



# CURRENT STATUS OF GENERAL RESOURCES AND OPERATION OF PEDIATRIC EMERGENCY DEPARTMENTS IN PUBLIC HOSPITALS IN LATIN AMERICA (STUDY RFSEPLA)

ESTADO ACTUAL DE RECURSOS GENERALES Y FUNCIONAMIENTO DE SERVICIOS HOSPITALARIOS DE EMERGENCIAS PEDIÁTRICAS CON GESTIÓN PÚBLICA EN LATINOAMÉRICA (ESTUDIO RFSEPLA)

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## ABSTRACT

**Introduction:** To improve the quality of care in Pediatric Emergency Departments (PEDs), it is essential to carry out measurements and surveys. Purpose. To describe the resources and operation of PEDs of public hospitals in Latin America.

**Methods:** A retrospective, quantitative and descriptive study was conducted in 2019, consisting of a survey administered to PEDs of Latin-American public hospitals that have a Pediatric Intensive Care Unit (PICU). Data were processed using REDcap and InfoStat programs. Continuous variables are presented as median and range, categorical variables as percentages, and productivity/resource relationships as ratios. Univariate analysis was performed. **Results:** Of 371 PEDs in 17 countries, 107 (28.8%) answered the survey. A total of 102 departments (95.3%) have an observation area and 42 (39.3%) have isolation rooms. Median number of annual visits/observation beds and daily visits/office were 4830.6 and 24.4, respectively. Overall, 6.1% of the patients required hospitalization and 2.0% were assisted in the Resuscitation Area. 37 PEDs (34.6%) have more than 80% of 27 items considered essential by the International Federation for Emergency Medicine; 43 PEDs (40.2%) have incomplete airway equipment and 74 (69.2%) perform triage. The median number of daily visits is 38.4/physician and 35.3/nurse. Electronic records are used in 83 (77.6%) PEDs and 68 (64,1%) use five protocols for critical situations; in 10 (9.4%) time is allocated to teaching and research and in 43 (41%) there is quality improvement plan.

**Conclusion:** The information obtained regarding resources and operation of public PEDs in Latin America reveals important gaps.

**Keywords:** Pediatric Emergency Departments; Quality of Health Care; Preparedness; Surveys and Questionnaires; Health Resources. (Source: MeSH NLM).

## RESUMEN

**Introducción:** Para mejorar la calidad de atención en los Servicios de Emergencias Pediátricas (SEP), es indispensable realizar mediciones y relevamientos. **Objetivo:** Describir los recursos y funcionamiento de los SEP de hospitales públicos de Latinoamérica. **Métodos:** Estudio retrospectivo, cuantitativo y descriptivo. Encuesta realizada en SEP de hospitales latinoamericanos con financiación pública y con Unidad de Cuidados Intensivos Pediátricos (UCIP) (2019). Datos procesados mediante programas REDcap e InfoStat. Se presentan variables continuas como medianas y rangos; variables categóricas, como porcentajes; relaciones de productividad/recursos como razón. Se realizó análisis univariado.

**Resultados:** De 371 servicios en 17 países, 107 (28,8%) contestaron la encuesta. 102 servicios (95,3%) tienen sector de observación y 42(39,3%), salas de aislamiento. La mediana de consultas anuales/cama de observación fue 4 830,6; la mediana de consultas diarias/consultorio 24,4. El 6,1% de las consultas requirieron internación y 2,0% fueron asistidas en el Sector de Reanimación. 37 SEP (34,6%) disponen de > 80% de 27 ítems considerados imprescindibles por la Federación Internacional de Emergencias; en 43 SEP (40,2%) el equipo de vía aérea es incompleto. En 74 servicios (69,2%) se realiza triaje. La mediana de consultas diarias es de 38,4/médico y 35,3/enfermero. En 83(77,6%) centros se manejan datos informatizados. En 68 SEP (64,1%) se utilizan cinco protocolos de situaciones críticas. En 10(9,4%) el personal médico cuenta con horario de docencia/investigación. Existe plan de mejora de calidad en 43 (41%) servicios. **Conclusión:** La información obtenida sobre los recursos y funcionamiento de los SEP públicos en Latinoamérica revela brechas importantes.

**Palabras Clave:** Medicina de Urgencia Pediátricas; Calidad de la Atención de Salud; Preparación; Encuestas y cuestionarios; Recursos en Salud. (Fuente: DeCS BIREME).

