



Epidemiological Characteristics of Patients in the Pediatric Intensive Care Unit of Calderón General Teaching Hospital, Quito.

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ABSTRACT

Introduction: The assessment of severity, clinical instability and prognosis is a vital component of Pediatric Intensive Care Units (PICU). For this reason, the systematic evaluation of epidemiological indicators in these services plays a fundamental role in public health services. The objective of this study was to identify the epidemiological characteristics of patients in the ICU of the General Teaching Hospital of Calderón, Quito from 2018 to 2019.

Methods: We conducted a descriptive, retrospective, and cross-sectional study by reviewing the medical records of all pediatric patients admitted in 2018 and 2019. The following variables were considered: age, gender, cause of admission, ventilatory support, infections associated with health care (IAHC), PICU stay, and cause of discharge.

Results: 217 cases were included. There was a predominance of males 130/217 (60%) and infants 116/217 (53%). Infections were the main cause of admission 137/217 (63%). An important sector of patients required invasive mechanical ventilation 84/217 (38.7%). IAHC rates were minimal (pneumonia 3.2%; central line catheter infection 2.3%). The mean hospital stay in the PICU was 4.8 ± 0.8 days and mortality was 5.99% (95% CI 5.78-6.21%).

Conclusion: These results agree with international reports of mortality, prevalence, and epidemiology.

Keywords:

MESH: Intensive Care Unit, Child; Critical Care; Infant mortality; Health Services Research, Epidemiology.

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INTRODUCTION

The concept of concentrating patients according to disease severity is traditionally attributed to nurse Florence Nightingale, who created the first intensive care unit (ICU) in the 19th century during the Crimean War by establishing a separate area in a hospital that cared for soldiers who were the most injured or undergoing surgery.¹ Later, critical care emerged in the infant population, with the first pediatric intensive care unit (PICU) established in Sweden in 1955² and Latin America in 1959. In Ecuador, the first mixed and multidisciplinary ICU began in 1970 at the Carlos Andrade Marín Hospital in Quito.³

PICUs were defined in 1983 according to the Guidelines for Pediatric Intensive Care as "a hospital unit that provides treatment to pediatric patients with a wide variety of diseases of a potentially lethal nature, including those with highly unstable conditions requiring sophisticated medical or surgical treatment."⁴ Specialist doctors, nurses, and other related health professionals work in a coordinated and collaborative manner in the management of patients with potentially lethal failure of at least one organ or vital system, or with multi-organ or multi-system failure, including stabilization after serious surgical interventions, all of which include 24-hour activities: diagnosis, monitoring, support of altered vital functions and the treatment of underlying diseases.⁵ In fact, the most common conditions treated in PICUs in Ibero-American countries include post-operative support, infectious, neurological, respiratory diseases, oncological diseases, and immunosuppression, cardiovascular, trauma and poisoning, which are conditions closely related to infant mortality.²

In this sense, the current challenges of intensive medicine include therapeutic limitations, the application of new technologies, and the quality of care provided in the PICUs in so-called developing countries, whose shortcomings impact the rates of morbidity and mortality.⁵ Thus, for example, important differences have been reported in deaths in South American and European PICUs (13.29% and 5%,

respectively) correlated in the first case with not only complications associated with critical care but also with the availability of pediatric intensivist staff and the number of beds available.² In parallel, disadvantages are noted in ICUs where children and adults are cared for due to economic limitations or health policies, without considering the benefits associated with independent PICUs in terms of decreased morbidity and mortality and improved cost-efficiency.⁶

In this regard, the international scientific community has directed efforts to identify the main problems in PICUs, among which the causes of admission or underlying illnesses that warrant intensive care are analyzed, as well as purported infections associated with health care and procedures to maintain vital functions. All of these factors can affect the hospital stay and discharge of the patient due to discharge or death.^{2, 7-13} In view of what has been described, we consider it relevant to regularly evaluate pediatric critical medicine units.

The PICU of the Calderón General Teaching Hospital in the city of Quito has been established in recent years as a local and national reference institution for the care of children and adolescents in critical conditions. However, since its founding in 2015, no studies have been carried out to determine the behavior of epidemiological indicators, which led to the present study aimed at establishing the epidemiological characteristics of said PICU patients in the period from 2018 to 2019, which will serve as a reliable and useful database for the institution and the health system and, even, the improvement of public health standards and policies.

