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Predictors of post-anaesthetic mortality in newborns in Kinshasa (2025-2026): a prospective cohort study. Original article

D. Mwela[1,2], B.K. Nkongolo[3], S. Ndjoko[1,8], P. Mukuna[1], W. Mbombo[1], T. Mawisa[4], J. Kalambay[5,6], JJ. Kalongo[6,8], L. Okenge[7], B. Barhayiga[1], J. Nsiala[1]

[1]Department of Anaesthesia and Intensive Care, University Clinics of Kinshasa, Kinshasa, Democratic Republic of the Congo
[2]Faculty of Medicine, Pharmacy and Public Health, University of Mbujimayi, Mbujimayi, Democratic Republic of the Congo
[3]Nutrition, Kinshasa School of Public Health, University of Kinshasa, Democratic Republic of the Congo
[4]Anaesthesia and Intensive Care Unit, Ngaliema Medical Center, Kinshasa, Democratic Republic of the Congo
[5]Anaesthesia and Intensive Care Unit, El Rapha Clinic, Kinshasa, Democratic Republic of the Congo
[6]Anaesthesia and Intensive Care Unit, Biamba Marie Mutombo Hospital, Kinshasa, Democratic Republic of the Congo
[7]Higher Institute of Medical Techniques, University of Kinshasa, Kinshasa, Democratic Republic of the Congo
[8]Anaesthesia and Intensive Care Unit, Kalembe-Lembe Paediatric Hospital, Kinshasa, Democratic Republic of the Congo

Corresponding author: D. Mwela, Department of Anaesthesia and Intensive Care, University Clinics of Kinshasa, Kinshasa, Democratic Republic of the Congo. E-mail: delmwenko2013@gmail.com

Keypoints

The evaluation of protocols for the prevention of sepsis and surgical asepsis, the optimisation of anaesthetic practices, and the development of specialised care pathways could significantly reduce mortality and improve the survival of newborns undergoing surgery in the DRC.

Abstract

Introduction

Mortality in neonatal anaesthesia is low in high-income countries (<5%), but high in Africa. The studies on this topic are scarce. This study aimed to identify predictors of mortality in neonatal anaesthesia in Kinshasa.

Methods

A prospective cohort study conducted among 178 newborns who underwent anaesthesia for a surgical and/or diagnostic procedure in five hospitals. Recruitment was exhaustive and consecutive. Pre, intraoperative and postoperative evolutionary variables, were recorded. Statistical analyses used Chi-square test, bivariate and multivariate logistic regression; the threshold for statistical significance was set at $p < 0.05$.

Results

Post-anaesthesia mortality was 39.9%. Significant predictors were: prematurity (ORa = 4.9), birth weight (ORa = 3.5), weight on the day of surgery < 2500 g (ORa = 3.9), age on the day of surgery between 1–7 days (ORa = 5.7) and 8–14 days (ORa = 9.8), American Society of Anesthesiologists (ASA)-physical status III (ORa = 10.2; p = 0.001) and IV (ORa = 18.7; p = 0.001), and emergency (ORa = 3.05). General anaesthesia was predominant (96.6%) and associated with mortality (p = 0.005). Standard monitoring was absent in 100% of cases.

Conclusion

Post-anaesthesia neonatal mortality in Kinshasa remains high. The specific predictors identified serve as a warning sign in clinical management to reduce this mortality.

Keywords

Predictors, Mortality, Neonatal anaesthesia, Kinshasa

Introduction

Each year, nearly 1.5 million newborns undergo anaesthesia for surgical and/or diagnostic procedures, with

risks significantly higher than those observed in older children and adults [1,2]. The multicenter NECTARINE study conducted in Europe reported a morbidity rate of 35.2% and a mortality rate of 3.2% among anaesthetised newborns [3,4]. In sub-Saharan Africa, the rates are much higher: in Nigeria, a mortality rate of 12% has been reported, whilst in the Democratic Republic of the Congo (DRC), a study found a mortality rate of 32.1% in the subgroup of newborns undergoing surgery in Kinshasa [5,6]. These figures reflect the dramatic scale of the problem in resource-limited countries.

