Armengol, J, Vázquez-Lima MJ. Los Servicios de Urgencias y Emergencias ante la pandemia por SARS-CoV-2. Emergencias. 2020;32:155-6.
6 González Del Castillo J, Cánora Lebrato J, Zapatero Gaviria A, Barba Martín R, Prados Roa F, Marco Martínez J. Epidemia por COVID-19 en Madrid: crónica de un reto. Emergencias. 2020;32:191-3.
7 Martín-Sánchez FJ, González Del Castillo J, Valls Carbó A, López Picado A, Martínez-Valero C, Miranda JD, et al. Categorías diagnósticas y resultados a corto plazo en los pacientes con sospecha de COVID-19 atendidos en un servicio de urgencias. Emergencias. 2020;32:242-52.
8 Gil-Rodrigo A, Miró O, Piñera P, Burillo-Putze G, Jiménez S, Martín A, et al. Evaluación de las características clínicas y evolución de pacientes con COVID-19 a partir de una serie de 1000 pacientes atendidos en servicios de urgencias españoles. Emergencias. 2020;32:233-41.
9 Ministerio de Sanidad, Consumo y Bienestar Social. Catálogo Nacional de Hospitales 2019 (Consultado 11 Junio 2020). Disponible en: http://www.msssi.gob.es/ciudadanos/prestaciones/centros-ServiciosSNS/hospitales/docs/CNH2019.pdf
10 Álvarez Rodríguez V, Merlo Loranca M, Cuesta R.-Torices MM, Ruiz Polaina MJ, Martín Martínez A, Silvio J, et al. Análisis del impacto y

Autonomous Community (Seroprevalence of SARS-CoV-2 according to the ENE-COVID study[2])	Insufficient resources in the ED				Leave of emergency personnel		
	Healthcare areas	Human resources	Test SARS-CoV-2	FFP2-FFP3 masks	Doctors	Nurses	Other personnel
C. of Madrid (11.5%)	57.6%	46.7%	52.3%	43.5%	67.0%	70.1%	61.1%
Castilla-La Mancha (11.5%)	32.5%	27.5%	65.0%	25.0%	25.0%	21.2%	29.2%
Castilla y León (6.1%)	31.7%	23.3%	48.3%	41.7%	13.3%	10.0%	6.7%
Catalonia (5.5%)	36.4%	22.8%	64.4%	28.6%	28.4%	25.0%	24.5%
Autonomous Community of Navarre (4.6%)	66.7%	16.7%	91.7%	41.7%	25.0%	0%	0%
La Rioja (3.5%)	75.0%	0%	0%	25.0%	25.0%	25.0%	12.5%
Aragon (3.3%)	22.2%	25.0%	69.4%	61.1%	11.1%	13.9%	8.3%
Basque Country (3.0%)	13.9%	8.3%	50.0%	25.0%	13.9%	11.1%	0%
Extremadura (2.9%)	70.8%	58.3%	95.8%	66.7%	8.3%	33.3%	8.3%
Cantabria (2.9%)	25.0%	0%	37.5%	25.0%	12.5%	0%	0%
Andalusia (2.1%)	21.5%	22.1%	45.7%	47.1%	7.6%	6.5%	7.3%
Valencia (1.8%)	33.0%	35.0%	51.0%	45.0%	10.0%	9.0%	6.0%
Balearic Islands (1.8%)	3.6%	3.6%	53.6%	28.6%	25.0%	11.1%	25.0%
Murcia (1.6%)	25.0%	36.1%	63.9%	44.4%	0%	11.1%	6.3%
Canary Islands (1.5%)	22.2%	8.3%	47.2%	28.1%	0%	0%	0%
Asturias (1.4%)	7.1%	0%	35.7%	25.0%	3.6%	0%	10.7%
Galicia (1.2%)	25.0%	21.2%	38.5%	28.8%	11.5%	11.5%	13.5%
Ceuta and Melilla (1.1%)	25.0%	12.5%	50%	0%	0%	25.0%	25.0%
% seroprevalence of SARS-CoV-2 in the autonomous community 0-1.9% 2-3.9% 4-5.9% 6-7.9% 8-9.9% ≥ 10%	**% pandemic time with resource shortage* in the ED** 0-10% 10-19.9% 20-29.9% 30-39.9% 40-49.9% ≥ 50%				**% of pandemic time with > 5% of professionals on leave** 0-5% 5-9.9% 10-14.9% 15-19.9% 20-24.9% ≥ 25%		