POPULATION AND METHODS

Study design

The design is a retrospective, cross-sectional, observational study.

Setting

The study was carried out in the Pediatric Intensive Care Unit of the Calderón General Teaching Hospital in Quito, Ecuador between May 1, 2018 and April 30, 2019. The field period was considered a period of recruitment and exposure. The monitoring of the results ended on May 24, 2019 and the data collection period ended on June 24, 2019. The hospital is classified as a Second Level Health Hospital with five beds and admits pediatric patients categorized by age: newborns (from 0 to 30 days), infants (1 month to 2 years); preschool (2 to 6 years); schoolchildren (6 to 10 years) and adolescents (10 to 15 years).

Participants

All pediatric patients admitted to the institution's Pediatric Intensive Care Unit during the study period participated. No cases were excluded from the analysis.

Variables

The epidemiological variables were nominal or numerical: (a) demographic: age (years), sex (female, male); (b) clinical: cause of admission (infection, trauma, postoperative, poisoning, general illnesses), procedures used for ventilatory support (invasive mechanical ventilation, mandatory oscillatory ventilation, non-invasive mechanical ventilation, none), health care-associated infections (pneumonia, urinary tract infection, central line catheter infection, others, none), stay in the PICU (days of hospitalization), cause of discharge (discharge, death, transfer).

Data sources /measurement

For each variable, the institutional software for the registration of clinical records was used as a data source, and the electronic clinical record was consulted along with the clinical record that remains in the institution. Additionally, laboratory software was consulted for data extraction. The data were compiled in an electronic Excel sheet and later transferred to the SPSS statistical software.

Control of sources of bias

To collect the information, two weekly visits were made to the Department of Clinical Records Archives of the PICU, at a rate of eight records per day. The protocol of this study was pre-approved by the Institutional Teaching Committee.

Study size

The sample was non-probabilistic, in which all potentially eligible cases from the center were included.

Management of quantitative variables

The quantitative variables in scale are presented with means and standard deviation. Nominal quantitative variables are presented as frequency and percentage.

Statistical methods

The information was initially subjected to a descriptive treatment through frequency distribution for the nominal variables (gender, cause of admission, ventilatory support, cause of discharge). For the numerical variables (age and days of hospitalization), this statistical method was also applied as well as measures of central tendency, dispersion and/or proportion.

When normality in the distribution of the sample was verified, statistical tests of association (p) were applied: non-parametric Chi square (χ^2) and parametric Student's t (t), both with a level of significance of alpha (α) 0.05 (95% confidence), using the SPSS v.21 statistical package for Windows.

RESULTS

Participants

The number of patients included in the study was 217.

Characteristics of the studied population

217 medical records, corresponding to the total admissions to the PICU during a 12-month period in the years 2018-2019, were reviewed. The results are presented in Table 1. Regarding the demographic variables, there is evidence of a male gender predominance and heterogeneous distribution according to age, with more than 50% of the subjects

located in the lactating category (between one month and two years of age).

The data corresponding to the clinical variables show that infections were the main cause of admission. Likewise, it has been verified that most of the patients required invasive or non-invasive mechanical ventilation, although a significant percentage did not require ventilatory support.

Table 1. Demographic and clinical variables in the PICU of the Calderón General Teaching Hospital, Quito, 2018-2019.

