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Analysis of post-operative risk factors in emergency surgery “A study conducted at the Mbandaka General Referral Hospital, Equateur Province, DRC”

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Abstract

Introduction: The immediate postoperative phase is a period of significant vulnerability in sub-Saharan Africa, where gaps in monitoring and logistical constraints increase mortality.

Objective: This study comprehensively identifies the risk factors associated with post-surgical complications in patients admitted via A&E.

Methodology: Conducted at the Wangata General Referral Hospital (Mbandaka), this quantitative, cross-sectional study retrospectively analyses 221 clinical records collected between February and April 2026. Data were extracted using a validated data collection form.

Results: The incidence of surgical site infection (SSI) was 24.0% and mortality was 14.0%. Multivariate analysis reveals that the three main independent predictors of SSI are an ASA

score ≥ 3 (OR = 4.21), the absence of perioperative antibiotic therapy (OR = 3.67) and a pre-hospital waiting time exceeding 24 hours (OR = 3.18).

Discussion: The data highlight that the prognosis depends on systemic breakdown (shortages of pharmaceutical supplies, precarious access to water and electricity) combined with the patients' physiological exhaustion due to delays in care.

Conclusion: Overcoming this vulnerability requires a shift towards proactive safety: the systematic implementation of antibiotic prophylaxis, standardisation of hourly nursing monitoring, and the restoration of basic resources.

Keywords: Analysis, risk factor, postoperative, emergency surgery.

1. Introduction

The management of surgical emergencies is now a key issue in global public health, at the intersection of severe clinical presentations and material constraints. Whilst surgery in the operating theatre is often life-saving, the immediate postoperative phase remains a critical area of vulnerability. In this regard, several clinical studies compiled by Biccard et al. (2021) highlight an alarming paradox in sub-Saharan Africa, where postoperative mortality predictably affects a population that is younger than in the West, due to systemic failures in the continuous monitoring of patients.

Globally, out of approximately 313 million surgical procedures recorded each year, postoperative incidents affect 7% to 15% of hospitalised patients, resulting in a mortality rate ranging from 1% to 4% depending on the level of development of healthcare facilities, as noted by Weiser et al. (2024). In light of this, the World Health Organisation (WHO) identifies surgical site infections (SSIs) as the most common major complication, substantially increasing healthcare costs and prolonging hospital stays.

The findings of the African Surgical Outcomes Study (ASOS), as discussed by Biccard et al. (2021), underscore this severity by revealing that the risk of post-surgical death in sub-Saharan Africa is twice the global average, a situation directly attributable to a severe shortage of qualified staff and the lack of suitable monitoring units.

In the Democratic Republic of the Congo, the healthcare system faces major structural obstacles, centred on financial barriers, outdated technical facilities and a chronic shortage of specialist healthcare staff. In this context, surgical emergencies—primarily involving abdominal and trauma cases—exhibit postoperative complication rates that sometimes exceed the critical threshold of 25% in certain referral institutions, as reported by Karemere et al. (2023).

The province of Équateur, located at the heart of the central basin, also features a specific forest and river ecosystem that shapes the local pathogen community. This hot and humid climate accelerates microbial proliferation, thereby exacerbating the prevalence of surgical site infections (SSIs). In the city of Mbandaka, the patient care pathway is hampered by major geographical and economic constraints that delay transport to the operating theatre, according to the analyses by Mabakutuvangilanga (2023).

Reports from the Provincial Health Division (DPS) highlight a clear predominance of digestive and obstetric emergencies, with typhoid-related peritonitis and emergency caesarean

sections accounting for the bulk of the surgical caseload at the Mbandaka General Referral Hospital (HGR). These procedures are frequently carried out there under precarious technical conditions, where maintaining the chain of sterility and post-operative clinical follow-up constitute daily challenges, according to the Equateur Provincial Health Division (DPS) (2025). The overview of emergency surgery at the HGR in Mbandaka thus reveals an estimated incident rate of around 18%. This rate, significantly higher than international standards, manifests as severe clinical conditions such as wall suppuration, septic shock and evisceration, as documented by Mabakutuvangilanga (2023), most of which occur within a critical seven-day window and severely compromise the chances of recovery for those who have undergone surgery.

