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ORIGINAL ARTICLE

The COVID-19 Pandemic and the Organization of Pediatric Health Services in Portugal - a Medical perspective

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Abstract

The COVID-19 pandemic presents a new and significant infection control challenge within healthcare units. Therefore, there was a need to reorganize and restructure the Pediatric Services nationwide whilst establishing efficient protection measures. This study aims to portray physicians perspective on their hospitals measures implemented during early phase of the COVID-19 pandemic. Analytical cross-sectional study conducted to Pediatricians and Pediatrics Residents concerning the month of April of 2020. It was based on an anonymous and confidential survey applying a Likert Scale of 5 level points of agreement. Inferential and descriptive analysis resorting to SPSS®26 (p=0.05). Total of 113 respondents, 67% Pediatricians; 92% working in National Health Service (n=104). In 66% of the sample the reorganization was considerate adequate, with creation of protocols before the officials in 50%, team division in 48%, 60% turnover. The articulation with Public Health was possible (77%) and adequate (56%). Restructure and creation of circuits in 90%, physical division of all sectors in 67%, considered safe and adequate in 80%. Protection include training on Personal Protection Equipment (75%) and SARS-CoV-2 jab (47%). Personal Protection Equipment: complete 47%, rationing 70%, self-acquired 26%. In response to COVID-19, the adjustment of Pediatric Services showed a higher degree of adaptation and adequacy proportional to the availability of material and individualization of separated workspaces. The greatest deficiencies were found at the level of Personal Protection Equipment, namely with rationing or need for acquisition by professionals.

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INTRODUCTION

At the end of 2019, the world saw a new form of disease emerge in Wuhan, China, named Coronavirus Disease 2019 (COVID-19).[1-2] On January 30, 2020, the World Health Organization (WHO) declared it an international Public Health emergency.[3]

Transmission occurs through exposure to respiratory droplets (less than five microns), direct contact with respiratory secretions, surfaces contaminated by either of them, or through air in aerosol-generating events.[2]

The new infection causing severe acute respiratory syndrome (SARS) mediated by the SARS-CoV-2 virus has reshaped our organization individually and at the level of the National Health Service (SNS).

An immediate need arose to reinvent health services in light of the most recent knowledge, mirroring the action taken during the SARS, MERS-CoV crisis in 2002, emphasizing the importance of providing healthcare workers (HCW) with Personal Protective Equipment (PPE).[4-5]

Inconsistent access to PPE and gaps in infection control training were contributing factors to cases of infection in HCW during the SARS crisis in Canada.[5]

The first pediatric case of COVID-19 in Portugal was documented on March 7, 2020.[6]

A series of measures were since taken to reorganize, restructure, improve the safety and protection measures in place at Pediatrics Services (PS) at a national level. This article describes the adjustments made at PS in response to the COVID-19 pandemic in the initial phase from the perspective of physicians.

METHODS

This analytical and cross-sectional observational study included the responses to a questionnaire about the organization of healthcare services in April 2020, provided by an anonymized population of Pediatricians (P) and Pediatrics Residents (PR) working in Portugal during the study period.

The questionnaire comprised objective multiple-choice questions following a Likert scale (LS) with five levels of agreement (1 – Totally disagree; 2 - Disagree; 3 - Neither agree nor disagree; 4 - Agree; 5 - Completely agree; NA - Not applicable) and open-ended questions.

The responses in the LS were defined as Totally Agree if the average response score was between [4.5-5]; Agree for scores in the [3.5-4.5] range; Neither agree nor disagree for scores between [2.5 and 3 ,5]; Disagree fro scores between [2.5-1.5]; and Totally disagree for scores between [1.5-1]. Answers 4 or 5 in the LS were deemed as reflecting agreement.

The following variables were considered: age, sex, place of work, years at the service, established protocols, service restructuring measures, SARS-CoV-2 testing criteria and methods, coordination between inter- and intra-hospital services and infection control. SPSS®26 $p<0.05$.

The questionnaire was available online for 36 days, between June 30 and August 4, 2020; a convenience sample was assembled.

