Pediatric Anesthesia and Critical Care Journal 2019;7(1):8-12
doi:10.14587/paccj.2019.2

PACCJ

Pediatric mortality in the multipurpose intensive care unit of Sylvanus Olympio Teaching Hospital (CHU SO) of Lomé (Togo)

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Keypoints

Pediatric deaths in countries with limited resources are due to curable conditions, inadequate development of emergency services and pediatric intensive care unit. This study analyzes pediatric deaths (0 to 15 years) occurred in a Multipurpose Intensive Care Unit (ICU) often receiving adults and with few pediatric facilities.

Abstract

Introduction

The objective of the study is to analyze pediatric deaths (0 to 15 years) registered in the Intensive Care Unit (ICU) of the Sylvanus Olympio Teaching Hospital (CHU SO) in Lome.

Material and methods

It was a retrospective study, during the period from November 2012 to October 2015 (3 years). We included all exploitable records of deceased patients aged 0 to 15 years.

Results

70 deaths were recorded out of 260 files included; rate: 26.9%. The mean age of patients who died was 44.9±56 months; age groups: below 1month: 17(24.3%), 1 to 24 months: 21 (30%), 25 to 60 months: 10 (14.3%), and 60 to 180 months: 22 (31.4%). Male represented 55, 7% (39deaths), ratio: 1, 26. High lethality was observed in children below 1 month (43.5%, p = 0.07) and in females (33.3%, p = 0.04). Surgical pathologies represented 90% (63 deaths out of 70) and medical pathologies 10% (7 deaths). Medical pathologies were more lethal (46.7%) than surgical pathologies (25.7%), p = 0.04. Digestive surgery: 34 (48.6%) followed by trauma 14 (20%) of which 13 were severe traumatic brain injury, and severe burns 13 (18.6%) were the most represented surgical etiologies.

Conclusions

the etiologies of pediatric deaths in the ICU of the CHU SO of Lome are dominated by surgical pathologies, particularly digestive, traumatic and severe burns.

Keywords

Pediatric mortality, intensive care, Togo.

Introduction

Pediatric deaths in countries with limited resources are due to curable conditions, inadequate development of emergency services and pediatric intensive care unit [1]. In Sub-Saharan Africa and particularly in Togo, studies have found the low level of development of pediatric care and the consequent high mortality [2-5]. The objective of this study was to analyze the deaths of pediatric patients (0-15 years) received in the multi-purpose Intensive Care Unit (ICU) of Sylvanus Olympio Teaching Hospital (CHU SO) in Lomé.

Material and Methods

Data were collected in the ICU of CHU SO of Lome. This ICU has a capacity of 12 functional beds, with a team of 4 resuscitation and anesthetists' doctors, 4 anesthetists'

nurses, 16 nurses and 20 nursing aides. It is a multipurpose ICU, welcoming patients with vital distress, or for resuscitation after heavy surgery. This ICU welcomes all age patients, adults and pediatrics. It has few specific pediatric facilities and equipments. This study was retrospective, based on medical records of patients. Study concerned the period from November 2012 to October 2015 (3 years). All records of deceased patients aged 0 to 15 years admitted during the study period were included. Records of patients who died at admission were excluded. The parameters studied were: age, sex, time to admission, pathologies involved in death, immediate causes of death.

Statistical analysis

Statistical processing and analysis of data was performed using epi info 3.5 software. Chi2 and Fisher statistical tests were used and a $p \leq 0.05$ values was considered significant.