	Total sample (n = 217)	High (n = 185)	Death (n = 13)	Transfer (n = 19)	P ^d
Age ^a	3.49 ± 1.4	3.62 ± 2.5	1.46 ± 0.3	3.28 ± 2.7	0.01
Indicators by age^b					
Newly born	8 (4.0%)	5 (2.3%)	0 (0%)	3 (1.3%)	
Infants	116 (53.0%)	100 (46.0%)	12 (5.5%)	7 (3.2%)	
Preschool	36 (17.0%)	31 (14.2%)	0 (0%)	5 (2.3%)	
Schoolchildren	27 (12.0%)	24 (11.0%)	0 (0%)	2 (0.9%)	
Teenagers	30 (14.0%)	25 (11.5%)	1 (0.4%)	2 (0.9%)	
Gender M: F ^c	2: 1				0.021
Female	87 (40.0%)	79 (36.4%)	4 (1.8%)	4 (1.8%)	
Male	130 (60.0%)	106 (48.8%)	9 (4.1%)	15 (6.9%)	
Cause indicators income^b					
Infections	137 (63.1%)	122 (56.2%)	11 (5.0%)	4 (1.8%)	<0.001
Trauma	19 (8.7%)	7 (3.2%)	0 (0%)	12 (5.5%)	
Poisonings	8 (4.0%)	8 (4.0%)	0 (0%)	0 (0%)	
Postoperative	7 (3.2%)	5 (2.3%)	1 (0.4%)	1 (0.4%)	
General illness	46 (21.1%)	44 (20.2%)	1 (0.4%)	2 (0.9%)	
IACS indicators^b					
Pneumonia	7 (3.2%)	6 (2.7%)	0 (0%)	1 (0.4%)	0.001
Central line catheter	5 (2.3%)	4 (1.8%)	1 (0.4%)	0 (0%)	
None	205 (94.4%)	175 (80.6%)	12 (5.5%)	18 (8.2%)	
Indicators of ventilatory support procedures^b					
NIMV	68 (31.3%)	56 (25.8%)	6 (2.7%)	6 (2.7%)	0.001
VMI	84 (38.7%)	75 (34.5%)	2 (0.9%)	7 (3.2%)	
VAFO	3 (1.3%)	3 (1.3%)	0 (0%)	0 (0%)	
None	62 (28.5%)	51 (23.5%)	5 (2.3%)	6 (2.7%)	
Hospital stay	4.84 ± 0.8	5.43 ± 4.24	3.65 ± 4.24	4.94 ± 4.24	0.001
Total alive ^b	204 (94.1%)				
Total deaths ^b	13 (5.9%)				

IACS: infections associated with health care; NIMV: non-invasive mechanical ventilation; IMV: invasive mechanical ventilation; HFOV: high-frequency oscillatory ventilation; Hospital stay: number of days in PICU. a: mean and standard deviation. b: percentage. c: proportion. d: association determined by χ^2 (nominal variables) and t (nominal and numerical variables).

Similarly, the rates of health care-associated infections were minimal. It was found that the hospital stay in the PICU averaged 4.8 ± 0.8 days. It was also found that the prevalent cause of discharge was discharge (living patients). The mortality of patients in the PICU was 5.9% (95% CI 5.87-6.21%) and was almost entirely in the group of infants admitted for an infectious process. These descriptive population characteristics are presented in **Table 1**.

DISCUSIÓN

When comparing the epidemiological findings, the predominance of infants in the present series coincides with similar international studies,^{6, 12,13} although a predominance of children in the age group 1-4^{10,14-18} and an average of 6.2 years in the ICU has also been reported for adults.¹³ In the case of our country, recent studies report similar results, a circumstance that demonstrates the prevalence of critical illnesses in the Ecuadorian child population from one month to two years of age.^{19, 20}

The present report showed the prevalence of males in a ratio of 2:1. Although inter-sex differences are not reported at the national level¹⁹, some international publications are in accord with this finding, validating the importance of this demographic indicator in PICUs.^{11-13,18}

Regarding the causes of admission, in the present study, infections ranked first (63.1%). Similar reports abound in the literature with rates between 24.5% and 80.7%^{14,15,18-20}, thus revealing the care burden caused by infectious processes that warrant intensive care.

Another aspect to highlight is the low frequency of IACS in this series. It has been reported that in pediatric patients requiring PICU, bacteremias associated with a central line catheter range from 13-22%²¹, figures significantly higher than those reported (2.3%). Nosocomial pneumonia rates in critically ill patients ranging from 49% to 77%²²⁻²⁵, are also mentioned. In

the present investigation, it was found in 3.4% of the cases, which shows appropriate management by the work team in the PICU.