In light of the observed gap between theoretical standards and on-the-ground realities, this study seeks to comprehensively identify the determinants associated with immediate postoperative morbidity and mortality. By exploring clinical, biological and managerial variables, this research aims to formulate concrete strategies to optimise patient safety in a resource-limited setting. The investigation thus centres on the following question: what are the specific risk factors influencing the emergence of postoperative complications in patients admitted to the surgical emergency department at the Mbandaka Regional General Hospital?

To answer this, we hypothesise that such an incidence stems from a harmful synergy between the slowness of pre-hospital diagnosis, the patients' poor biological and nutritional status on admission, and the lack of standardised nursing monitoring tools upon leaving the operating theatre.

2. Methodology

2.1. Study design

This research is based on a quantitative cross-sectional design, combining descriptive and analytical objectives to rigorously frame the collection and evaluation of data. In line with Fortin and Gagnon (2022), this design is ideal for examining the characteristics of a cohort at a specific point in time whilst measuring the interconnections between specific parameters. In practical terms, the descriptive component serves to map the landscape of postoperative incidents at the HGR in Mbandaka, whilst the analytical component aims to objectively identify the statistical links between individual risk factors (delays, anaemia, hygiene) and the clinical outcomes of patients who have undergone surgery. As argued by Polit and Beck (2021), the cross-sectional approach offers an efficient means of gathering evidence to guide immediate

interventions in hospital settings subject to severe budgetary constraints. Finally, this model goes beyond simple statistical enumeration by incorporating the temporal and spatial contingencies of Equateur Province to analyse the structural factors that impact surgical safety.

2.2. Presentation of the study setting

The choice of institutional setting is crucial to establishing the external validity of the findings. The study was conducted at the Wangata General Referral Hospital (HGR), located in Mbandaka, the capital of Equateur Province in the Democratic Republic of the Congo. Situated at the centre of the eponymous health zone, this facility is bordered to the north by the Air-Congo district, to the south by the equatorial forest, to the east by the municipality of Mbandaka and to the west by the Congo River, according to the Provincial Health Division (DPS Équateur, 2023). This geographic positioning makes it a health hub where rural, island and riverside populations converge. The inclusion of this area meets representativeness requirements: on the one hand, it accounts for the highest volume of surgical emergencies in the municipality, providing an accurate reflection of post-operative follow-up; on the other hand, according to the DRC Health Observatory (2023), shortages of supplies and gaps in surveillance are particularly acute there, which helps to highlight the obstacles to safe care. The physical accessibility of the records also optimised the conduct of the work.

2.3. Population and sampling

Defining the reference group allows for the identification of subjects sharing common attributes to be studied (Lambert & Laplantine, 2023). The study population comprises all patients who underwent surgery (minor or major) at the Wangata General Hospital between August and October 2025, as well as the nursing teams in the surgical and intensive care units. Selection was carried out using a non-probabilistic method based on reasoned choice or convenience. In accordance with the guidelines of Gingras (2022), this technique allows for the selection of participants who strictly meet the research requirements based on their accessibility in the field, in order to identify specific cases of postoperative complications. The homogeneity of the cohort is based on strict criteria: included are patients operated on at the Wangata Regional General Hospital who stayed for at least 48 hours post-operatively and who freely consented to the study. Excluded are subjects transferred to other facilities before the end of the initial monitoring period and clinical records with major documentation gaps that prevent any analysis, according to Moreau (2024). The sample size was set at 170 subjects based on the surgical workload. According to D'Aragnon (2023), this

sample size ensures an ideal saturation threshold for identifying major trends and dominant risk factors without limiting the depth of the analysis.