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## INTRODUCTION

Pediatric emergency and urgent care have increased over the last 30 years, leading to the need to adapt in order to provide quality care, defined by the WHO as “the degree to which the health services for individuals and populations increase the likelihood of desired health outcomes”; quality health services should be “effective, safe, people-centred, timely, equitable, integrated and efficient”<sup>(1)</sup>. Health agencies from different countries and international institutions have developed standards and indicators to improve the quality of care in PEDs<sup>(2,10)</sup>. It is essential to carry out measurements and surveys to know the status, needs, and opportunities for improvement<sup>(11-17)</sup>; so far, such studies have not been published in Latin America.

## OBJECTIVE

This study aims to describe the general resources and operations of PEDs in public hospitals in Latin America.

## METHODS

### Study design type and area

A retrospective, cross-sectional, quantitative, descriptive study was conducted consisting of a survey to collect data on the structure and operation of PEDs in Latin America in 2019.

### Population and sample

The survey was sent to the chairs of PEDs of Latin-American public hospitals. Since hospital complexity is classified differently in the countries of the region and to focus on the institutions that offer the best possibility of developing the specialty of Pediatric Emergency Medicine, public hospitals that have a pediatric intensive care unit (PICU) and are financed entirely or partially by the public sector were included. Centers that did not send the Confidentiality Agreement (CA) signed by the Chief Medical Officer or the head of the

Research Committee were excluded.

### Instrument and variables

The assessment instrument was a survey based on documents, questionnaires, and reports of quality indicators published by national and international agencies<sup>(9,10,12,14)</sup> and was subsequently revised by experts in Pediatric Emergency Medicine belonging to the Safety and Quality Committee of the Sociedad Latinoamericana de Emergencias Pediátricas (SLEPE) and the Red de Investigación y Desarrollo de la Emergencia Pediátrica Latinoamericana (RIDEPLA). Data on productivity and physical, human, regulatory, and management resources for 2019 were collected. The survey consisted of 133 questions grouped into 8 sections: institutional information, facilities, equipment, electronic records and online resources, human resources, available specialist consultation, teaching and research activity, emergency care protocols, and quality and safety procedures.

The research team included 28 On-site Collaborators (OC) from 17 Latin-American countries. The OCs prepared the lists of hospitals that met the inclusion criteria in their countries, contacted the chairs of the PEDs, and accompanied the respondents in the processes of signing the CA and data collection.

### Analysis of data

The data collection and analysis was carried out on the REDCAP platform (Research Electronic Data Capture: <https://www.project-redcap.org>). For further statistical data analysis, the 2020 version of the InfoStat software (National University of Córdoba, Argentina: <http://www.infostat.com.ar>) was used.

The normality of the distribution of quantitative data was evaluated using the Shapiro-Wilk test. None of the continuous variables showed normality; therefore, the medians and interquartile ranges are reported. Categorical variables are expressed as numbers and percentages. For between-group comparison the Chi-square test was used. The level of significance was set at 0.05. Relationship between healthcare productivity data and structural resources was reported as ratios.

## Ethical Aspects

The study protocol, the survey, and the CA were approved by both the Research and Ethics Committees of Hospital Garrahan and sent to the heads of the PEDs. Once the CA was signed by the Chief Medical Officer of each hospital or by the head of the Research Committee, the survey was sent via the REDCap program.

The study was conducted from December 1st, 2019 to December 8th, 2020.