The use of IMV (38.7%) and NIMV (31%) resemble the trends reported in the literature^{12,17,18,25} as these are fundamental procedures in the management of acute respiratory failure, indicated in 20-50% of critically ill pediatric patients.²⁶

In this study, the average length of stay in the PICU was 4.8 ± 0.8 days, with a minimum of <24 hours and a maximum of 45 days, which differs from that reported by other studies in Ecuador (7 ± 5.3 ²⁰ and 10.1 ± 2.3 ¹⁹), and globally (different studies report different figures: 2.45 ± 3.1 ¹³, 3 to 6 días¹², 9 ± 3.2 ¹⁸, and 19.1 ± 9.7 ¹⁴). It is inferred that said variability would be influenced by various factors: comorbidities, complications, quality of medical care, and deaths.

In fact, the total number of patients in this series who survived (201 = 94.1%) and those who died (13 = 5.9%) differs substantially from what was previously reported in the country (28.2%¹⁹), and is similar to the reports of Hon et al⁸ (5.3%) and Boedha et al¹⁵ (6.27%), but it conflicts with other studies where the rates varied between 11.7% and 41.6%.^{10,12,13,17,18} Likewise, in contrast to the findings obtained here, in most of these reports, deaths were statistically significantly associated with the type/severity of the admission pathology and complications, but not necessarily with age group and/or sex. In this sense, it is important to highlight that mortality rate is a key epidemiological indicator of the health-disease process and the level of care of the critical pediatric patient, an argument that confirms the successful work by the personnel assigned to the PICU of the General Teaching Hospital of Calderón.

The main objective of the PICU is to sustainably ensure the health and well-being of those who suffer from a serious or potentially lethal disease, requiring human and material resources to reduce the rates of morbidity and mortality, as well as new epidemiological investigations that provide further

evidence regarding the weaknesses and strengths in the provision of critical care to the Ecuadorian child population.

CONCLUSION

Based on the results obtained in this study, the most prevalent patients in the PICU are infants, the main cause of admission is infections, the average stay is 4.8 days, and the mortality rate is 5.99% (95% CI 5.87-6.21%).

ARTICLE ADMINISTRATIVE INFORMATION

Abbreviations

IACS: infections associated with health care.

PICU: Pediatric Intensive Care Unit

HFOV: high-frequency oscillating ventilation

MIV: invasive mechanical ventilation

NMNI: non-invasive mechanical ventilation.

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Authors' contributions

MRJF, DMVM, DEOC, MEÁP, CVGM worked equally in shaping the research idea. MRJF, DMVM performed the bibliographic review, data collection and writing of the document. MRJF and CVGM performed the critical analysis of the article. MRJF made the editorial corrections. All authors read and approved the final version of the manuscript.

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Availability of data and materials

Data is available upon request with reasonable and relevant objectives.

ETHICAL STATEMENTS

Ethics approval and consent to participate

This research complies with all the ethical standards on health science research in force in Ecuador, having been analyzed and approved by the Ethics and Research Committee of the General Teaching Hospital of Calderón.

Consent for publication

The authors have the authorization for the publication of the data by the tutors of the patients.

Protection of people:

The authors have applied the components of the Singapore Declaration.

Confidentiality of the data:

The authors have technically concealed the identification data of each patient for the analysis and publication process.

Competing interests

The authors declare that they have no competing interests.