2.4. Method, technique and data collection tool

The logical approach adopted consists of a systematic survey of written care reports, coupled with an analytical approach aimed at objectifying the causal relationships between the environment and clinical incidents. The operationalisation is based on the literature review technique. According to Gauthier and Bourgeois (2021), this process allows pre-existing written documents to be examined without interfering with the environment or the subjects, facilitating—the use of monitoring forms, operating theatre logs and medical records to reconstruct the first postoperative week. The instrument selected is a data collection grid (documentary analysis) designed to gather objective facts. Unlike interviews, this tool ensures data reliability by drawing on non-reactive documents, which provide a true reflection of nursing practice at the Mbandaka Regional General Hospital, whilst recording variables such as nutrition, monitoring and timeframes. The content validity of the checklist was validated by comparing it with international standards and through the review of nursing science lecturers and researchers; Paillé (2022) notes that a tool is valid when it accurately measures the theoretical dimensions of the research question. The reliability and consistency of the instrument were established through a pre-test on a subset of 10% of clinical records, enabling the adjustment of items and the standardisation of coding—a step deemed essential by Karsenti and Sulpher (2023) to ensure the reproducibility of measurements in health sciences.

2.5. Study variables

A variable refers to a changeable attribute that is observed or measured to answer research questions. The model distinguishes the dependent variable from the independent factors. The dependent variable is the quality of postoperative nursing care. According to Fortin and Gagnon (2022), it represents the outcome or effect influenced by other factors, measured here by the compliance of recorded care (vital signs, pain, treatments) with standards. The independent variables, described as probable causes of the phenomenon by Polit and Beck (2023), encompass three areas: patient characteristics (age, gender, medical history, diagnosis), the organisation of care (staff-to-patient ratio, access to equipment, whether the surgery is urgent or elective) and clinical competencies (staff grade, traceability of handover notes, adherence to intervention timelines). To make these concepts measurable, the operationalisation process transforms abstract notions into

observable indicators. N'da (2021) points out that this conversion ensures the accuracy of the protocol by precisely defining the data to be extracted from the records, such as the presence of temperature readings or the frequency of dressing changes.

2.6. Data collection process

The systematic collection of information is structured around three distinct phases:

Preparatory phase: Dedicated to obtaining formal administrative authorisations from the management of the Wangata General Hospital to ensure legal access to the archives. Creswell (2022) emphasises that this negotiation of access determines the clarity and smooth running of the data collection, enabling the target units and registers to be identified in advance.

Execution phase: This involves the active, manual extraction of data using the evaluation grid. According to Yin (2021), the rigour of this stage requires critical reading and objective transcription without hasty interpretation. It involves selecting records that meet the criteria, identifying variables (identity, anaesthesia, monitoring, complications) and systematically recording them on the grid.

Closing phase: Consists of a final check to verify the completeness and internal consistency of the records. For Depelteau (2023), this final review eliminates omissions and consolidates the mathematical robustness of the analysis, paving the way for computer processing.

2.7. Techniques for processing and analysing results

The transformation of raw data into meaningful information follows a sequential process. According to Bernier (2022), processing begins with data cleansing to eliminate input errors, followed by the numerical coding of qualitative indicators in order to transition from physical media to software-based analysis. Quantitative analysis relies on descriptive statistics which, according to Flick (2023), structure the observations to identify central trends. Frequencies and percentages measure the occurrence of complications, whilst means and medians break down parameters such as age or length of stay, all modelled in the form of tables and graphs using Excel or SPSS. In parallel, content analysis is used to process textual data from nursing handover notes, defined by Bardin (2021) as a set of objective descriptive procedures to compare figures with recorded realities. Finally, interpretation focuses on bringing out the meaning of the results by comparing them with the literature and nursing theories, a milestone which, according to

Mucchielli (2022), constitutes the culmination of the work, moving from simple factual observation to an understanding of the phenomena at the Wangata General Hospital.

