



Trend in Childhood Mortality in a Private Pediatric Hospital of Kisangani: A Descriptive Study

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Authors' contributions

This work was carried out in collaboration between all authors. Author BGM designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors KVM, NJM, EM, KET, SDF and LBB collected the data and managed the analyses of the study. Authors OJA and DNN managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Aims: To determine patterns of childhood mortality and its trends over a 4 years' period in a private pediatric hospital.

Study Design: A cross-sectional descriptive study.

Place and Duration of Study: Study conducted in the Nouveau Village de Pédiatrie (NVDP), in Kisangani town, Democratic Republic of Congo, between June 2014 and June 2018.

Methodology: Socio-demographic, clinical and biological data of children of 0-16 years were retrospectively recorded. Descriptive statistics were used to analyse patterns of childhood mortality and its trends during the four years' period.

Results: From June 2014 to June 2018, 3789 children of 0 to 16 years were hospitalised in the Nouveau Village de Pédiatrie. The global mortality was 16.1% in 2014 and 2.4% in 2018. Mortality

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within 24 hours of admission was 58%. Neonatal mortality decreased from 22.4% in 2014 to 7.4% in 2018. The leading diagnosis was neonatal causes: sepsis, prematurity, neonatal asphyxia, severe, congenital abnormalities. Most of older children died from severe pneumonia, meningitis, severe anaemia and severe malaria. Severe pneumonia was the most frequent and common cause of children death in all ages.

Conclusion: Microbiological data, point of care exams, high quality antimicrobials and antibiotic stewardship in antimicrobial prescribing had a great impact in the significant reduction of childhood mortality in the Nouveau Village de Pédiatrie. Efforts must be focused on the reduction of neonatal mortality.

Keywords: Children; mortality; trends; hospital.

1. INTRODUCTION

The global under-five mortality rate in 2015 was 43 per 1000 live births, while the neonatal mortality rate was 19 per 1000 live births – representing declines of 44% and 37% respectively compared to the rates in 2000. The African Region had the highest under-five mortality rate. Democratic Republic of Congo is one of the 8 African countries with the highest under-five mortality rate, just before 7 others [1].

Many studies have been conducted on this theme and have reported a prevalence of 4-8% [2,3]. The major causes are dominated in high income countries by non-communicable diseases like congenital abnormalities, neoplasms, transport accidents [4,5]. In low income countries, the major causes are neonatal prematurity, sepsis and asphyxia. for older children, infectious diseases, especially pneumonia, malnutrition, anaemia, diarrhoea are the most reported [6-8].

All efforts to improve children survival must be conjugated, as well by the public as by private hospitals. Studies reported a lower mortality rate in private versus public hospitals [9,10]. This study aimed to determine patterns of childhood mortality and its trends over a 4 years' period in a private pediatric hospital.

2. MATERIALS AND METHODS

This was a cross-sectional descriptive study conducted in The Nouveau Village de Pédiatrie, a pediatric specialised private hospital in Kisangani. This Hospital is one of two pediatric private hospitals in Kisangani town. It had a capacity of 30 beds, and was run by 4 physicians (general practitioners), 4 pediatricians and 14 nurses. It is one of three hospitals that have basic equipment like newborn resuscitation kit (ambu bag, suction devices, oxygen

concentrator), newborn incubators, pulse oximeters. Laboratory staff received a capacity building training from a laboratory technician who had been trained in Antwerp Institute of Tropical Medicine. The physical medicine in this hospital had been enriched by the C reactive protein (CRP) assay (QuickReadGo®, Orion Diagnostica). During the same period, there was a large study about bacteremia in hospitalised children in 5 hospitals of Kisangani, including the NVDP. The study received the funding from VLIR-UOS and determined the local epidemiology and sensibility patterns of common bacteria to antibiotics. CRP and bacteriology helped to address infectious diseases and rationalise antibiotic prescriptions. Another important policy of the hospital is to make available only certified drugs, including antimicrobials, bought in the pharmacies located in the European Union.

Were included in this study all children who

- were hospitalised in the NVDP from June 2014 to June 2018,
- had medical problems (because surgical cases were referred)
- arrived at the hospital alive.