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REFERENCES

1. Granvik A, Pinsky MR. Evolution of the intensive care unit as a clinical center and critical care medicine as a discipline. *Crit Care Clin.* 2009; 25:239-50.
2. Campos-Miño S, Sasbón JS, von Dessauer B. Cuidados intensivos pediátricos en Latinoamérica. *Med Intensiva.* 2012; 36(1): 3-10. DOI: [10.1016/j.medin.2011.07.004](https://doi.org/10.1016/j.medin.2011.07.004)
3. Ochoa-Parra M. Historia y evolución de la medicina crítica: de los cuidados intensivos a la terapia intensiva y cuidados críticos. *Acta Col Cuid Int.* 2017; 17(4):258-68. DOI: [10.1016/j.acci.2017.08.006](https://doi.org/10.1016/j.acci.2017.08.006)
4. De la Oliva P, Cambra-Lasaosa J, Quintana-Díaz P, Rey-Galán C, Sánchez-Díaz J, Martín-Delgado MC et al. Guías de ingreso, alta y triaje para las unidades de cuidados intensivos pediátricos en España. *An Ped.* 2018; 88(5):287.e1-287.e11.
5. Kon AA, Shepard EK, Sederstrom N, Swoboda SM, Marshall M, Birriel B et al. Defining futile and potentially inappropriate interventions: a Policy Statement from the Society of Critical Care Medicine Ethics Committee. *Crit Care Med.* 2016; 44:1769-74. DOI: [10.1097/CCM.01965](https://doi.org/10.1097/CCM.01965).
6. Botero-González PA, Arango-Posada CA, Castaño DM, Castaño-Castrillón JJ, Díaz-Guerrero S, González-Muñoz L, et al. Morbimortalidad en la Unidad de Cuidados Intensivos Pediátricos del Hospital Infantil Universitario de Manizales durante los años 2006 y 2007. *Rev Fac Med.* 2010; 58(1):3-14
7. Bárzaga MS, González AK, Pompa GG, Álvarez AA. Morbilidad y mortalidad en la unidad de terapia intensiva. *Multimed.* 2017; 21(4):396-413. [Internet]. [citado dic 26 2019]; 38(2):126-8. SU: [medigraphic/mul174](https://doi.org/10.1016/j.jcrc.2016.09.019)
8. Hon KL, Luk MP, Fung WM, Li CY, Yeung HL, Liu PK et al. Mortality, length-of-stay, bloodstream and respiratory viral infections in a pediatric intensive care unit. *J Crit Care.* 2017; 38:57-61. DOI: [10.1016/j.jcrc.2016.09.019](https://doi.org/10.1016/j.jcrc.2016.09.019).
9. Suttle ML, Jenkins TL, Tamburro RF. End-of-Life and Bereavement Care in Pediatric Intensive Care Units. *Pediatr Clin North Am.* 2017;64(5):1167-83. DOI: [10.1016/j.pcl.2017.06.012](https://doi.org/10.1016/j.pcl.2017.06.012).
10. Short SR, Thienprayoon R. Pediatric palliative care in the intensive care unit and questions of quality: a review of the determinants and mechanisms of high-quality palliative care in the pediatric intensive care unit (PICU). *Transl Pediatr.* 2018;7(4):326-43. DOI: [10.21037/tp.2018.09.11](https://doi.org/10.21037/tp.2018.09.11).
11. Kalzén H, Larsson B, Eksborg S, Lindberg L, Edberg KE, Frostell C. Survival after PICU admission: The impact of multiple admissions and complex chronic conditions. *PLoS One.* 2018;13(4):e0193294. DOI: [10.1371/journal.pone.0193294](https://doi.org/10.1371/journal.pone.0193294).
12. Abdelatif RG, Mohammed MM, Mahmoud RA, Bakheet MAM, Gima M, Nakagawa S. Characterization and Outcome of Two Pediatric Intensive Care Units with Different Resources. *Crit Care Res Pract.* 2020; 2020:5171790. Published 2020 Mar 17. DOI: [10.1155/2020/5171790](https://doi.org/10.1155/2020/5171790).
13. Vaalavi E, Aminzhadeh M, Shirvani E, Jaafari L, Madhooshi S. The Main Causes of Mortality in Pediatric Intensive Care Unit in South West of Iran. *Zahedan J Res Med Sci.* 2018;in press. DOI: [10.5812/zjrms.63006](https://doi.org/10.5812/zjrms.63006)
14. Sanches C, Cardim de Oliveira CA, Moro-Bass SA, Troster EJ. The epidemiological profile of Pediatric Intensive Care Center at Hospital Israelita Albert Einstein. *Einstein.* 2012;10(1):16-21.
15. Boeddha, N. P., Schlapbach, L. J., Driessen, G. J., Herberg, J. A., Rivero-Calle, I., Cebej-López, M. et al. Mortality and morbidity in community-acquired sepsis in European pediatric intensive care units: a prospective cohort study from the European Childhood Life-threatening Infectious Disease Study (EUCLIDS). *Crit care.* 2018;22(1), 143. DOI: [10.1186/s13054-018-2052-7](https://doi.org/10.1186/s13054-018-2052-7)
16. Kalzén H, Larsson B, Eksborg S, Lindberg L, Edberg KE, Frostell C. Survival after PICU admission: The impact of multiple admissions and complex chronic conditions. *PLoS One.* 2018;13(4):e0193294. Published 2018 Apr 5. DOI: [10.1371/journal.pone.0193294](https://doi.org/10.1371/journal.pone.0193294)
17. Badia M, Vicario E, García-Solanes L, Servía A, Justes M, Trujillano J. Atención del paciente crítico pediátrico en una UCI de adultos. Utilidad del índice PIM. *Med Intensiva.* 2013; 37(2):83-90. DOI: [10.1016/j.medin.2012.03.007](https://doi.org/10.1016/j.medin.2012.03.007)
18. Ayara G, Mutlu-Uysal Y, Sanliay S, Gunduza R, Yakuta H, Oden Akmana A et al. Perfil de mortalidad de seis años en una Unidad de Cuidados Intensivos Pediátricos: asociación entre la mortalidad y el período fuera del horario diurno semanal. *Arch Argent Pediatr.* 2019;117(2):120-5. DOI: [10.5546/aap.2019.120](https://doi.org/10.5546/aap.2019.120)
19. Barreno-Layedra, AM, Lozano-Moreno, DP. Índice de riesgo de mortalidad, puntuación PRISM comparado con el nivel sérico de ácido láctico en niños de 1 mes a 14 años en la Unidad De Cuidados Intensivos Pediátricos del Hospital Baca Ortiz en el periodo abril a junio del 2016. [Internet]. Tesis de Especialización. Pontificia Universidad Católica del Ecuador. 2019. DOI: despace/puce/12833.
20. García-Torres A, Moreira-Bermúdez ME. Comparación entre una unidad de cuidados intensivos pediátrica de puertas abiertas y una con horarios de visita establecidos, en cuanto a tiempo de hospitalización, uso de analgésicos, percepción y relación de los familiares y personal de salud, durante el periodo de abril a mayo de 2019. [Internet]. Tesis de Especialización. Pontificia Universidad Católica del Ecuador. 2019. SU: [Despace/puce/16758](https://despace/puce/16758)