The main factors associated with this morbidity and mortality include organ immaturity, cardiorespiratory fragility, congenital anomalies, surgical emergencies, and high ASA-physical status [4,7,8]. Critical intraoperative complications such as hypotension, desaturation, anaemia, hypothermia, and cardiac arrest are particularly serious [7,8,9]. Mortality can reach 72% in the event of cardiac arrest [7,8]. Beyond immediate mortality, neurological sequelae linked to the toxicity of anaesthetic agents constitute a major challenge [1,3].

Reducing these rates requires better training for anaesthetists and surgeons, adapting protocols to neonatal specifics, and improving the technical infrastructure [10,11]. However, in the DRC, and particularly in Kinshasa, major challenges persist: a lack of local data, with only a few published studies on paediatric anaesthesia [6,12,13], a shortage of qualified staff and suitable equipment, the absence of standardised protocols, and a scarcity of dedicated infrastructure [6]. In this context, it is crucial to identify specific predictors of mortality among anaesthetised newborns. This study aims to fill this gap by generating local data, in order to guide health policies, strengthen hospital capacities, and improve the survival of newborns undergoing surgery in resource-limited setting.

Methods

Type and period of the study

This was a prospective cohort study conducted among newborns who underwent anaesthesia for a surgical and/or diagnostic procedure. It covered the period from May 2025 to March 2026, a total of eleven months.

Study setting

The study was carried out in five hospitals in Kinshasa, selected on the basis of regular neonatal anaesthesia practice: the University Clinics of Kinshasa (CUK), the Kalembe-Lembe Paediatric Hospital (KLPH), the Biamba Marie Mutombo Hospital (BMMH), the El Rapha Clinic (ERC) and the Ngaliema Clinic (NC).

Study population and patient selection

The target population consisted of all newborns (from birth up to 30 days postnatal) who had undergone anaesthesia for a surgical and/or diagnostic procedure in the five selected hospitals. The selection criteria were:

Inclusion criteria:

- Newborns who underwent anaesthesia for a surgical and/or diagnostic procedure in selected facilities.

Exclusion criteria:

- Newborns who underwent anaesthesia but whose records were missing key variables for the study.

Sampling

The sample size was calculated using Keyes' formula:

$n = z^2 \cdot p \cdot qa^2$

With z=1.96 (95% CI), p=0.12 [5], q=0.88, and a=0.05, the sample size was 162 subjects. After adding a 10% margin to account for data loss, the final required sample size was 178 newborns.

Patient recruitment was exhaustive and consecutive: all anaesthetised newborns meeting the criteria were included.

Study variables

- Patient characteristics: age, sex, weight, mode of delivery, APGAR score, congenital anomalies, ASA-physical status.
- Surgical/diagnostic procedures: surgical indication, type of diagnostic procedure, emergency or elective, duration.
- Anaesthetic procedures: type and duration of anaesthesia, complications, intraoperative monitoring.

- Preoperative laboratory variables: Haemoglobin level (Hb), White Blood Cell (WBC) count, platelet count, urea and creatinine.
- Post-anaesthesia outcome: survival or death up to day 30 post-operative.
- Endpoints:
    - Primary: all-cause mortality up to day 30 post-anaesthesia.
    - Secondary: occurrence of intraoperative complications.

Data Collection

The methodology followed a rigorous process. The protocol was submitted to the Ethics Committee of the School of Public Health at the University of Kinshasa for approval, in accordance with the Declaration of Helsinki. Official authorisations were obtained from hospital management. A preparatory phase enabled the recruitment and training of investigators, ensuring consistent and reliable data collection. A pilot test of the data collection form was carried out of in a facility not included in the study, in order to validate the relevance of the variables.