Study Instrument

The study instrument consisted of a questionnaire prepared by the authors of this article. The links to access the questionnaire were distributed via social media platforms and electronically to Pediatricians, with reminders sent periodically until the end of the study period.

Responses were collected anonymously through Google Forms®. The questionnaire contained 28 questions divided into six sections:

(1) Demographic characteristics;
(2) Protocols and restructuring of services;
(3) SARS-CoV-2 testing;
(4) Medical care – visits;
(5) Coordination between services;
(6) Infection control within PS.

Data analysis was performed using descriptive and inferential statistics, using SPSS-26.0® Software (Statistical Package for the Social Sciences).

Statistical analysis

Compliance with the criteria set for parametric tests was attained prior to inferential analysis. To this end, the Kolmogorov-Smirnov test was performed to test the null hypothesis (H0) that the data followed a normal distribution; if p-value was ≤ 0.05 for the variables under study, the Null Hypothesis (H0) was rejected and a non-normal distribution assumed for the sample of data. Non-parametric tests were then used, with a significance level of 0.05.

The Chi-Square test (x2) was applied to investigate associations between qualitative variables.

Spearman's correlation coefficient was used to correlate the degree of agreement of presence of suspected cases within the team and the variables under study.

The Kruskall-Wallis test was applied to compare the variables under study in more than two groups.

RESULTS

1 – Study Population Demographic/ Socioeconomic Characteristics

Females amounted to 85.3% of the 113 participants who voluntarily answered the questionnaire; 25.7% were aged 20-30 years; 33.6% were aged 31-40 years; 21.2% were aged 41-50 years; 14.2% were aged 51-60 years; and 5.3% were aged 60+ years.

Regarding the region in which they worked, 28.3% were in the North of the country, 42% in the Center region, 20% in the Greater Lisbon Region, 4% in the Alentejo and Algarve region, and 7% in the Islands.

The vast majority (92%) worked in the public sector in the SNS. Residents amounted to 33% of the study population (2nd-year residents, on average) and 74% were specialists. On average, they were working in health services for 14.7 years. Table 1 describes the detailed characteristics of the respondents.

2 – Protocols and Service Restructuring

2.1 – Protocols

Clinical protocols published by official organizations (Directorate-General of Health – DGS – and/or the Portuguese Society of Pediatrics – SPP) were designed to facilitate and standardize guidance and procedures; they were implemented in 93.7% (n=109) of the PS surveyed. The most frequently adopted were the protocols for the contingency (91.2%), mitigation (88.5%) and the resumption of care (73.35%) phases.

In 97.5% (n=98) of cases, the PS themselves created protocols prior to the publication of official guidance and developed guidance for issues not addressed by the competent authorities. The protocol developed for the contingency phase was the most used (65.5%), followed by the one designed for the mitigation phase (61.9%), resumption of care (54.9%), dissemination of results and outpatient follow-up of patients tested for SARS-CoV-2 infection (52.2%), and treatment of pediatric patients with mild to moderate COVID-19 (50.4%).

No protocols were created from scratch in 12% of the cases.

Table 1. Demographic Characteristics.

	Minimum/ Maximum	Mean/Standard Deviation
Years at the service	1-42	14.7/11.3
Year of Residency	1-50	2.84/1.30
Gender	N	%
Male	93	82.3
Female	20	17.7
Age Group		
20 - 30 years	29	25.7
31 - 40 years	38	33.6
41 - 50 years	24	21.2
51 - 60 years	16	14. 2
>60 years	060	5.3
Region where you work		
North	32	28.3
Center	47	41.6
Greater Lisbon	23	20.4
Alentejo and Algarve	04	03.5
Islands	07	06.2
Place of work		
SNS	104	92.9
Private hospital	007	06.3
Private practice	001	00.9
Job Status		
Resident physician	37	32.7
Specialist	76	67.3

2.2 – Restructuring of Services

The reorganization and restructuring of pediatrics services was introduced early on in 15% of the cases (17% P, 11% PR), at an adequate moment in 66.4% of the cases (60% PR, 70% P), and at a late moment in 18.6% of the services (30% PR, 13% P).