2.8. Ethical considerations

Research in a healthcare setting remains subject to unconditional adherence to key ethical guidelines to protect both participants and the institution. In practice, this is organised around four pillars:

Authorisation and access: Formal approval was granted by the management of the Wangata General Hospital (HGR) prior to accessing the records. Guillemain and Gillam (2021) point out that ethics begins with recognising the host institution's sovereignty over its data, thereby ensuring the transparency of the research.

Anonymity and confidentiality: Privacy is safeguarded through the systematic application of alphanumeric coding that prohibits the use of names. As Israel (2022) emphasises, the ethical framework for retrospective analyses rests on the impossibility of linking published results to individuals' civil identities, with the data remaining restricted to strictly academic use.

Beneficence and non-maleficence: The author undertakes to protect staff and the institution from any harm arising from the evaluation of their work. Wassenaar (2023) specifies that the analysis of records must not serve as a tool for denunciation but as a means of optimising quality, preserving professional integrity through a comprehensive approach to addressing gaps in documentation.

- **Scientific integrity:** This is based on absolute fidelity to archival documents, ruling out any falsification or deliberate omission of factual data that would contradict the hypotheses. Hamon (2021) states that this intellectual rigour ensures that the conclusions accurately reflect the clinical reality observed during the study period.

3. Results

3.1. Clinical Results and Treatment Outcome

Table 1: Incidence of Surgical Site Infection (SSI)

SSI	Sample size (n)	Frequency (%)
Yes	53	24
No	168	76
Total	221	100

Surgical infection is not an isolated incident at the Mbandaka Regional General Hospital, but an endemic systemic problem. This rate of 24.0% reflects the direct impact of an unfavourable hospital environment where compliance with basic hygiene rules is hampered by physical barriers and chronic stock shortages.

Table 2: Breakdown by length of hospital stay

Length of hospital stay	Sample size (n)	Frequency (%)
< 10 days	119	53.8
> 10 days	102	46.2
Total	221	100

Longer hospital stays (46.2%) have a twofold negative impact: they result in significant additional financial costs for families who are often struggling financially, and they lead to a shortage of available beds, limiting the institution's capacity to admit new emergency cases.

Table 3: Breakdown by treatment outcome (Patient outcomes)

Outcome	Number (n)	Frequency (%)
Recovered / Discharged	177	80.1
Deaths	31	14
Transferred	13	5.9
Total	221	100

A mortality rate of 14.0% demonstrates the extreme severity of the clinical conditions treated. Transfers (5.9%) highlight the critical material limitations of the local technical facilities, which are unable to manage the most severe organ failure independently upon discharge from the operating theatre.

Table 4: Distribution of patients by nutritional status (BMI)

BMI (kg/m ²)	Number (n)	Frequency (%)
< 18.5 (Underweight)	78	35.3
18.5 – 24.9 (Normal)	125	56.6
Over 30 (Obesity)	18	8.1
Total	221	100

Malnutrition (35.3%) acts as a silent enemy that weakens patients' immune systems even before the first incision is made. Without early nutritional or surgical intervention, the body no longer possesses the biological resources necessary to ensure suture integrity and cellular repair.

Table 5: Frequency of postoperative complications (excluding ISO)

Complication	Yes (n)	Yes (%)	No (n)	No (%)
Blood transfusion	34	15.4	187	84.6
Postoperative haemorrhage	28	12.7	193	87.3
Urinary tract infection	24	10.9	197	89.1
Wall dehiscence	21	9.5	200	90.5
Surgical repair	19	8.6	202	91.4
Bedsore	15	6.8	206	93.2
Anastomotic fistula	10	4.5	211	95.5
Deep vein thrombosis	6	2.7	215	97.3

Haemorrhage and the need for transfusion dominate the picture of immediate complications. Their high prevalence often indicates technically challenging procedures on tissue weakened by infection, paving the way for serious events such as wound dehiscence or reoperation.