The data collection itself took place in the five selected hospitals, with data extracted from medical records in some cases, and supplemented in others during the anaesthetic period and post anaesthetic follow up, by trained investigators under the supervision of the principal investigator. A double quality control process was applied: initial verification by the principal investigator, followed by validation by the research team before data entry. This process ensured the reliability and validity of the data.

Data processing and analysis

Data were entered into Excel 2016 and then analysed using SPSS 26.0. Qualitative variables were expressed as frequencies and percentages, whilst quantitative variables were presented as means ± standard deviations. Comparisons of proportions were performed using the chi-square test, or Fisher's exact test when necessary. Chi-square test results were presented only in the comments to reduce the number of tables.

To avoid confounding factors, only clinically plausible variables were selected for analysis: gestational age, age on the day of surgery, birth weight, weight on the day of surgery, ASA-physical status, and degree of surgical urgency. These variables were entered into a logistic regression model, first in bivariate analysis and then in multivariate analysis, to identify independent predictors of neonatal post-anaesthesia mortality. Variables with a p-value < 0.05 were considered significant predictors.

Results

Socio- demographic and anthropometric characteristics of anaesthetised newborns

The majority of anaesthetised newborns came from the UCK (47.2%).

The population was predominantly male (57.3%) with a median age on the day of the procedure between 1 and 14 days (57.3% of cases).

The vast majority of newborns were full-term (89.3%), but nearly a quarter had a birth weight of less than 2500 g. At the time of surgery, 30.3% still weighed less than 2500 g (Table I).

Variables	n=178	%
Health care setting		
BMMH	6	3.4
ERC	13	7.3
NC	28	15.7
UCK	84	47.2
KLPH	47	26.4
Sex		
Ambiguity	1	0.6
Female	75	42.1
Male	102	57.3
Age on the day of the operation (in days)		
1-7	54	30.3
8-14	48	27.0
15-21	20	11.2
22-28	38	21.3
>28	18	10.1
Gestational age		
Premature	19	10.7
Full-term	159	89.3
Birth weight (in grams)		
< 2500	42	23.6
>= 2500	136	76.4
Weight on the day of the operation (in grams)		
< 2500	54	30.3
>= 2500	124	69.7

Table I. Socio- demographic and anthropometric characteristics of anaesthetised newborns

Clinical and paraclinical characteristics of anaesthetised newborns

The majority of anaesthetised newborns had a satisfactory Apgar score (56.7%), but nearly 38% did not have a specified score.

Vaginal delivery was the most common mode of delivery (61.2%), whilst congenital anomalies were present in 74.2% of cases. The ASA-physical status showed a high proportion of high-risk patients (ASA III–IV: 55.1%) (Table II).

Variables	n=178	%
APGAR		
Good	101	56.7
Depressed	10	5.6
Not specified	67	37.6
Mode of delivery		
Caesarean section	69	38.8
Vaginal delivery	109	61.2
Congenital anomalies		
No	46	25.8
Yes	132	74.2
ASA-physical status		
I	59	33.1
II	21	11.8
III	81	45.5
IV	17	9.6

Table II. Distribution of clinical characteristics of anaesthetised newborns

The variables follow a non-normal distribution (Kolmogorov-Smirnov test significant at p=0). The median values indicate biological parameters that are generally within normal limits.

However, the wide interquartile range (IQR) reflects significant variability among anaesthetised newborns (Table III).

	Kolmogorov-Smirnov test		Descriptives	
	Statistics	Sig .	Median	EIQ
WBC	0.114	0	9735	6368
Hb	0.104	0	15	2.7
Platelets	0.12	0	209000	117250
Urea	0.096	0	28.5	17.85
Creatinine	0.205	0	0.81	0.49

Table III. Preoperative paraclinical characteristics of anaesthetised newborns

Figure 1 shows a clear predominance of digestive surgical indications (62.9%). The diagnostic indication concerned CT scan alone in 20.5% of cases (Figure 1).