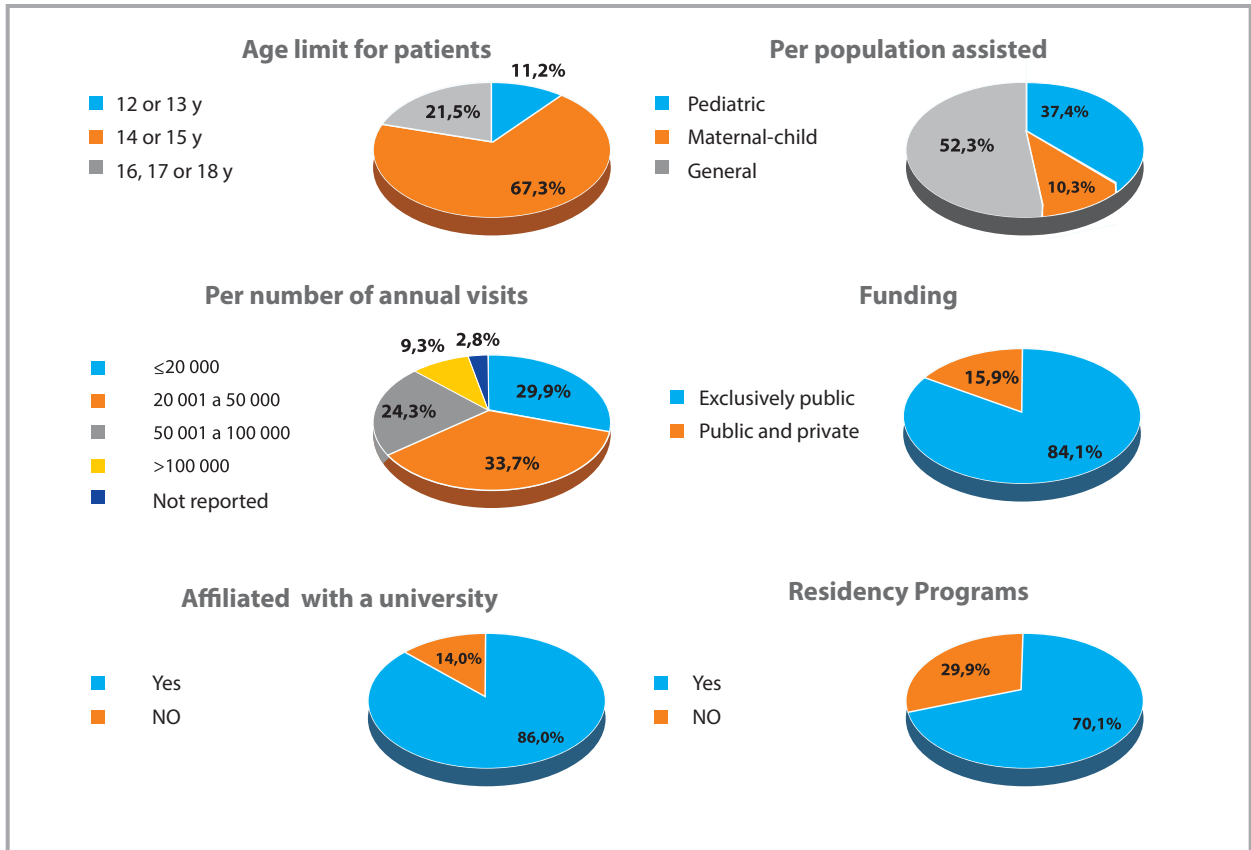
## RESULTS

### Institutional information

Table 1 shows the number and percentage of hospitals identified, contacted, and included in the study, as well as their location. No contact could be established with the PEDs of Haiti, Cuba, and Venezuela.

**Table 1.** Hospitals and participants identified by country

Country	Identified / contacted n / n	Responded - (% of total identified) n (%)
Argentina	66 / 66	63 (95)
Bolivia	8 / 8	7 (88)
Brasil	161 / 70	1 (<0.1)
Chile	25 / 16	3 (12)
Colombia	6 / 6	1 (17)
Costa Rica	1 / 1	1 (100)
Ecuador	4 / 4	3 (75)
El Salvador	3 / 2	2 (66.7)
Guatemala	1 / 1	1 (100)
Honduras	2 / 2	1 (50)
México	57 / 38	13 (22.8)
Nicaragua	1 / 1	0 (0)
Panamá	3 / 3	1 (33)
Paraguay	7 / 7	5 (71)
Perú	22 / 21	3 (13.6)
República Dominicana	1 / 1	1 (100)
Uruguay	3 / 3	1 (33)
<b>TOTAL</b>	<b>371 / 250</b>	<b>107 (28.8)</b>



**Figure 1.** Characteristics of the hospitals respondents (n = 107)

**Hospital supplies and services.** A total of 104 hospitals (97.2%) have a central oxygen delivery system and 99 (92.5%) a central vacuum system; 24-hour laboratory and pharmacy services are available in 105 hospitals (98.1%) and 65 hospitals (60.7%), respectively. Around-the-clock diagnostic imaging availability is as follows: simple radiology in 104 (97.2%), computed tomography in 88 (82.2%), and magnetic resonance imaging in 19 hospitals (17.8%).

**Specific functions assigned by the hospital.** The surveyed PEDs are responsible for the regional interhospital transport system in 46 (43%) hospitals, for the operation of the rapid response team in 61 centers (57%), and for the hospital evacuation plan in 71 (66.4%) institutions.