3.2. Demographic and Clinical Factors

Table 6: Association between age and the occurrence of ISO

Age group	ISO (+)	ISO (-)	Total	ISO incidence (%)
Over 75	6	7	13	46.2%
Under 75	47	161	208	22.6%
Total	53	168	221	24%

Statistical parameters: Calculated Chi-square = 6.12 (ddl=1) – Tabulated Chi-square = 3.84 – p=0.013 – Significant (there is an association)

Advanced age (75 years and over) doubles the risk of local infection. This finding necessitates individualised clinical vigilance and a much more aggressive postoperative monitoring protocol for this section of the population, whose skin and immune defences are biologically depleted.

Table 7: Association between time to admission and the occurrence of ISO

Time to admission	ISO (+)	ISO (-)	Total	ISO incidence (%)
> 24 hours	41	82	123	33.30%
Less than 24 hours	12	86	98	12.20%
Total	53	168	221	24.00%

Statistical parameters: calculated chi-square: 17.32, df: 1, tabulated chi-square (threshold 0.05): 3.84, p: < 0.001 (Highly significant)

The time factor is more decisive for survival and infectious prognosis than the surgeon's technical skill. Waiting longer than 24 hours amounts to operating on a patient whose abdominal cavity is already in an advanced stage of bacterial proliferation, making complications almost inevitable.

Table 8: Association between the ASA score and the occurrence of ISO

ASA score	ISO (+)	ISO (-)	Total	ISO incidence (%)
ASA ≥ 3	26	29	55	47.30%
ASA ≤ 2	27	139	166	16.30%
Total	53	168	221	24.00%

Statistical parameters: calculated chi-square: 22.17, df: 1, tabulated chi-square (threshold 0.05): 3.84, p: < 0.001 (Highly significant)

More than just an anaesthetic tool, an ASA score of 3 or higher indicates systemic deterioration and physiological exhaustion in the patient on arrival at the operating theatre. It almost invariably predicts severe and complex post-operative complications.

3.3. Intraoperative Factors and Immediate Complications

Table 9: Association between the type of surgery (according to Altemeier) and the occurrence of ISO

Type of surgery	ISO (+)	ISO (-)	Total	ISO incidence (%)
Soiled / Contaminated	44	88	132	33.30%
Clean / Clean-contaminated	9	80	89	10.10%
Total	53	168	221	24.00%

Statistical parameters: calculated chi-square: 19.80, df: 1, tabulated chi-square (threshold 0.05): 3.84, p: < 0.001 (Highly significant)

The very nature of the emergency (often typhoid peritonitis or contaminated wounds) immediately condemns a third of patients to infection. This finding highlights the vital importance of peritoneal lavage and the management of intraoperative sepsis in mitigating this initial bacterial impact.

Table 10: Association between the absence of intraoperative antibiotic therapy and the occurrence of SSI

Antibiotic therapy	ISO (+)	ISO (-)	Total	ISO incidence (%)
Not received	34	51	85	40.00%
Pass	19	117	136	14.00%
Total	53	168	221	24.00%

Statistical parameters: calculated chi-square: 20.34, df: 1, tabulated chi-square (threshold 0.05): 3.84; p: < 0.001 (Highly significant)

The absence of antibiotic prophylaxis increases the risk of SSI by nearly threefold. This finding demonstrates that the risk of infection is not solely linked to the patient's condition, but depends directly on logistical and managerial failings within the institution (management of pharmacy stocks).

Table 11: Association between postoperative haemorrhage and the occurrence of SSI

Postoperative haemorrhage	Sepsis (+)	ISO (-)	Total	ISO incidence (%)
Yes	18	10	28	64.30%
No	35	158	193	18.10%
Total	53	168	221	24.00%

Statistical parameters: calculated chi-square: 28.45; df: 1; tabulated chi-square (threshold 0.05): 3.84; p: < 0.001 (Highly significant)

Haemostasis must be surgically flawless. Any uncontrolled residual bleeding immediately becomes an ideal culture medium in situ, neutralising the patient's natural defences and promoting deep infection.