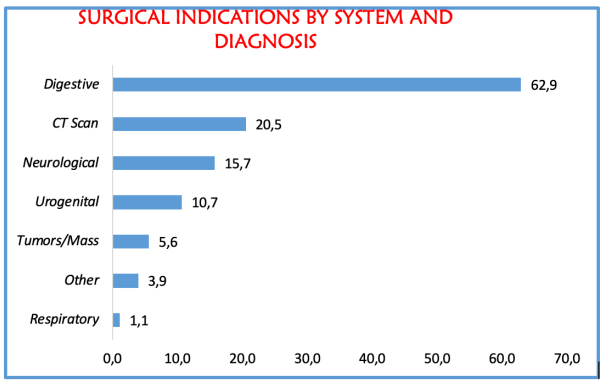

Figure 1: Surgical indications by system and diagnostic procedures (N = 178)

The most frequent complications were metabolic: delayed awakening (33.1%); hypoglycaemia and hypothermia with 3.4% each, followed by cardiorespiratory complications (desaturation 28.1%; bradycardia 15%, difficult intubation 11.8%; bronchial aspiration 9.6%; cardiorespiratory arrest 3.9%, laryngospasm 3.4%; bronchospasm and acute pulmonary oedema with 0.6% each) and haematological (anaemia 12.9%) (Figure 2).

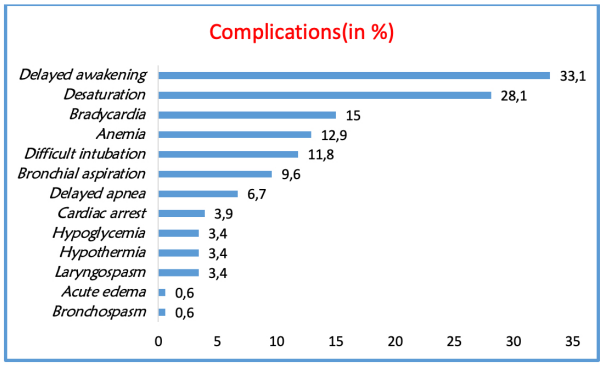

Figure 2: Intra- and post-anaesthetic complications in newborns (N = 178)

Post-anaesthetic mortality observed in newborns

Figure 3 shows that post anaesthetic neonatal mortality remains high, with 39.9% death versus 60.1% survival (Figure 3).

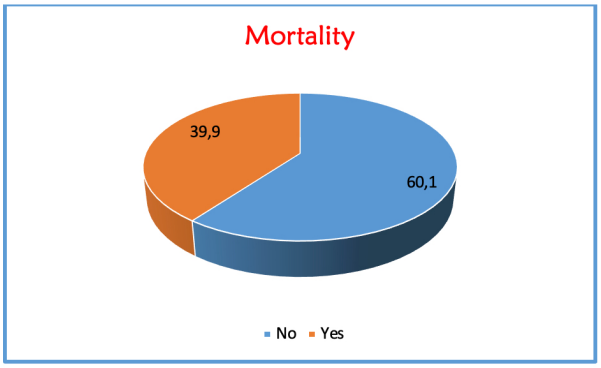

Figure 3: Post-anaesthetic mortality among newborns (N = 178)

The majority of anaesthetised newborns survived, but mortality remained significant. The main causes identified were septic shock (66.2%) and acute respiratory distress (ARD) (32.4%) (Table IV).

Death register	Frequency	Percentage
Anaemia	1	1.4
ARD	23	32.4
Septic shock	47	66.2
Total	71	100.0

Table IV. Causes of death of anaesthetised newborns (N = 71)