2.2.1 – Physical Segregation

In 60% of cases, the segregation was described as adequate and safe, and in 90% specific circuits were created for the circulation of suspected cases of COVID-19.

The majority of respondents deemed the physical segregation of spaces satisfactory; physical segregation was implemented in all sectors in approximately 66% of the cases.

Physical separation between COVID and non-COVID areas was possible in 86% of the waiting rooms, 73% of the emergency units, in 76% of the short-term inpatient units, in 67% of the outpatient units, in 69% of the delivery and operating rooms, and in 86% of the nurseries.

Physical segregation of emergency rooms was not possible in 54% of the cases, as illustrated in Table 2.

2.2.2 – Team Segregation

At an organizational level, the segregation of HCW by teams was not consistent, with most respondents choosing the option “Neither agree nor disagree”.

Segregation of healthcare workers into COVID and non-COVID areas occurred in 48% of the medical teams (average=4.0), in 39% of the medical assistant teams (average=4.5), and in 39% of the nursing teams (average=3.7).

The allocation of HCW into different sectors was also possible in most cases (average=4.4); rotation schemes were adopted in 60% of the cases (average=3.9) – Table 2.

2.3 – SARS-CoV-2 testing

2.3.1 – SARS-CoV-2 testing criteria

With regard to the SARS-CoV-2 testing criteria, in 21% of the cases (average=2.1) tests were carried out only in emergency unit patients in the COVID area; in 93% of the cases (average=4.8) tests were performed in patients meeting the criteria for hospitalization; and in 71% of the cases (average=4.1) tests were administered to patient companions. Only 55% of the outpatients were tested (average=3.5).

Table 2. Physical segregation of space for healthcare workers.

Segregation	N	LS≥4 (%)	LS (Mean)	Standard deviation
Possible in all sectors	112	75	4.0	1.3
Possible, adequate and safe	112	68	3.7	1.3
Circuits	111	100	4.5	0.9
Waiting room	109	94	4.4	1.0
Pediatric emergency room	107	79	3.9	1.5
Emergency room	104	37	2.6	1.7
Outpatient wards	960	64	3.8	1.4
Short-term inpatient unit	101	77	4.1	1.4
Delivery rooms	78	54	3.8	1.3
Operating rooms	84	58	3.9	1.4
Nursery	79	43	3.4	1.5
Organization				
Medical staff segregation	113	54	4.0	1.7
Nursing staff segregation	113	44	3.7	1.6
Medical assistant segregation	113	44	4.5	1.6
Segregation by Sectors	113	57	4.4	1.6
Rotation schemes	113	68	3.9	1.6

Seventy-nine percent of the newborns from women tested positive in the postpartum period without a prepartum test were tested (average=4.3); in 3% of the cases, they were tested indiscriminately – Table 3.

2.3.2 –SARS-CoV-2 testing criteria in pediatric emergency care units

Specific criteria were defined at emergency units located in different institutions.

The majority (79%) of the PSs adopted the measures defined by the DGS (average=4.0) and 65% (average=3.5) defined their own testing criteria based on the standards defined by the DGS.

The criteria were adjusted taking into account a rationing policy in effect in 37% of the services (average=2.6) – Table 3.

2.3.3 – SARS-CoV-2 testing areas

In 46% of the cases, emergency units had areas specifically designated for COVID-19 testing (average = 3.0); the same applied to 73% of the elective procedures (average = 4.1) and 69% of the tests performed in newborns (average = 4.5) – Table 3.

2.4 – Continuation of care | visits

2.4.1 – In-person visits

As illustrated in Table 4, care was affected in the majority of PSs and was entirely suspended in numerous hospitals (77%, average=4.1); in-person visits were held in a limited fashion in most services (84%, average =4.4).

The majority of the PSs adopted video patient visits (97%, average=4.7).