21. Cruz-Rodarte P, Rincón-Zuno J, Mendieta-Alcántara GG. Factores de riesgo asociados a infección de catéter venoso central. [Internet]. Arch Invest Materno Inf. 2015;7(3):107-15. **SU:** [medigraphic/67731](https://doi.org/10.1097/PCC.0254).
22. Ruth A, McCracken CE, Fortenberry JD, Hall M, Simon HK, Hebbar KB. Pediatric severe sepsis: current trends and outcomes from the Pediatric Health Information Systems database. Pediatr Crit Care Med. 2014;15(9):828-38. **DOI:** [10.1097/PCC.0254](https://doi.org/10.1097/PCC.0254).
23. Balamuth F, Weiss SL, Neuman MI, Scott H, Brady PW, Paul R et al. Pediatric severe sepsis in U.S. children's hospitals. Pediatr Crit Care Med. 2014;15(9):798-805. **DOI:** [10.1097/PCC.0254](https://doi.org/10.1097/PCC.0254).
24. Weiss SL, Fitzgerald JC, Pappachan J, Wheeler D, Jaramillo-Bustamante JC, Salloo A, et al. Global epidemiology of pediatric severe sepsis: the sepsis prevalence, outcomes, and therapies study. Am J Respir Crit Care Med. 2015;191(10):1147-1157. **DOI:** [10.1164/rccm.201412-2323OC](https://doi.org/10.1164/rccm.201412-2323OC).
25. Schlapbach LJ, Straney L, Alexander J, MacLaren G, Festa M, Schibler A, et al. Mortality related to invasive infections, sepsis, and septic shock in critically ill children in Australia and New Zealand, 2002-13: a multicentre retrospective cohort study. Lancet Infect Dis. 2015;15(1):46-54. **DOI:** [10.1016/S1473-3099\(14\)71003-5](https://doi.org/10.1016/S1473-3099(14)71003-5).
26. Castillo A. Ventilación mecánica invasiva en el paciente pediátrico. Neumol Pediatr. 2017; 12 (1):15-22.

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