**Infrastructure and functionality.** The available facilities are described in Table 2 and the functionality in relation to the care process in Table 3.

**Table 2.** Facilities - description (n: 107)

Areas	n(%)
<b>Entrance and reception area</b>	
Independent entrance for ambulances	85 (79,4)
Security personnel at the entrance	96 (89,7)
Differentiated WR according to patient severity	25 (23,4)
Different WR for children and adults (n: 67) *	39 (58,2)
<b>Patient care areas</b>	
Observation Room	102 (95,3)
Pediatric OR separated from adult OR (n: 67) *	55 (82,0)
Pediatric RA separated from adult RA (n: 67) *	43 (64,2)
Isolation room with a private bathroom	42 (39,3)
Private area for interviews	37 (34,6)
Room for inhalation therapy	62 (57,9)
Room for oral rehydration	45 (42,1)
Room for procedural sedation	36 (33,6)
Room for minor procedures	78 (72,9)
X-ray room or X-ray equipment (own or adjacent)	71 (66,4)
Classroom available in the PED or in the hospital (n: 106)	101 (95,3)

WR: Waiting room    OR: Observation Room    RA: Resuscitation Area

\* When evaluating the visual and acoustic separation of children and adults in the WR and in the RA, only the 67 general and maternal-child hospitals were considered.

**Table 3.** Care process and functionality of the infrastructure

Care process (n: number of hospitals that responded to the survey)		
	n(%)	
<b>1. Triage</b>		
Triage (n:107)	74 (69.2)	
Triage 24/365 (n:74)	60 (81.1)	
Electronically registered triage (n:74)	47 (63.5)	
<b>2. Functionality of the infrastructure</b>		<b>Median (IQR)</b>
Daily visits per medical office (n: 106)		24.4 (14.7- 49.1)
Percentage of patients assisted in the RA (n:87)		1.98% (0.9% – 5.8%).
Number of beds in the OR (n:107)		6 (4-14)
Annual admissions per bed in the OR (n:100)		4,830.6 (2,200 – 9,125.5)
Percentage increase in beds in seasonal peak (n:107)		74.1% (28.6% - 150%).
<b>3. Care times</b>		
Outpatient care time (n:29)		2 (1-4) hours
Length of stay in the OR (n: 49)		10 hours (6 - 24)
Length of stay in the RA (n: 37)		2 hours (1 - 3)
<b>4. Admissions</b>		
Percentage of admitted patients (n: 94)		6.1% (3.8% – 16.2%).

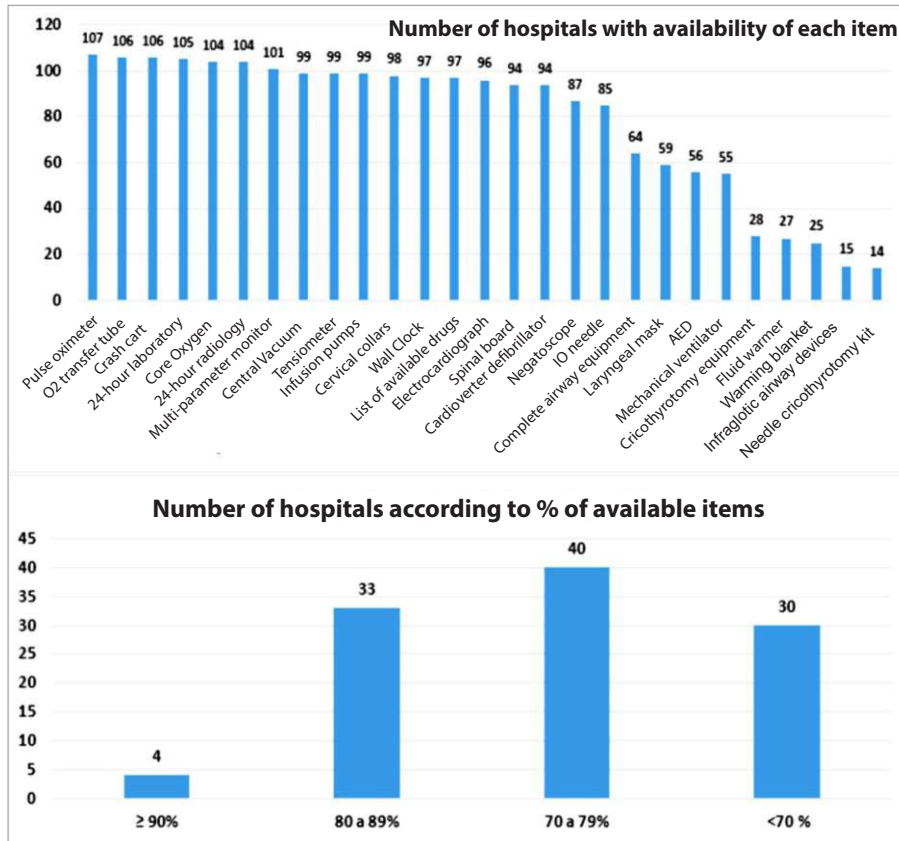
WR: Waiting Room    OR: Observation Room    RA: Resuscitation Area