2.4.2 – Preventive measures

Preventive measures were adopted in PSs where care was not completely suspended. The decrease in the number of individuals per room was introduced almost unanimously (93%, average=46), as well as more time between visits (82%, average=4.4), and limitation in the number of companions (96%, average=4.6). Face masks were distributed in most PSs to patients and their companions (76%, average=4.1).

Pre-visit screening occurred inconsistently between PSs (66%, average=3.8) – Table 4.

2.5 – Coordination between Services

Table 5 shows data about the coordination between different services, namely Surgery, Orthopedics, Gynecology and Obstetrics, Radiology and Public Health with Pediatrics.

Regarding the coordination with Surgery and Orthopedics, no changes were seen in 57% of the cases (average=3.7), although protective measures were adopted and specific criteria and procedures were created for the observation of pediatric patients in the COVID area in 60% of cases (average=3.8).

Protocols (73%, average=4.0) and circuits (72%, average=3.9) were designed with Gynecology and Obstetrics in a number of hospitals. The majority of the respondents rated the coordination with emergency units (64%, mean=4.0) and delivery rooms (69%, mean=4.0) as adequate.

Specific circuits were developed for complementary diagnostic tests performed in the COVID area in 62% of

Table 3. Criteria and places for SARS-CoV-2 testing.

Criteria	n	LS≥4	LS (Mean)	Standard deviation
Only emergency unit patients with COVID	111	24	2.1	1.7
Patients meeting hospitalization criteria	108	100	4.8	1.6
Hospice patients	100	55	3.5	1.6
Patient companions	108	77	4.1	1.6
All newborns	89	3	1.4	0.9
Newborns from mothers with positive/unknown test results				
Standards defined by the DGS	80	63	4.3	1.1
Normas definidas pela DGS	113	89	4.0	1.1
Emergency unit testing criteria				
Pediatric service criteria	112	73	3.5	1.5
Test rationing	112	41	2.6	1.6
Testing areas				
COVID and non-COVID in the same area	105	48	3.0	1.7
Newborns in different areas	800	68	4.5	1.1
Elective procedures in different areas	972	73	4.1	1.4

Table 4. Management of care activities.

Visits	n	LS≥4	Mean	Standard deviation
In-person visits suspended	110	85	4.1	1.2
Select in-person visits	108	91	4.4	1.1
Video visits	110	107	4.7	0.5
Preventive Measures				
Pre-visit screening	113	75	3.8	1.5
Limited number of companions	113	108	4.6	0.7
Face masks for patients and companions	113	86	4.1	1.3
Fewer people per room	113	105	4.6	0.9
More time between visits	113	93	4.4	1.0

the centers (average=3.6), as well as for referrals between services in 82% of the centers (average=4.2), with cases in which patients remained in the emergency unit. Portable diagnostic devices were made available in 62% of the centers (average=3.6).

2.6 – Infection control in the services

Infection control was implemented in the form of tests for Streptococcus pyogenes in tonsil exudate (60%, average=3.5) and nebulization (89%, average=4.6). Corticosteroid therapy was also discontinued in about 36% of cases (average=2.8).

HCW training was provided in 51% of the cases (average=3.4), of which about 11% were directed exclusively to COVID teams (average=1.7), with 24% of intended trainees not having time to attend training sessions (average =2.3).

These sessions focused on the correct placement, use and removal of PPE in 75% of the cases (average=4.0), and on the technique to test patients for SARS-CoV-2 infection in 43% of the cases (average=3.1).

In the study population, 69% were suspected with (average=3.7) and 44% had confirmed cases of COVID-19 (average=2.7).

Regarding the availability of PPE (Table 6), HCW had access to personal protective equipment in 47% (average=3.2) of the cases; masks, face shields and FFP2 gloves were provided (43%, average=3.5). There was a need for rationing in 61.5% of the centers (average=3.8), meaning that 26% (average=2.3) of the HCW had to purchase PPE for themselves.

In the majority of the cases (70.0%, average 3.8), daily self-monitoring for possible symptoms and implementation of safety measures and frequent hand hygiene (97.3%, average=4.7) were encouraged; and disinfection supplies were broadly provided (89.2%, average=4.5).