Results

During the study period, 1742 patients were admitted to the ICU of CHU SO and 321 (18.4%) among them were under 15 years old. A total of 260 (81%) records were included for the study. Of these 260 cases, 70 deaths were recorded, with a rate of 26.9%. The average time to stay before the occurrence of death was 2.8 ± 2.7 days, with a median at 2 days and extremes of 1 day and 17 days. The average age of deceased patients was 44.9 ± 56 months, with the extremes of 03 days and 180 months. Deaths according to age groups were distributed as follows: below 1 month: 17 (24.3%), 1 to 24 months: 21 (30%), 25 to 60 months: 10 (14.3%), and 60 to 180 months: 22 (31.4%). Children below 5 years represented 68.6% of deaths. The most affected age group according to admissions was those below 1 month (43.5%, p = 0, 07). Of the 70 deaths, 31 (44.3%) were female and 39 (55.7%) were male. Mortality was higher among females: 33.3%, p = 0.04. Table 1 details the cross-section of deaths among the age groups and sex. According to the type of pathology, 90% (63 deaths out of 70) of the deaths were due to surgical pathologies. The lethality of medical pathologies was 46.7% (7 deaths out of 15 admitted), and that of surgical pathologies was 25.7% (63 deaths out of 245 admitted), p = 0.04 (Table 1).

	Deceased n (%)	Not Deceased n (%)	TOTAL n (%)
Ages (p =0.07)			
< 1 month	17 (43.5)	22 (56.4)	39 (100)
1 – 24 months	21 (22.1)	74 (77.9)	95 (100)
25 – 60 months	10 (24.4)	31 (75.6)	41 (100)
61 – 180 months	22 (25.9)	63 (74.1)	85 (100)
Gender (p = 0.04)			
Female	31 (33.3)	62 (66.7)	93 (100)
Male	39 (23.4)	128 (76.6)	167 (100)
Pathology (p = 0.04)			
Medical	7 (46.7)	8 (53.3)	15 (100)
Surgical	63 (25.7)	182 (74.3)	245 (100)

Table 1. Age, gender and type of pathology of deceased patients.

The medical conditions were mainly infectious: 6 cases and 1 case of toxic epidermal necrosis. According to the surgical conditions, digestive surgeries were the most providers of death: 34 (48.6%), followed by trauma: 14 (20%) and severe burns (18.6%). Peroperative cardiac arrest occurred with 2 infants operated for hypertrophy of the adenoids, and 1 of them died at the ICU despite the cardiopulmonary resuscitation.

The lethality by severe burn was 46.4% (13/28 patients). The average body surface burned was 64.5 ± 13%. Within the trauma, deaths by severe traumatic brain injury were 26.5% (13 out of 49 admitted patients). Table 2 gives the details of deaths according to the different surgical conditions.

Of the immediate causes of death, respiratory distress (35.7%) ranked first, followed by severe sepsis: 19 (27.1%), brain dead: 15 (21.4%), severe anemia: 5 (7.1%), cardiac arrest: 5 (7.1%) and acute renal failure: 1 (1.4%). Respiratory distress essentially complicated digestive surgeries (23 deaths); severe sepsis complicated mainly peritonitis (8 deaths) and severe burns (8 deaths); brain dead complicated most of severe traumatic brain injury (13 deaths). Severe anemia occurred on severe burns (3 deaths) and severe malaria (2 deaths).

Diagnosis	Number (léthality in %)	Percentage (%)
Traumas:	**14/53 (26.4)**	**20**
Severe traumatic brain injury	13/49 (26.5)	18.6
Abdominal wound	1/4 (25)	1.4
Non traumatic neurosurgical surgery	**1/4 (25)**	**1.4**
Neurological tumors	1/4 (25)	1.4
Non traumatic digestive surgery	**34/84 (40.5)**	**48.6**
Digestive malformations	23/46 (50)	32.9
Bowel invagination	4/14 (28.6)	5.7
Acute peritonitis	6/18 (33.3)	8.6
Digestive tumors	1/6 (16.7)	1.4
ENT affections	**1/2 (50)**	**1.4**
Hypertrophy of adénoïds (HVA)	1/2 (50)	1.4
Severe Burns	**13/28 (46.4)**	**18.6**
Total	**63/245 (25.7)**	**90**