**Triage:** Patients who leave without having been seen are reliably recorded in 28 PEDs (26.2%) and incompletely or partially recorded in 43 centers (40.2%); there are no records of these patients in 36 hospitals (33.6%).

**Observation room:** In 58 PEDs (54,2%), a maximum, length of stay in the OS is established,

with a median of 12 hours (IQR:6-24 hours).

**Equipment:** Figure 2 describes the resources and their availability in the Resuscitation Area.



**Figure 2.** Equipment of the Resuscitation sector (n: 107)

The airway equipment considered essential by the International Federation for Emergency Medicine® was surveyed as a whole.

In 43 PEDs (40.2%), airway equipment was reported to be incomplete. Thirty-seven departments (34.6%) have an ultrasound scanner and 21 (19.6%) an End-tidal CO<sub>2</sub> monitor.

**Table 4.** Electronic records and resources (n: 107)

Item	n(%)
Electronic general records	83 (77.6)
Electronic medical records	51 (47.7)
24-hour available medical records*	71 (66.4)
Diagnostic coding system in the PED	82 (76.6)
Discharge form	91 (85)
Digital images	63 (58.9)
Model templates for frequent diseases	23 (21.5)
Hospital protocols and guidelines	47 (43.9)
Drug alert system	16 (15)
Tracking of patients in the PED	30 (28)

\*Including paper records

Coding is performed by doctors in 47 departments (56.8%), by administrative personnel in 34 (42%), and by nurses in 1 hospital (1.2%).

## Human Resources

Different human resources and their functions are shown in Table 5.

**Table 5.** Human Resources

Staff that works exclusively in the PED* (n: 106)	
Medical staff	65 (61.3)
Medical Coordinator	61 (57, 5)
Nursing Coordinator	71 (67)
Secretary	52 (49.1)
Social worker	22 (20.8)
Respiratory therapist	15 (14.2)
Pharmacist	11 (10.4)
Training and access to specialties (n hospitals that answered this item)	
Four full-time essential specialties ** (n: 106)	40 (37.4)
Respiratory endoscopist - full or part time (n:106)	59 (55.7)
Obstetrician *** - full time (n:11)	8 (72.7)
Function (n hospitals that answered this item)	
Duration of medical shifts $\geq$ 24 hours (n: 106)	63 (59.4).
Number of doctors is adapted to the demand (n: 107)	64 (59.8)
Number of nurses is adapted to the demand (n: 107)	70 (65.4)
	<b>Median (IQR)</b>
Daily visits per doctor (n : 103)	38.4 (20.6 - 53.2)
Daily visits per nurse (n: 102)	35.3 (13.6 - 59.6)

\* Personnel who do not work in other areas of the hospital

\*\* Specialties considered essential were surgery, traumatology, anesthesiology, and pediatric intensive care

\*\*\* Availability of obstetricians was inquired in 11 maternal-child hospitals

Median number of daily visits per physician is greater than 65 in 16 PEDs (15.6% of 103 that reported the data); median number of daily visits per nurse is greater than 65 in 22 centers (21.6% of 102 responses).

### Previous training

Overall, pediatricians account for 76% of the PED staff (1903 pediatricians out of 2502 physicians); 49.6% are certified in Pediatric Emergency Medicine or have more than 5 years of experience in the specialty. Family physicians, general practitioners, or clinicians represent 11% and adult emergency physicians 7.8% of the staff.

### Support services

Biochemical technicians or specialists are 24/7 available in 84 centers (79.2%), hemotherapy technicians in 82 (78.1%), and pharmacists in 29 (27.4%).