Temperature was measured at the entrance in 48.6% of the centers (average=3.1) and a surgical mask was provided in 84.8% of the centers (average=4.4). In rare cases, FFP2 masks (19.4%, average=2.2) and face shields (41%, average=2.8) were provided. Biometric registration was discontinued in only 47.1% of the centers (average=3.0) of cases.

Table 5. Coordination with other Specialties.

	n	LS≥4	Mean	Standard deviation
Surgery and Orthopedics				
No changes	103	59	3.7	1.6
Observation criteria and procedures in COVID areas	101	61	3.8	1.4
Gynecology and Obstetrics				
Adequate in emergency units	83	53	3.8	1.1
Adequate in delivery rooms	78	53	4.0	1.0
Joint circuits	83	60	4.0	1.3
Joint protocols	83	61	3.9	1.4
Radiology: tests in the COVID area				
Specific criteria	110	71	3.6	1.4
Circuits and procedures for patient referral	111	92	4.2	1.2
Portable devices	105	65	3.6	1.5
Public Health				
Accessible	107	59	3.7	1.1
Possible	107	82	4.1	1.0
Adequate	108	61	3.7	1.1

Table 6. Self-management and safety measures in the workplace.

Self-management and safety measures	n	EL≥4	Média	Desvio-padrão
Self-monitoring once or twice a day encour-aged	113	790	3.8	1.3
Temperature measured at entrance	113	550	3.1	1.7
Surgical masks at entrance	112	950	4.4	1.2
FFP2 mask at entrance	113	220	2.0	1.4
Discontinuation of biometric registration	104	490	3.0	1.8
Frequent hand hygiene	112	109	4.7	0.6
Face shield	110	450	2.8	1.7
Disinfection supplies	112	100	4.5	1.0

DISCUSSION

In late March 2020, the DGS advised health institutions to adopt measures to prevent and control infection[7,8], with the use of PPE fit to the circumstances in which there was contact with patients. These measures should be promoted and implemented, with training delivered to the different groups of workers on how to wear PPE.

Piché-Renaud PP et al. regarded training on how to place and remove PPE as the factor with the most significant impact on HCW. Therefore, the early implementation of infection prevention and control measures, as well as adequate use of PPE, were crucial elements in the mitigation of the nosocomial spread of COVID-19.[9]

Our study found that in 51% of the cases there was at least one training session, 75% of which focused on the correct placement, use and removal of PPE. However, only in less than half (47%) was the testing procedure for COVID-19 addressed. These training sessions convened all HCW – not only COVID-19 teams – in 89% of the centers.

The Global Strategy for the Management, Access and Use of PPE[10,11] was designed to minimize the need for PPE by defining what constitutes adequate and optimal use of PPE. It is the responsibility of healthcare units and management bodies to ensure there is an adequate and sufficient supply of PPE. In our study, we found that FFP2 masks, face shields and gloves were available for the majority of healthcare workers (60%), despite the significant need for PPE rationing (70%) and the fact that 26% had to buy PPE for themselves. About 25% of the study population said that the consistent and sufficient supply of PPE recommended by the DGS was not fully implemented.

DGS Standard 007/2019 recommended the implementation of basic infection control measures in all procedures and moments, especially hand hygiene, respiratory etiquette, adequate decontamination of supplies and equipment, among others. Equipment and infrastructure used for patient treatment had to be cleaned with degreasing disinfectant agents by personnel with specific PPE to perform the job.[7,11] Previous studies revealed that 86-97% of HCW believe that hand hygiene was crucial in preventing infection[12-13], and that the failure to do so constituted the most relevant issue in infection control.[14]

In the pediatric context, basic precautionary measures such as the use of gowns and droplet precautions[15] are now routinely recommended; compliance levels have increased with hand hygiene[16] being observed in 97% of the included centers. The use of KN-95 masks (a close equivalent to FFP2 masks[17,18]) is also considered essential, based on the evidence that 95% of aerosolized particles are blocked when masks are worn correctly.[19] Surgical (84.8%) and/or FFP2 (19%) masks were provided in the majority of the centers; individuals entering healthcare centers were also required to put masks on, with replacement if they were worn for more than 4-6 hours or if the mask became wet or damaged.[18,20]