All clinical, biological data were retrospectively recorded for all newborns deceased during the study period. For newborn, the variables were date and time of arrival, age, sex, home residence, delivery mode, birthweight, Apgar at 5 minutes, history of premature rupture of membranes, temperature, gestational age, Hemoglobin level (Hemocue 301), blood glucose (Contour®, Bayer), clinical signs like fever, icterus, seizures, respiratory distress. Diagnosis, hospitalisation duration and mode of exit completed the list. For older children, records from medical files concerned age, sex, date and time of arrival, weight, clinical signs, CRP, urine dipstick, chest-RX, malarial rapid diagnostic test

Malaria Antigen P.f/Pan (Standard Diagnostics Bioline®). Thick blood smears and parasite density of malaria were also determined. Chest RX were realised, if the clinical state of the child allowed it, in private imaging settings and interpretation was done by the four pediatricians. There was no setting of cancer diagnosis at Kisangani. Malignant diseases were diagnosed on the clinical suspicion only. Data were analysed by Epi info™ 7.2.1.0. Average and standard deviation were used for quantitative variables, percentage for categorical variables.

3. RESULTS

3.1 General Prevalence and Mortality Trends

From June 2014 to June 2018, 3789 children aged 0 to 16 years were hospitalised in the Nouveau Village de Pédiatrie. In the second semester of 2014, there were 29 deaths out of 473 admissions, 46 out of 895 in 2015, 39 out of 805 in 2016, 37 out of 1035 in 2017 and 11 out of 581 in the first semester of 2018. Mortality within 24 hours of admission was 58% (95 out of 162) and 61,5% of children died during the period between 6 PM to 6 AM.

The mortality trend is summarised in the Fig. 1.

All causes of mortality among children due to medical diseases have decreased of 68% since 2014. Likewise, neonatal mortality decreased from 22.4% to 7.4%. The global mortality was 2.4%.

3.2 Socio-demographic Features

Two out of three children who died were newborn. Note high rate among 6-16 years.

3.3 Clinical Data

Two children out of 3 had fever and half had respiratory distress.

Neonatal infections, prematurity, perinatal asphyxia and severe anaemia were the leading causes of newborn fatalities. Among older children, bacterial and parasite infectious diseases were the leading causes of infant mortality. In both groups, *severe pneumonia* was the most frequent cause of child mortality. The mean hospitalisation length was 2.7 days (median: 1 day).

Table 1. Socio-demographic data

		Frequency	%
Sex	Female	69	42.6%
	Male	93	57.4%
Age	0-28 days	98	60.5%
	1 - 24 months	38	23.5 %
	25 - 60 months	7	4 %
	6 -16 years	19	12%
Home	Makiso	97	59.8 %
	Kabondo	25	15.4 %
	Mangobo	19	11.7 %
	Tshopo	14	8.6 %
	Kisangani	4	2.4 %
	Lubunga	3	1.8 %

Table 2. Clinical signs

	Frequency	%
Fever	105	64.8%
Dyspnea /Respiratory distress	89	54.9%
Seizures	29	17.9%
Pallor	26	16 %
Diarrhoea and vomitus	23	14.2%
Endless crying	22	13.6%
Conscience impairment	21	13 %
Premature birth	16	9.9%
Cyanosis	14	8.6%
Icterus	14	8.6 %
Digestive haemorrhage	13	8 %
Abdominal metoerism	11	6.8%
hepato-splenomegaly	4	2.5%
Wheezing	3	1.9%
Mass	2	1.2%
Polyuria and polydipsia	2	1.2%
Edoema	2	1.2%
Hand-foot syndrome	1	0.6%

4. DISCUSSION

All causes of mortality decreased from 6,1% to 1,9% (Fig. 1) and the global mortality, in 2018 was 2.4%. This rate was lower than 7.35% found in Madagascar [11], 7.4% in Tanzania [12]. In many countries there is a decreasing of mortality at different rate [1,13]. This might be due to the policy of the hospital: making available point of care assays (crp, hemoglobin, hematocrit, plasma glucose, urine dipstick, malaria RDT), using data of local bacteriological studies to establish an antimicrobial stewardship on empiric antibiotic prescription. Many studies have shown

the impact of these strategies (availability of basic equipment) on the reduction of mortality [14,15,16].

The major contributor of mortality mortality in children aged 0 to 16 years was neonatal death (Table 1). These results are similar to most studies that found the predominance of neonatal

causes [1,3,4,6,11]. Fever and respiratory distress were the most common signs and infectious diseases, especially pneumonia was the leading cause of deaths in all ages (Tables 1 and 2). Severe pneumonia, severe anaemia and severe malaria were also found, in many studies in sub-Saharan Africa, associated to child mortality [12].