### Teaching and research activity and emergency care protocols

Daily rounds take place in 96 (90.6%) and grand rounds in 41 departments (38.7%). There is a continuous

training program for doctors in 36 (34.0%) and for nurses in 44 PEDs (41.5%). Of 74 hospitals where triage is performed, 58 (78.4%) provide training in triage. In 10 centers (9.4%) doctors have specific time for teaching and research and so have nurses in 13 hospitals (12.3%). Physicians from 48 departments (45.3%) have presented scientific studies at congresses over the last five years, and in the same period, physicians from 26 (24.5%) have published research papers.

### On-site training programs.

Eleven hospitals (10.4%) have a Pediatric Emergency Medicine training program (residency, fellowship, or other), while 92 PEDs (86.8%) receive rotations of resident doctors. Sixty-eight departments (64.1%) have protocols or clinical guidelines for CPR, shock and sepsis, respiratory failure, status epilepticus, and trauma. Forty PEDs (37.7%) have a disaster protocol that includes pediatric needs.



**Table 6. Univariate analysis**

	Per population assisted		Per funding		Per number of annual visits *			Per affiliation with a university		
	General	Pediatric/Materna I-Child	Exclusively Public	Public and private	≤ 50,000 (NCA1)	50,001 to 100,000 (NCA2)	> 100,000 (NCA3)	Affiliated	Not affiliated	p value
Distribution of hospitals - per listed category	56 (52,3)	51 (47,7)	90 (84,1)	17 (15,9)	68 (65,4)	26 (25,0)	10 (9,6)	75 (70,1)	32 (29,9)	<b>&lt;0,001</b>
<b>Functionality of Infrastructure</b>										
Daily visits per medical office	20,6 (27,0)	33,7 (43,7)	26,2 (34,6)	21,3 (38,1)	19,6 (24,2)	46,5 (55,7)	52,5 (62,1)	22,1 (34,6)	30,3 (36,5)	0,732
Annual visits per observation bed	5207,5 (6537,1)	4998,8 (7788,9)	4830,5 (7135,6)	6461,5 (7328,9)	3666,7 (6077,5)	6464,1 (8358,1)	7212,7 (11955,6)	4500,0 (6602,2)	6464,1 (8321,7)	0,291
Complete airway equipment	23 (41,1)	20 (39,2)	38 (42,2)	5 (29,4)	29 (42,6)	9 (34,6)	2 (20,0)	30 (40,0)	13 (40,6)	0,952
<b>Care process</b>										
Triage	33 (58,9)	40 (78,4%)	62 (68,9)	11 (64,7)	44 (64,7)	17 (65,4)	10 (100)	56 (74,7)	17 (53,1)	<b>0,028</b>
% increase in beds in seasonal peak	100 % (161,8%)	60% (107,7%)	75,0 % (143,2%)	66,7% (93,6%)	75,0% (137,9%)	66,7% (123,5%)	70,4 % (122,0%)	75,0% (143,6%)	83,3 % (115,9%)	0,929
% of admitted patients	4,3% (8,2%)	8,7% (15,2%)	6,4% (13,5%)	4,3 % (5,01%)	6,9% (15,1%)	3,9% (6,0%)	5,2% (7,1%)	6,7% (12,1%)	4,5% (11,7%)	0,499
% of patients assisted in the RA	1,4% (3,7%)	1,9 (3,7%)	6,4 % (13,5%)	4,3% (5,01%)	1,9% (4,3%)	1,6% (2,7%)	0,9% (2,9%)	1,7% (4,0%)	1,4 % (3,0%)	0,64
<b>Human resources</b>										
Physician or nurse PECC in each sift	35 (63,6)	37 (72,5)	61 (68,5)	11 (64,7)	45 (66,2)	18 (72,0)	7 (70,0)	57 (76,0)	15 (48,4)	<b>0,006</b>
Daily visits per physician	32,2 (32,2)	46,2 (48,5)	40,2 (41)	32,2 (36,8)	30,1 (29,9)	58,5 (60,9)	66,6 (66,3)	41,6 (43,7)	33,3 (32,5)	0,063
Daily visits per nurse	32,4 (38,3)	43,4 (44,1)	37,5 (42,5)	34,4 (34,5)	20,6 (29,9)	62,5 (65,0)	61,1 (64,4)	39,3 (44,8)	33,4 (32,8)	0,107
<b>Records</b>										
Electronic general records	42 (75,0)	41 (80,4)	70 (77,8)	13 (76,5)	48 (70,6)	23 (88,5)	9 (90,0)	57 (76,0)	26 (81,3)	0,551
<b>Teaching activities</b>										
Grand rounds	16 (29,1)	25 (49,0)	32 (36,0)	9 (52,9)	24 (35,3)	10 (40,0)	7 (70,0)	30 (40,0)	11 (35,5)	0,664
Training program for doctors	10 (18,2)	26 (51)	32 (36,0)	4 (23,5)	25 (36,8)	6 (24,0)	5 (50,0)	29 (38,7)	7 (22,6)	0,1117
Training program for nurses	15 (27,3)	29 (56,9)	35 (39,3)	9 (52,9)	26 (38,2)	11 (44,0)	7 (70,0)	32 (42,7)	12 (38,7)	0,707
<b>Quality of Care</b>										
Competency evaluation for physicians	10 (18,2)	16 (32,0)	23 (26,1)	3 (17,7)	18 (26,5)	3 (12,5)	5 (50,0)	22 (29,7)	4 (12,9)	0,068
Competency evaluation for nurses	11 (20,0)	17 (34,0)	25 (28,4)	3 (17,7)	21 (30,9)	4 (16,7)	3 (30,0)	23 (31,1)	5 (16,1)	0,114
QI committee	27 (49,1)	30 (60,0)	46 (52,3)	11 (64,7)	38 (55,9)	11 (45,8)	6 (60,0)	44 (59,5)	13 (41,9)	0,1
QI plan	17 (30,9)	26 (52,0)	35 (39,8)	8 (47,1)	30 (44,1)	6 (25,0)	7 (70,0)	34 (45,9)	9 (29,0)	0,108