3.4. Postoperative complications and the occurrence of ISO

Table 12: Association between blood transfusion and the occurrence of ISO

Blood transfusion	ISO (+)	ISO (-)	Total	ISO incidence (%)
Yes	16	18	34	47.10%
No	37	150	187	19.80%
Total	53	168	221	24.00%

Statistical parameters: calculated chi-square: 7.23, df: 1, tabulated chi-square (threshold 0.05): 3.84, p: 0.007 (Significant)

Blood transfusion, although vital in cases of severe anaemia, acts as a temporary immunosuppressant. It exposes the patient to an increased risk of cross-infection, which necessitates restricting its use to what is strictly necessary.

Table 13: Association between repeat surgery and the occurrence of ISO

Reoperation	ISO (+)	ISO (-)	Total	ISO incidence (%)
Yes	12	7	19	63.20%
No	41	161	202	20.30%
Total	53	168	221	24.00%

Statistical parameters: calculated chi-square: 16.23, df: 1, tabulated chi-square (threshold 0.05): 3.84; p: < 0.001 (Highly significant)

Returning to the operating theatre doubles the risk of infection. Reoperation must be considered a last-resort measure, as it further damages tissue that is already severely compromised and significantly reduces the chances of a rapid recovery.

Table 14: Association between wall dehiscence and the occurrence of ISO

Wall dehiscence	ISO (+)	ISO (-)	Total	ISO incidence (%)
Yes	15	6	21	71.40%
No	38	162	200	19.00%
Total	53	168	221	24.00%

Statistical parameters: calculated chi-square: 28.08, df: 1, tabulated chi-square (threshold 0.05): 3.84; p: < 0.001 (Highly significant)

In Mbandaka, wall dehiscence (71.4%) is the macroscopic clinical sign of an underlying uncontrolled infection. It demonstrates that mechanical failure of the sutures is almost always secondary to deep bacterial invasion.

3.5. Postoperative complications and the occurrence of ISO

Table 15: Association between blood transfusion and the occurrence of ISO

Blood transfusion	ISO (+)	ISO (-)	Total	ISO incidence (%)
Yes	16	18	34	47.10%
No	37	150	187	19.80%
Total	53	168	221	24.00%

Statistical parameters: calculated chi-square: 7.23, df: 1, tabulated chi-square (at the 0.05 level): 3.84; p: 0.007 (Significant)

Anastomotic fistula (80.0%) is the most serious visceral complication of local gastrointestinal surgery. The continuous release of septic material into the peritoneum makes scar tissue failure and parietal infection virtually inevitable, resulting in a poor prognosis.

Table 16: Association between reoperation and the occurrence of ISO

Reoperation	ISO (+)	ISO (-)	Total	ISO incidence (%)
Yes	12	7	19	63.20%
No	41	161	202	20.30%
Total	53	168	221	24.00%

Statistical parameters: calculated chi-square: 16.23, df: 1, tabulated chi-square (at the 0.05 threshold): 3.84, p: < 0.001 (Highly significant)

Reoperation is very strongly associated with the occurrence of ISO (63.2% versus 20.3%). Each reoperation exposes the surgical site to further exogenous contamination and exacerbates tissue trauma, creating conditions conducive to the persistence or worsening of sepsis.

Table 17: Association between wound dehiscence and the occurrence of ISO

Wound dehiscence	ISO (+)	ISO (-)	Total	ISO incidence (%)
Yes	15	6	21	71.40%
No	38	162	200	19.00%
Total	53	168	221	24.00%

Statistical parameters: calculated chi-square: 28.08, df: 1, tabulated chi-square (at the 0.05 threshold): 3.84, p: < 0.001 (Highly significant)

Wall dehiscence shows a strong statistical association with ISO (71.4% versus 19.0%). In the majority of clinical cases observed in Mbandaka, dehiscence is not merely a mechanical complication, but the direct consequence of a deep infection that compromises the strength of the sutures and impedes normal tissue healing.