Factors associated with mortality during and after neonatal anaesthesia

In this study, following application of the chi-square test, several variables showed a significant association with post-anaesthetic neonatal mortality. Clinical factors included age on the day of surgery (p = 0.001), gestational age (p = 0.001), birth weight (p = 0.001), weight on the day of surgery (p = 0.001), Apgar score (p = 0.001), and ASA-physical status (p = 0.001). The hospital setting (p = 0.03) also influenced the prognosis. The surgical indication (p = 0.001), the type of anaesthesia (p = 0.005), and the urgency of the surgery (p = 0.001). Intraoperative complications further exacerbated this vulnerability: difficult intubation (p = 0.002), bronchial aspiration (p = 0.001), hypothermia (p = 0.038), hypoglycaemia (p = 0.004), desaturation (p = 0.001), anaemia (p = 0.002), delayed awakening (p = 0.001), unplanned delayed extubation (p = 0.004), and bradycardia (p = 0.001) were all strongly correlated with mortality. Finally, the duration of surgery (p = 0.001) and anaesthesia (p = 0.006) were aggravating factors. In multivariate analysis, using logistic regression, several determinants emerged as significantly associated with post-anaesthetic neonatal mortality. Prematurity markedly increases the risk (aOR = 4.9; p = 0.005), as does a birth weight < 2500 g (aOR = 3.5; p = 0.007) or a weight on the day of surgery < 2500 g (aOR = 3.9; p = 0.002). Age on the day of surgery is also a key factor: interventions performed between 1–7 days (aOR = 5.7; p = 0.01) and 8–14 days (aOR = 9.8; p = 0.01) strongly increased the risk, whilst those performed between 22–28 days appear to have protective effect (aOR = 0.21; p = 0.05). A high ASA-physical status indicates greater severity: ASA III (ORa = 10.2; p = 0.001) and ASA IV (ORa = 18.7; p = 0.001). Emergency operations triple the risk (ORa = 3.05; p = 0.001) (Table V).

Variables	*ORb (95% CI)*	*p*	*ORa (95% CI)*	*P*
Age on the day of surgery				
1–7 days	8.0 (1.6–39.5)	0.001	5.7 (1.1–29.4)	0.01
8–14 days	12.2 (2.4–61.2)	0.001	9.8 (1.8–52.3)	0.01
15–21 days	2.7 (0.4–17.1)	0.12	2.1 (0.3–14.3)	0.15
22–28 days	0.15 (0.03–0.7)	0.01	0.21 (0.04–1.0)	0.05
>28 days	1		1	
Gestational age				
Premature	6.2 (2.1–18.5)	0.001	4.9 (1.6–15.2)	0.005
Full-term	1		1	
Birth weight				
< 2500 g	4.7 (2.0–10.9)	0.001	3.5 (1.4–8.7)	0.007
≥ 2500 g	1		1	
Weight on the day of surgery				
< 2500 g	5.1 (2.5–10.5)	0.001	3.9 (1.7–8.8)	0.002
≥ 2500 g	1		1	
ASA-physical status				
IV	25.2 (7.1–89.4)	0.001	18.7 (5.0–70.1)	0.001
III	13.6 (6.1–30.1)	0.001	10.2 (4.3–24.1)	0.001
I–II	1		1	
Urgency level				
Scheduled	1		1	
Urgent	3.31 (1.79–6.12)	0.001	3.05 (1.62–5.75)	0.001

Table V. Predictors of post-anaesthetic neonatal mortality identified by logistic regression in bivariate and multivariate analyses (N = 178)

Discussion

Key findings

This study aimed to identify specific predictors of neonatal mortality under anaesthesia in Kinshasa. Post-anaesthetic mortality remains high (39.9%), driving by clinical and logistical vulnerabilities. The most frequent complications were metabolic, notably delayed awakening (33.1%), hypoglycaemia, and hypothermia (3.4% each).

These were followed by cardiorespiratory complications (desaturation 28.1%, bradycardia 15%, difficult intubation 11.8%, bronchial aspiration 9.6%, cardiorespiratory arrest 3.9%, laryngospasm 3.4%, bronchospasm and pulmonary oedema 0.6% each) and haematological complications (anaemia 12.9%).