According to the SPP guidelines on how to approach pediatric patients with COVID-19[21], aerosol-generating procedures (aerosol therapy, aspiration of respiratory secretions) should be avoided, with limited use of nebulization in 89% of the centers, and testing for group A Streptococcus tonsil exudate performed in 60% of the centers, given the high-risk nature of the procedure. According to these recommendations, systemic corticosteroid therapy can increase viral excretion time in cases of viral pneumonia, thereby increasing its replication. Therefore, this therapy should be avoided, which was the case in 36% of the centers.

Daily self-monitoring should also be carried out to allow the early identification of symptoms consistent with COVID-19, in order to ensure adequate referral and have infection control and prevention measures implemented as soon as possible.[22,23] In the study population, self-monitoring of symptoms was encouraged (76%) and body temperature was measured at the entrance of healthcare centers (49%). Face shields were only provided in 40% of the cases and biometric registration was discontinued in 47%, which might constitute an important infection prevention measure, since biometric equipment relies on an operator and requires proper individual hand hygiene.

The existence of suspected cases of infection in medical teams was seen in 2/3 of the cases, and they were confirmed in only 44% of the study population.

The official protocols issued by the competent authorities (DGS and SPP) were adapted and molded to the reality of each service. This may have been caused by the lack of studies on the potential vertical transmission of SARS-CoV-2 culminating in neonatal infection, which impaired the development of guidelines.[22,24] In the study population, 30% of the respondents revealed that all newborns were tested indiscriminately, while 79% only tested newborns from mothers with an unknown or positive test. According to our study, there were pediatric services in which protocols were designed for breastfeeding, since no guidelines were issued by the competent authorities on this subject. The guidelines from the WHO and the Center for Disease Control and Prevention contradicted the ones issued by the Spanish and Chinese authorities on the separation of mothers and children and the type of breastfeeding, accentuating the difficulty in establishing a correct procedure. To date, no viral load of SARS-CoV-2 has been detected in breast milk.[24] Delivery and operating rooms were segregated, but the same only happened in 54% of nurseries. This duality stresses the need for new studies on the subject.

At a national level, diagnostic criteria were frequently revised, and no specific guidelines were created for the pediatric population. Initially, a case was considered suspicious and the possibility of testing was only considered if the patient met certain clinical and epidemiological criteria and consultation was held with the Medical Support Line[10,25] (created to support and standardize HCW response). By the end of March, clinical signs prevailed and individuals presenting with fever, cough, and dyspnea were deemed as potentially ill and thus eligible for SARS-CoV-2 testing. Due to the lack of specificity of the criteria and the fact that the pediatric population was subjected to the same guidelines as the adult population without considering the specificities of Pediatrics, mass testing for SARS-CoV-2 was carried out and in 37% of the pediatric services rationing of tests had to be enforced.

In the study population, about 79% of the respondents reported that the testing criteria were based on the standards defined by the DGS, while 65% adapted official guidelines.

Patients meeting admission criteria were tested in 93% of the pediatric services, with a lower percentage of their companions being tested (73%). An important gap was found in testing in a hospice setting, with half of the pediatric services not testing these patients. However, it should be noted that 22% of the pediatric services tested patients exclusively in COVID emergency units.

Testing these patients allowed their allocation into cohorts and COVID and non-COVID areas. This was possible in all sectors in 77% of the services, with segregation considered appropriate and safe by 61% of the respondents. Segregation occurred mainly at the level of waiting rooms, emergency rooms, wards, and short-term admissions. Greater difficulty was seen in emergency units, which were segregated in only 36% of the cases. This may have affected by the logistics inherent to supplies, human resources, and the need for timely intra-hospital location.

Personnel segregation was also implemented in most cases, with greater success rates in teams of medical personnel and medical assistants. Rotation of teams between in-person and remote care was implemented in 70% of the services.