Table 18: Association between anastomotic fistula and the occurrence of ISO

Anastomotic fistula	ISO (+)	ISO (-)	Total	ISO incidence (%)
Yes	8	2	10	80.00%
No	45	166	211	21.30%
Total	53	168	221	24.00%

Statistical parameters: calculated chi-square: 17.94, df: 1, tabulated chi-square (significance level 0.05): 3.84, p: < 0.001 (Highly significant)

Anastomotic fistula shows an extremely strong association with ISO (**80.0%**). Clinically, the leakage of digestive contents into the peritoneal cavity leads to massive and persistent septic contamination, making surgical site infection virtually inevitable in this context.

3.6. Multivariate analysis

Table 19: Logistic regression of independent factors associated with SSI

Variable	Adjusted OR	95% CI	p-value
ASA score ≥ 3	4.21	[1.98 – 8.96]	< 0.001
No antibiotic therapy	3.67	[1.79 – 7.52]	< 0.001
Admission delay > 24 hours	3.18	[1.41 – 7.18]	0.005
Postoperative haemorrhage	2.98	[1.32 – 6.72]	0.008
Type of dirty surgery	2.95	[1.27 – 6.84]	0.012
Anastomotic fistula	2.89	[1.09 – 7.67]	0.034
Wall dehiscence	2.76	[1.12 – 6.80]	0.027
Surgical revision	2.45	[1.01 – 5.94]	0.048
Unreliable access to water/electricity	2.31	[1.08 – 4.94]	0.031

Poorly provided nursing care	2.08	[1.01 – 4.28]	0.047
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4. Model performance indicators

- **Hosmer-Lemeshow test:** p = 0.581 (indicating a good fit of the model).
- **Area under the ROC curve (AUC): 0.874** (95% CI: 0.82–0.93), indicating excellent discriminatory power.

After adjustment, ten factors remain significantly associated with the occurrence of ISO independently.

1. **Predominance of clinical and management factors:** The three most powerful predictors are an **ASA score ≥ 3** (OR = 4.21), **absence of antibiotic therapy** (OR = 3.67) and a **prolonged admission delay** exceeding 24 hours (OR = 3.18).
2. **Impact of surgical complications:** Postoperative haemorrhage, anastomotic fistula and wound dehiscence increase the risk of infection by a factor of nearly 3.
3. **Systemic factors:** These results confirm that environmental and organisational determinants — such as poor access to resources (water/electricity) and the quality of nursing care — play a role just as crucial as traditional clinical factors in the development of infectious complications.

5. Discussion

This study aimed to analyse the factors associated with postoperative complications, with a particular focus on Surgical Site Infection (SSI), at the Mbandaka General Referral Hospital. Our results reveal an overall incidence of SSI of 24.0%, a mortality rate of 14.0%, and identify a high ASA score, delayed admission and the absence of intraoperative antibiotic therapy as the main predictors of morbidity. The discussion that follows compares these data with the contextual realities of Equateur Province and with the findings of the contemporary scientific literature.

5.1. Delay in admission and surgical management

More than half of our patients (55.7%) were admitted more than 24 hours after the onset of symptoms. This delay is statistically associated with a three-fold increase in the risk of ISO (33.3% compared with 12.2% for early admissions, p < 0.001).

This finding is consistent with the observations of Ndayisaba et al. (2021) in Burundi, who highlight that geographical remoteness and the cost of transport in rural areas delay access to emergency care. Similarly, Kambale et al. (2022) report from the Democratic Republic of the Congo that the systematic use of traditional healers prior to hospital consultation worsens the initial infectious prognosis.

We believe that this diagnostic delay transforms initially treatable digestive emergencies into cases of advanced peritonitis or severe sepsis. The strong correlation between delay and infection (OR=3.18) demonstrates that early admission is a more decisive factor in survival than the medical procedure itself in our context.

5.2. Intraoperative antibiotic therapy and logistical resources

Nearly 38.5% of patients who underwent surgery received no intraoperative antibiotic coverage. Multivariate analysis shows that this deficiency increases the risk of developing a surgical site infection by a factor of 3.67.