A key finding is that 100% of operated newborns did not receive any standard monitoring (in this study, standard monitoring is defined as the simultaneous use of heart rate, non-invasive blood pressure, electrocardiogram, respiratory rate, pulse oximetry, temperature, and precordial stethoscope for general anaesthesia without intubation, regional anaesthesia, and sedation; and capnography for general anaesthesia with intubation), which is likely one of the main explanations for the observed mortality. Identified independent predictors include prematurity, low birth weight or low weight on the day of surgery, young age on the day of surgery, high ASA-physical status (III and IV), and emergency surgery. These results highlight the importance of appropriate monitoring and optimized practices to improve survival.

Sociodemographic and clinical characteristics, and complications during and after anaesthesia.

Sociodemographic and clinical characteristics

The study population is characterised by predominance of males, operated on very early (1–14 days), with a birth weight of less than 2500 g, and a high proportion of ASA-physical status III patients. These findings are consistent with data reported by Disma, Adigun, and Walker [4, 5,14] , who also observed a predominance of males, unlike Mubobo [6] , who described a higher proportion of female patients. Regarding the age at surgery, our results are limited to the strict neonatal period, whereas Disma and Walker [4, 14] included patients up to the 18th postnatal week, which broadens their scope of analysis, on the one hand; Adigun and Faponle reported 7.9 ± 6.6 days and ≤ 7 days, respectively, on the other. The age at the day of surgery in these two Nigerian studies is almost the same as ours [5, 9].

The predominance of gastrointestinal indications is consistent with the studies by Adigun, Mubobo, and Faponle [5,6,9] , confirming that gastrointestinal malformations constitute a major reason for neonatal surgery in resource-limited settings. The observed ASA-physical status are comparable to those reported by Adigun and Faponle [5,9] , whilst Mubobo reports a higher proportion of ASA I patients [6].

A critical issue is the lack of a documented APGAR score in 37.6% of patients, which introduces a major information bias and limits the validity of the model. As the APGAR score is a key indicator of neonatal vitality, its absence compromises the interpretation of risk factors. Comparison with DISMA [4] and African data highlights that, whilst the clinical profiles are similar, the lack of systematic documentation and specialised neonatal care constitutes a major difference that exacerbates the observed mortality.

Per- and post-anaesthetic complications

The observed complications were dominated by delayed awakening, hypoglycaemia, hypothermia, desaturation, bradycardia, difficult intubation, bronchial aspiration, anaemia, and septic shock. The latter was responsible for nearly two-thirds of the deaths. This profile is comparable to that described by Adigun and Faponle [5,9] , where metabolic and respiratory complications predominate. In contrast, Disma and Walker [4,14] report more cardiovascular instability and desaturation, likely linked to the use of appropriate monitoring.

Analysis of the determinants shows that non-modifiable factors (prematurity, low birth weight and early neonatal age) impose anatomical, physiological, respiratory, cardiovascular, neurological, and pharmacological vulnerability. They account for the frequency of respiratory complications (desaturation, difficult intubation, bronchial aspiration) and metabolic complications (hypoglycaemia, hypothermia, delayed awakening), as pulmonary and metabolic immaturity limits tolerance to anaesthesia [3,11,15,16].

Conversely, modifiable factors such as the lack of standard monitoring, inadequate prevention of hypothermia and hypoglycaemia, airway management directly contribute to increase mortality. In our study, the complete lack of monitoring is likely the main explanation for the severity of complications. Respiratory complications reveal that the airway is the weak link, as confirmed by Adigun and Faponle [5,9]. These factors represent key levers: improving them through standardised monitoring, anticipation of metabolic risks, and better airway management could significantly reduce post-anaesthetic neonatal mortality in Africa.

Post-anaesthetic neonatal mortality

The mortality observed in Kinshasa up to day 30 post-neonatal anaesthesia (39.9%) is exceptionally high and reflects the fragility of the patients as well as the constraints of the healthcare system. In sub-Saharan Africa, reported rates vary: Adigun describes 12.1% without specifying the timeframe, Mubobo finds 32.1% at day 30, and Faponle reports 39.2% at day 14 postoperative in the context of emergency neonatal surgery [5,6,9]. In Europe, multicenter studies show much lower rates: Disma at 3.2% and Walker at 1.1% [4,14]. This illustrates the impact of a healthcare system equipped with appropriate technical resources.