Table 2. Surgical affections and mortality

Discussion

The mortality rate observed in our study was 26.9%. In Togo, a study in the Pediatric Resuscitation Unit of the Pediatric Department of the same hospital (CHU SO) which welcome only medical conditions found a mortality rate of 12.6% in 2015 [6]. In Ivory Coast studies found 34.7% and 10.6% [7, 8]. In Burkina Faso the rate found in a study was 19.2% in the pediatric intensive care unit of the Pediatric Hospital of Ouagadougou [9]. Another studies in Congo, a sub-saharan country, found 23.6% and 35.5% as pediatric mortality in the intensive care [7-11]. These rates remain very high compared Northern countries. A prospective cohort study of deaths in 5 pediatrics intensive care unit in US public hospitals reported mortality rates ranging from 1.85% to 3.38% [12]. These differences in rates could be explained by the absence or inadequacy of equipment of structures specifically pediatric in our country, children being in these conditions admitted in multipurpose resuscitations more often receiving adults with little or no specifically pediatric equipment. Add to these reasons the lack of specialization of the teams of caregivers to the care in pediatric intensive care.

The most affected age group, in our study, was that of newborns (43.5%). They were mainly admitted for surgical, malformative or abdominal surgery in emergency. This rate confirms the high lethality associated with neonatal surgery in Africa already reported, in relation to a low level of care [3]. Few medical cases have been admitted to the multipurpose ICU of CHU SO, due to the presence of another pediatric intensive care unit at the CHU SO in the department of pediatrics. This one receives exclusively vital distress complicating medical affections. The rare medical affections which were received in the multipurpose ICU were explained by the severity of these distress requiring supplemental therapies, in particular respiratory by means of mechanical ventilation, only possible in the multipurpose ICU. This extreme gravity of the medical conditions referred to the multipurpose ICU explained the high lethality (46.7%) associated with them. Deaths were predominantly related to surgical conditions (90%) in this study, in relation to surgical conditions admitted which represent 94.2%.

Mortality from surgical pathology was 25.7%. This rate remains very high. Trauma and severe burns accounted for 42.9% of deaths. Among these traumas, severe traumatic brain injury, 13 deaths out of 49 admitted (26.5%) were particularly lethal. A previous study in Dakar (Senegal) a Sub-Saharan town reported mortality from severe traumatic brain injury among pediatrics of 34.8% [13]. The lack of pre-hospital care, and the occurrence in this conditions of secondary brain injury caused particularly by hypoxemia and hypovolemia, the difficulty of neuromonitoring, in particular transcranial Doppler, and intracranial pressure monitoring not available, the difficulties in performing brain imaging tests that are quite costly for a poor population are all factors that can explain this high lethality by severe traumatic brain injury.

The heavy surgery which caused deaths recorded in our study was mainly indicated for digestive malformations (23/46) and abdominal emergencies such as bowel obstruction (4/14) and peritonitis (6/18). Perioperative pediatric death factors in resource-limited countries in Africa and particularly in Togo have been identified in previous studies and are characterized by delayed consultation, poor access to care for the poor, shortage of pediatric surgeons, low-skilled anesthetic teams and under-equipped structures [2-5].

Conclusion

The pediatric mortality rate of 26.9% in the multipurpose ICU of CHU SO of Lome remains very high. These deaths have mainly involved patients below 5 years of age, particularly newborns. Trauma and surgical conditions were the main etiologies. Solutions for reducing this pediatric mortality in the short to medium term include the equipment of a few beds in pediatric resuscitation, clear protocols for the management of pediatric patients in resuscitation. Long-term, solutions can include training of skilled personnel in the care of pediatric patients, creation and equipment of Pediatric intensive care units, a subsidy for pediatric intensive care too expensive for a poor population.

Conflicts of interest

Authors declare no conflicts of interest.

Ethical consideration

This study received approval from the Head of Anaesthesia and ICU Department of CHU SO to be conducted. Since it was counting records, patient consent was not required. However during the counting and data collection patient names were not collected in order to preserve confidentiality.

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