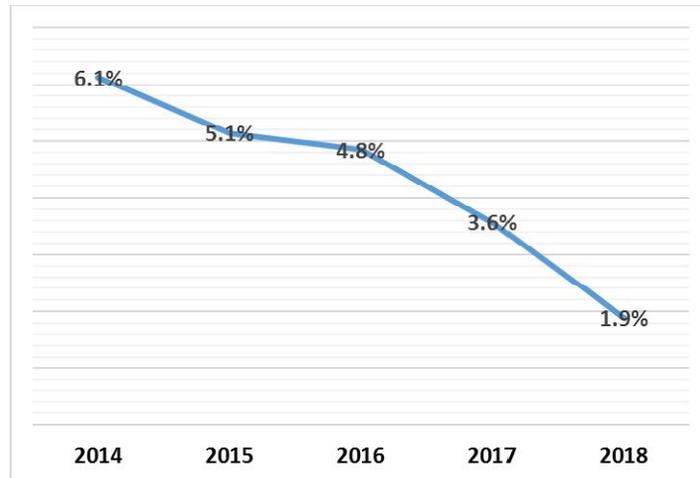


Fig. 1. Mortality trend since June 2014

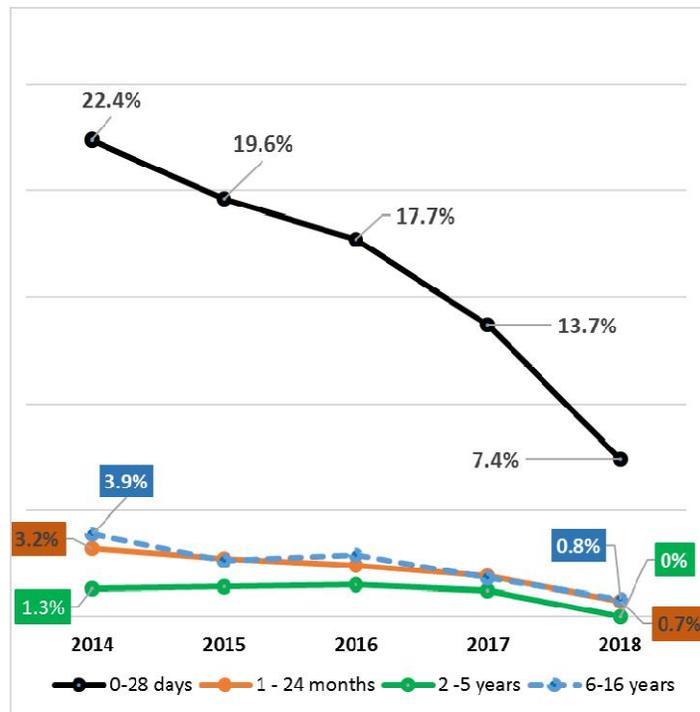


Fig. 2. Age-specific mortality trends

Table 3. Diagnosis

	Frequency %	
Neonatal causes (0-28 days)		
Sepsis	38	23.5%
Pneumonia	33	20.1%
Prematurity	31	18.9%
Severe anaemia	39	23.8%
Perinatal asphyxia	21	12.8%
Meningitis	10	6.1%
Congenital abnormalities*	7	4.3%
Hemolytic disease of newborn	2	1.2%
Tetanus	1	0.6%
Older children (> 1 month)		
Pneumonia	20	12.2%
Severe anaemia	22	13.4%
Sepsis	15	9.1%
Meningitis	11	6.7%
Severe malaria	9	5.5%
Malignant tumour	4	2.4%
Asthma	3	1.8%
Diabetes mellitus	3	1.8%
Sickle cell	3	1.8%
Pyelonephritis	2	1.2%
Gastro-enteritis	2	1.2%
Bronchiolitis	1	0.6%
Tuberculosis primo-infection	1	0.6%

5. LIMITS

In this study we did not have data on surgical causes and pediatric trauma, as studies state that pediatric trauma is being an emerging epidemic [17].

6. CONCLUSION

Microbiological data, point of care biological diagnostic assay, high quality antimicrobials and antibiotic stewardship in antimicrobial prescribing had a great impact in the significant reduction of childhood mortality in the Nouveau Village de Pédiatrie. Efforts must be focused on the above mentioned strategies to achieve reduction of childhood mortality, especially in neonates.

CONSENT

It is not applicable.

ETHICAL APPROVAL

This study had the agreement of research Authorities of the faculty of medicine and Pharmacy of the University of Kisangani.

DISCLAIMER

This paper is based on the preliminary dataset. Readers are requested to consider this paper as a preliminary research article. Authors are aware that detailed statistical analysis is required to get a scientifically established conclusion. Readers are requested to use the conclusion of this paper judiciously as statistical analysis is absent. Authors also recommend detailed statistical analysis for similar future studies.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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