Coordination with other hospital services also required some change. In 43% of the services, changes were required in the interactions with Orthopedics and Surgery services; although appropriate measures were implemented, they may have occasionally decreased the quality of care provided, especially for patients in the COVID area. Considering consistency and correct conduct, in 60% of the services specific criteria and procedures were outlined for patients in this area.

The DGS defined that transporting patients to carry out procedures/treatments required cautionary measures, and that procedures/treatments should be carried out at the bedside whenever possible[7,26]. Thus, in 65% of the cases criteria were created to justify travel (through individualized circuits – 83%) and in 62% of the services portable devices were used.

Regarding care, the DGS established the replacement of face-to-face consultations with non-face-to-face consultations to ensure patient safety[8], which was the case in the majority of the respondents (97%).

The DGS advised that surgical masks be worn in waiting rooms and consultation offices[11], which only occurred in 76% of the services. At the same time, a gap between visits was also advised to crowding in waiting rooms[11,27], which was observed in 82% of the services, which allowed a decrease of 93% in the number of patients in waiting rooms.

In only 66% of the services patients were screened for symptoms of COVID-19 and prior contact with a suspected or confirmed case of COVID-19 before a visit.

The presence of a companion was not recommended. In Pediatrics, however, children could be accompanied by a person[7,28]; the procedure implemented in 96% of the services limited the number of companions.

Since the SARS-CoV-2 outbreak constituted a public health issue, a national Public Health team was activated and acted as a Task Force, performing epidemiological monitoring and surveillance, management and communication of risks in effect in the context of the pandemic[29].

Thus, adequate coordination with Public Health authorities became an essential element, which was fully implemented in 77% of the services, was accessible in 55% and adequate in 57%. These proportions illustrate the communication difficulties experienced.

This study presented some limitations, namely the collection of information via a questionnaire and not direct observation, which may result in bias on the part of respondents. Convenience sampling does not guarantee randomness or uniformity in data collection. The small representation of private services in the study population does not allow inferences to be derived about this group of services.

CONCLUSION

The COVID-19 pandemic has shed light on the insufficient availability of human and material resources, in addition to the organizational and structural shortcomings of the SNS.

Various approaches were developed to address the pandemic in different pediatric services throughout the country, with more consistent decisions made in certain sectors, namely in emergency units, to the detriment of others, which could have made crucial hygiene and safety measures to face the pandemic unfeasible.

Although formally correct and ambitious, the measures devised by official bodies often idyllic in light of the reality of public pediatric services, and at times inadequate for the pediatric population. We found gaps in terms of lack of PPE, poor physical segregation measures, and inconsistent practices across services. Cost-effective measures, such as discontinuing biometric registration or providing face shields, were also not implemented in most cases.

The definition of different circuits, especially in the context of emergency units, is essential to minimize contact between confirmed/suspected and non-suspected cases of disease. The gaps in physical segregation and lack of material resources constituted an obstacle that required the reorganization of pediatric services to ultimately improve the quality of care provided.

A critical analysis of the actions taken and their respective repercussions in the face of the adversities imposed by the pandemic should be seen as a learning opportunity for authorities and HCW.

National and international guidelines should be designed and constantly updated in order to standardize the procedures to be adopted in the context of a crisis, so that the essential resources are guaranteed for the correct operation of pediatric services.

Authors' Contribution Statement

All the authors contributed to the conception and design of the work, acquisition, analysis, interpretation of data for the work; drafting the work, revising it critically for important intellectual content; final approval of the version to be published and agreed to be accountable for all aspects of the work, ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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Conflicts of Interest

The authors declare that there were no conflicts of interest in conducting this work.

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Protection of Humans and Animals

The authors declare that the procedures fol-lowed were in accordance with the regulations of the relevant clinical research ethics committee and with those of the Code of Ethics of the World Medical Association (Dec-laration of Helsinki).

Data Confidentiality

The authors declare having followed the protocols in use at their working center regarding data publication.

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