In our series, the leading causes of death were septic shock (66.2%), followed by acute respiratory distress (32.4%) and anaemia (1.4%). These data suggest that mortality is more likely to be of surgical aetiology (deficiencies in surgical asepsis) and/or related to the management of sepsis in the neonatal units of Kinshasa (sepsis caused by a maternal transmitted neonatal infection being the common reason for admission to neonatal care), rather than to the anaesthesia itself. Respiratory distress, for its part, may reflect (i) the vulnerability of the respiratory system in preterm infants and newborns [3 , 15, 16] , (ii) perioperative difficulties in airway management (anatomical and/or technical due to the absence of standard monitoring), (iii) multi-organ failure following septic shock (iv) and finally, ineffective postoperative analgesia (the majority of procedures being gastrointestinal via laparotomy). Compared to African data [6, 13], our study highlights the significance of sepsis and respiratory complications as major causes of death. In contrast, European results [4, 14, 17, 18] show that continuous monitoring and multidisciplinary management can significantly reduce post-anaesthetic neonatal mortality.

Predictors of neonatal post-anaesthesia mortality

Post-anaesthesia neonatal mortality in Kinshasa is explained by a series of independent predictors that reflect the fragility of the patients. Prematurity and its consequences remain a central factor. This is consistent with the observations of Disma and Mubobo, where the preoperative clinical status is identified as a major determinant of survival [4,6]. Similarly, low birth weight or weight on the day of surgery (≤2500 g) exacerbates this vulnerability. Hypotrophic newborns have limited energy reserves and an increased susceptibility to metabolic disorders [15]. The work of Adigun and Nafiu confirms that low birth weight is a consistent predictor of mortality in African and international contexts [5,19].

Early surgical age (≤14 days) is another critical factor. Anaesthetic tolerance is reduced in the first few days of life, a period characterised by unique physiology due to the transition between intrauterine and extrauterine life. Physiological reserves are limited, and there is immaturity in drug metabolism due to reduced activity of certain cytochrome P450 enzymes and phase 2 hepatic reactions [3,11,15,16]. Walker shows that mortality decreases with age [14]. Added to this, a high ASA-physical status (III- -IV), which reflects clinical severity and remains a universal predictor. Data from Mubobo and Faponle confirm that ASA ≥III patients have a significantly increased risk of death [6,9]. This highlights the convergence of African and international observations.

Finally, emergency surgery reflects severity, as reported by Adigun, Mubobo, and Faponle. [5,6,9] Thus, whilst clinical predictors are universal, their impact is amplified in the DRC by logistical constraints, explaining the exceptionally high mortality rate.

Strengths and weaknesses of the study

This study has notable strengths: a large sample size (178 newborns), and a rigorous methodology (multicenter, prospective study) combining bivariate and multivariate analyses, and a wealth of clinical data (age, weight, APGAR score, ASA-physical status, complications, intraoperative monitoring, etc.). These elements enable the identification of specific predictors of neonatal mortality under anaesthesia in an African context.

However, it also has weaknesses: the high proportion of missing data (particularly for the Apgar score. It should be noted that any newborn without an Apgar score was transferred to the healthcare facility where they were operated on, thus implying they came from an unreliable facility) , the concentration of cases in a few hospitals limiting generalizability, and the lack of long-term follow-up. Local structural constraints (such as lack of equipment, etc.) strongly influence the results. In summary, this study offers a valuable contribution to understanding the predictors of post-anaesthesia neonatal mortality in Kinshasa, while highlighting the need to improve data quality, expand investigations, and strengthen hospital infrastructure.

The majority of anaesthetised newborns survived, but mortality remained significant. The main causes identified were septic shock (66.2%) and acute respiratory distress (ARD) (32.4%) (Table IV).