Quantitative variables are reported as "median (mean)"; categorical variables are reported as "n (%)".  
 \* PED's that receive >100,000 annuals visits were compared to those which receive ≤ 100,000 annual visits  
 PECC: Pediatric Emergency Care Coordinator. QI: Quality Improvement





## DISCUSSION

Pediatric Emergency Medicine has progressively expanded in Argentina and Latin America since it was first recognized in Mexico in 2006 and has gained momentum in recent years with the creation of the Sociedad Latinoamericana de Emergencias Pediátricas (SLEPE) and committees of Pediatric Emergency Medicine both in pediatric societies and societies of emergency medicine in numerous Latin-American countries<sup>(18)</sup>.

In many countries, recognition of the specialty has contributed to the development of this medical field and has encouraged healthcare teams to join efforts to improve care results<sup>(18-20)</sup>. The aim of this study was to assess the current state of resources and operation of PEDs of public hospitals in Latin America and, thereby, to contribute to the identification of opportunities for improvement.

The following observations and comments are based on Argentine regulations<sup>(21)</sup> and recommendations from agencies from different countries as references for the design of quality improvement programs<sup>(2-10,22)</sup>.

### Infrastructure and equipment.

The equipment of the Resuscitation Area was found to be deficient in many PEDs. The complete list of essential elements for airway management is available in only 59.8% of the departments. According to international standards, different aspects of the waiting rooms and sectorized areas for pediatric care are deficient as well<sup>(8)</sup>.

The Spanish Society of Pediatric Urgencies (SEUP) recommends to have one office for every<sup>(16-22)</sup> daily visits<sup>(6)</sup>. In the surveyed hospitals, median daily visits per office exceeded the maximum recommended number, and the interquartile ranges show that there is a paucity of offices in many departments. Univariate analysis showed that this deficit is more significant in pediatric and maternal-child hospitals, and in PEDs that receive more than 100 000 visits per year (category NCA3). The number of visits per observation bed was also significantly higher in NCA3 category departments.

### Care process

The use of triage was significantly associated with the categories of pediatric and maternal-child hospital and university hospital. Human Resources. Unlike other

specialties in which physicians work exclusively in their area of expertise, only 61.3% of hospitals hire professionals exclusively for the PED. A strong international recommendation is for PEDs (especially those in general hospitals) to have a physician and nurse PECC per shift to ensure the quality of pediatric care<sup>(8)</sup>. Currently, 32.1% of the PEDs lack these PECCs, and no difference was found between hospital categories.

According to international standards, the number of staff should be established based on the demand and the case-mix. It has been determined that a doctor or a nurse sees between 2.5 and 2.7 patients per hour (65 daily visits)<sup>(6,23)</sup>.

Our data suggest a generalized work overload, especially in shifts with a higher demand and in departments that do not adapt the number of staff to the demand flows. This opportunity for improvement is greater in pediatric and maternal-child hospitals and NCA3 category hospitals. Determining the characteristics of the patient flow and the "fingerprint" of their demand would allow PEDs to calculate the human resources and its temporal distribution based on the number and severity of the patients<sup>(24)</sup>.