Figure 7. Summary of the assessment of those responsible for hospital emergency services about the lack of resources and staff leaves according to the autonomous community. *Includes resource insufficiency with a certain degree of frequency or most of the time.

manejo de la pandemia de gripe A H1N1 en el servicio de urgencias de un H. terciario. Emergencias. 2010;22:181-6.
11 Trilla A. Transmisión de la gripe en los servicios de urgencias. Emergencias. 2018;30:5-6.
12 Castro Delgado R, Arcos González P, Rodríguez Soler A. Sistema sanitario y triaje ante una pandemia de gripe: un enfoque desde la salud pública. Emergencias. 2009;21:376-81.
13 Miró O, Salgado E, Bragulat E, Ortega M, Salmerón JM, Sánchez M. Repercusión de la falta de camas de hospitalización en la actividad de un servicio de urgencias hospitalario. Med Clin (Barc). 2006;126:736-9.
14 López-Barbeito B, Martínez-Nadal G, Bragulat E, Sánchez M, Gil V, Alonso JR, et al. Evolución de las características de las visitas por dolor torácico no traumático en una unidad de dolor torácico durante un periodo de 10 años (2008-2017). Emergencias. 2019;31:377-84.
15 González Armengol JJ, Fernández Alonso C, Martín-Sánchez FJ, González Del Castillo J, López Farré A, Elvira C, et al. Actividad de una unidad de corta estancia en urgencias de un H. terciario: cuatro años de experiencia. Emergencias. 2009;21:87-94.
16 Ferreras Amez JM, Arribas Entrala B, Sarrat Torres MA, García Noaín A, Caudevilla Martínez A, Colás Oros C, et al. Evaluación de los resultados antes y después de la implantación del Código Sepsis en Aragón. Emergencias. 2017;29:154-60.
17 Rodríguez-Montalvo JA, Aranda-Gallardo M, Morales-Asencio JM, Rivas-Ruiz F, Jiménez-Cortés Y, Canca-Sánchez JC. Implantación de un protocolo de triaje avanzado de enfermería en el manejo del dolor moderado en urgencias. Emergencias. 2020;32:141-3.
18 Ovens H. Saturación de los servicios de urgencias. Una propuesta desde el Sistema para un problema del Sistema. Emergencias. 2010;22:244-6.
19 Tudela P, Mòdol JM. La saturación en los servicios de urgencias hospitalarios. Emergencias. 2015;27:113-20.
20 Esbin MN, Whitney ON, Chong S, Maurer A, Darzacq X, Tjian R. Overcoming the bottleneck to widespread testing: a rapid review of nucleic acid testing approaches for COVID-19 detection. RNA. 2020;26:771-83.
21 Miró Ò. COVID-19: one threat, one world, one response (magical thinking). Eur J Emerg Med. 2020;27:165-166.
22 Miró O, Escalada X, Gené E, Boqué C, Jiménez Fábrega FX, Netto C, et al. Estudio SUHCAT (1): mapa físico de los servicios de urgencias hospitalarios de Cataluña. Emergencias. 2014;26:19-34.
23 Del Arco Galán C, Rodríguez Miranda B, González Del Castillo J, Ruiz Grinspan M, Carballo C, Bibiano Guillén C, et al. Estudio comparativo de la estructura física, recursos humanos e indicadores de actividad asistencial entre los servicios de urgencias hospitalarios públicos de las comunidades autónomas de Madrid y Cataluña. Emergencias. 2017;29:373-83.
24 Jacob J, Gené E, Alonso G, Rimbau P, Zorrilla J, Casarramona F, et al. Estudio SUHCAT-5: comparación de la percepción de la calidad de los servicios de urgencias de Cataluña entre los profesionales sanitarios y sus responsables. Emergencias. 2018;30:45-9.