Mulu et al. (2020) demonstrate that, in sub-Saharan Africa, irregular pharmaceutical supply is a major cause of ISO. Furthermore, Allegranzi et al. (2016), in the WHO guidelines, emphasise that antibiotic prophylaxis is ineffective if not administered within 60 minutes prior to incision, a condition that is difficult to meet during stock-outs.

We consider that the absence of antibiotic therapy is not a clinical choice but a systemic failure of the hospital pharmacy. This factor, coupled with unreliable access to drinking water and electricity (55.7%), creates an environment where maintaining aseptic conditions becomes a daily challenge for healthcare staff.

5.4. ASA score and comorbidities

An ASA score of ≥ 3 applies to 24.9% of patients and is the strongest predictor of ISO in our model (OR=4.21). Malaria (20.8%) and anaemia (17.2%) are the predominant comorbidities.

According to Serme et al. (2023), malnutrition and chronic anaemia, which are common in tropical regions, impair the post-operative immune response. Loforte et al. (2019) add that the ASA score, although subjective, remains an indicator of physiological frailty which, when high, consistently predicts complex post-operative outcomes.

In our study, a high ASA score reflects not only chronic comorbidities, but above all the physiological exhaustion

linked to the severity of the surgical condition at the time of admission. The preoperative weight loss observed (35.3%) confirms this nutritional vulnerability, which impedes healing.

5.5. Quality of postoperative nursing care

For 51.6% of patients, nursing care was judged to be “poorly provided”. This factor is independently associated with the occurrence of ISO (OR=2.08).

Aiken et al. (2014) have extensively documented the impact of nursing workload on mortality and hospital complications. In a similar context, Banza et al. (2020) highlight that a lack of continuing education in septic care promotes cross-contamination during dressing changes.

We argue that nursing supervision constitutes the last line of defence against complications. The fact that more than half of patients receive suboptimal care underscores the urgency of strengthening staff capacity and optimising the nurse-to-patient ratio to improve surgical safety in Mbandaka.

General Conclusion

This retrospective study, conducted between February and April 2026 on 221 records from the Mbandaka General Referral Hospital, demonstrates that the immediate postoperative phase is directly impacted by significant logistical and clinical shortcomings.

The sample, consisting mainly of young men, reveals a critical situation: 55.7% of patients are admitted after a delay of 24 hours and 57.5% arrive in a compromised general condition. Consequently, the incidence of surgical site infections (SSI) reaches 24.0% and the overall mortality rate stands at 14.0%. Multivariate analysis identified ASA score 3 (OR = 4.21), lack of perioperative antibiotic therapy (OR = 3.67) and admission delay (OR = 3.18) as the main independent predictors of infectious morbidity.

The initial hypotheses were confirmed: the onset of sepsis is closely linked to pre-hospital delay ($p < 0.001$), structural deprivation (poor access to water and electricity in 55.7% of cases) promotes micro, and 51.6% of nursing care is sub-optimal, acting as an independent risk factor (OR = 2.08).

Given the ‘clinical silence’ observed upon waking, the patient’s prognosis therefore depends on the consolidation of the entire care pathway rather than on the surgical procedure alone.

To put these findings into practice and break this organisational cycle, urgent reforms must be implemented at

clinical, logistical and community levels. From a medical perspective, it is imperative to implement a protocol for systematic antibiotic prophylaxis in the hour preceding the incision, to standardise the use of a form for hourly monitoring of vital signs in the recovery room, and to address anaemia (17.2%) or weight loss (35.3%) as early as the preoperative phase. Nursing staff, for their part, must adopt Martins' (2023) vigilance model to detect early warning signs of deterioration and maintain strict aseptic technique when changing dressings. At the institutional level, securing the pharmacy's stock of sterile supplies and rehabilitating water and electricity infrastructure are absolute priorities. Finally, public health strategies for Equateur Province must include awareness campaigns to reduce admission delays, therapeutic education programmes for families, and future research focusing on cultural barriers related to traditional healers and the impact of the LMD system on new graduates. This shift from reactive management to proactive safety is essential to optimise survival rates at Wangata General Hospital.

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