Factors associated with mortality during and after neonatal anaesthesia

In this study, following application of the chi-square test, several variables showed a significant association with post-anaesthetic neonatal mortality. Clinical factors included age on the day of surgery ($p = 0.001$), gestational age ($p = 0.001$), birth weight ($p = 0.001$), weight on the day of surgery ($p = 0.001$), Apgar score ($p = 0.001$), and ASA-physical status ($p = 0.001$). The hospital setting ($p = 0.03$) also influenced the prognosis. The surgical indication ($p = 0.001$), the type of anaesthesia ($p = 0.005$), and the urgency of the surgery ($p = 0.001$). Intraoperative complications further exacerbated this vulnerability: difficult intubation ($p = 0.002$), bronchial aspiration ($p = 0.001$), hypothermia ($p = 0.038$), hypoglycaemia ($p = 0.004$), desaturation ($p = 0.001$), anaemia ($p = 0.002$), delayed awakening ($p = 0.001$), unplanned delayed extubation ($p = 0.004$), and bradycardia ($p = 0.001$) were all strongly correlated with mortality. Finally, the duration of surgery ($p = 0.001$) and anaesthesia ($p = 0.006$) were aggravating factors.

In multivariate analysis, using logistic regression, several determinants emerged as significantly associated with post-anaesthetic neonatal mortality. Prematurity markedly increases the risk (aOR = 4.9; $p = 0.005$), as does a birth weight < 2500 g (aOR = 3.5; $p = 0.007$) or a weight on the day of surgery < 2500 g (aOR = 3.9; $p = 0.002$). Age on the day of surgery is also a key factor: interventions performed between 1–7 days (aOR = 5.7; $p = 0.01$) and 8–14 days (aOR = 9.8; $p = 0.01$) strongly increased the risk, whilst those performed between 22–28 days appear to have protective effect (aOR = 0.21; $p = 0.05$). A high ASA-physical status indicates greater severity: ASA III (ORa = 10.2; $p = 0.001$) and ASA IV (ORa = 18.7; $p = 0.001$). Emergency operations triple the risk (ORa = 3.05; $p = 0.001$) (Table V).

Conclusion

The post-anaesthesia neonatal mortality observed in Kinshasa (39.9%) reveals a multi-systemic and multifactorial vulnerability, dominated by prematurity, low birth weight, early surgical age, high ASA-physical status and lack of standard monitoring in 100% of anaesthetised newborns.

Beyond the observation, this study highlights operational priorities: strengthening intraoperative monitoring, improving airway management, systematically preventing hypothermia and organising appropriate neonatal intensive care.

These results open up avenues for future research, focusing on the effectiveness of simple and realistic strategies in resource-limited settings. The evaluation of protocols for the prevention of sepsis and surgical asepsis, the

optimisation of anaesthetic practices, and the development of specialised care pathways could significantly reduce mortality and improve the survival of newborns undergoing surgery in the DRC.

Ethical considerations:

The protocol had been approved by the Ethics Committee of the Kinshasa School of Public Health under number ESP/CE/71/2026, and the necessary institutional authorisations had been obtained. Compliance with the principles of dignity, beneficence, non-maleficence, justice, confidentiality, and anonymity had been guaranteed. The data had been coded and used solely for scientific purposes. The researchers had declared no conflict of interest and had committed to ensuring that the results would contribute to improving neonatal anaesthetic care in the Democratic Republic of the Congo.

Source of funding:

This study received no external funding.

Conflicts of interest*:*

The authors declare that they have no conflict of *interest.*

Authors' contribution*:*

- D. MWELA designed the protocol and coordinated the study;
- B.K. Nkongolo performed the statistical analysis;
- S. NDJOKO, J. KALAMBAY and JJ. KALONGO participated in the data collection, drafting and final validation;
- J. NSIALA supervised the design of the protocol, the collection of data and the proofreading of all versions of the manuscript;
- The others contributed to the editing of the manuscript from the initial to the final version.

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