The seasonal over-demand is evidenced by the increase in beds available in most PEDs during the seasonal peak<sup>(25)</sup>. The above data supports the importance of having triage systems with qualified personnel.

Overall, 76% of the staff members are pediatricians. It is encouraging to see that approximately half of these physicians are certified in Pediatric Emergency Medicine or have more than 5 years of clinical experience and training in the specialty.

Taking into account the complexity of the surveyed hospitals, it is striking that only 37.4% have 24-hour in-house coverage by general surgeons, traumatologists, anesthesiologists, and pediatric intensivists and that in three maternal-child hospitals, obstetricians are only available part-time or on call. The limited access to specialists in Respiratory Endoscopy suggests the need to consider training in the management of the difficult airway and the provision of the required equipment.



The high percentage of hospitals that do not provide 24/7 support by biochemical technicians/specialists and hemotherapy technicians deserves attention. In addition, the pharmacy department has become an important aid for the healthcare area; however, only 27.4% of hospitals have a pharmacist around the clock.

### Teaching and research activities

Training programs for both doctors and nurses are scarce; when comparing by categories, a significantly higher percentage of programs was found in pediatric and maternal-child hospitals versus general hospitals. Clinical grand rounds were also significantly associated with the condition of children's hospital. Triage training is carried out in 78.4% of the PEDs; it is recommendable to train all the personnel who perform this task.

We observed that few PEDs presented or published research studies and very few centers allocate time to teaching or research.

A considerable percentage of PEDs have protocols for the care of critical patients. On the other hand, few hospitals have protocols for disasters that consider pediatric needs, similar to findings reported by surveys carried out in other regions of the world <sup>(11,26)</sup>.

Noteworthy, many of the PEDs are in charge of interhospital transport and disaster response. Considering the organizational and professional training limitations of prehospital emergency services in Latin America, training in these medical fields and the development of clinical guidelines deserves special attention <sup>(27,28)</sup>.

### Quality and safety management

Surveys carried out in the US and Europe show that one of the most commonly observed difficulties is the lack of quality and safety improvement plans <sup>(11,26)</sup>. In this study analyzing the most complex hospitals in our region, we observed that only 54.3% have a quality and safety committee. Less than half of the surveyed PEDs have a continuous quality improvement (QI) plan. When analyzing by categories, the presence of QI plans was significantly associated with the conditions of children's hospital and highest demand.

Long shifts in a setting of work overload are associated with an increased risk of medical error. In addition to adapting the number of staff and promoting continuous education, quality and safety programs or tools <sup>(29)</sup> should be in place and incorporated into the medical curriculum <sup>(30)</sup>.

Development of a continuous QI plan is recommended together with the designation of a member of the staff in charge of quality management, as well as the use of a Quality Indicator Dashboard as a management tool to

measure, prioritize, plan, and sustain quality and safety interventions, and to report to the hospital authorities.

We emphasize the importance of defining specific competencies for PE physicians and nurses and assigning medical and nursing PECCs. These roles have been shown to be strongly associated with better preparedness of the PEDs <sup>(11)</sup>.

We found opportunities for improvement in issues of patient safety, including the recording of adverse events, the use of tapes for calculating weight, and the introduction of tools to prevent medication errors.

Support from the hospital management will be important to establish protocols for the maintenance of medical equipment, to define criteria for accepting and rejecting referrals, and to ensure access to on-line medical information.

### Limitations of the study

This study has some limitations. Not all contacted centers answered the survey, which may have reduced the validity of the results. In addition, this study was conducted in public hospitals only and excluded centers with private management contracted by the public healthcare system, which is a common healthcare modality in different countries, such as Brazil, Chile, and Colombia. Therefore, these countries were under-represented in the study. Moreover, the results may have been strongly influenced by the specific conditions of the PEDs in Argentina, which represent 58.9% of the sample, while in some countries of Central America only a single center met the inclusion criteria. Further research including larger and more representative samples from all countries will be necessary to identify changes that occurred in the PEDs during the COVID-19 pandemic. Despite these limitations, this study is a first approach to understanding the current status of PEDs in Latin America.

### CONCLUSION

The information obtained on the resources and operation of public PEDs in Latin America reveals important gaps. Furthermore, it is necessary to program interventions to improve the quality of care and promote monitoring of quality indicators.

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