

Management and Outcomes of Adult Intestinal Obstruction in Cameroon: A Five-Year Retrospective Study in Two Hospitals

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1. Abstract

1.1. Introduction: Intestinal obstruction is a common surgical emergency, accounting for nearly 20% of admissions for acute abdominal pain. Initial management involves adequate fluid resuscitation, nasogastric tube decompression, and prompt identification of total obstruction signs, necessitating urgent surgery. Given the persistent morbidity and mortality associated with intestinal obstruction in our region, a comprehensive study of its management and outcomes is imperative. This study aims to understand the management approaches, and outcomes of intestinal obstruction in two Cameroonian hospitals.

1.2. Materials and Methods: We conducted a comprehensive five-year retrospective analysis, encompassing cases admitted to the surgical emergency units of Yaounde General Hospital and Buea Regional Hospital from January 1, 2017, to December 31, 2022. Among 853 records of patients with acute abdominal conditions, 204 met the inclusion criteria for intestinal obstruction. Data were extracted from patient records and statistically analyzed, with significance at $p < 0.05$.

1.3. Results: Intestinal obstruction constituted 23.9% of acute abdomen cases, with a slight male predominance (1.1:1). Most patients arrived at the hospital more than 48 hours after symptom onset. Mechanical obstructions, primarily due to adhesions, were most common. Colon cancer emerged as the primary neoplastic

cause, while the majority of patients experienced small bowel obstructions. Abdominal pain (77.14%) was the predominant symptom. The most frequently prescribed medications included metronidazole (37.5%) and tramadol (39.64%), along with normal saline (44.3%) as the primary intravenous fluid. The average hospital stay was 13.7 ± 7.7 days, with the majority of cases managed surgically. Dehydration and sepsis were the main complications, contributing to an 11.76% mortality rate. Factors associated with poor outcomes included age over 55, delayed hospital presentation (>24 hours), large bowel obstruction, and surgical intervention.

1.4. Conclusion: Our study underscores the prevalent surgical management of intestinal obstruction in these hospitals, with common medications including metronidazole, ceftriaxone, tramadol, and normal saline. The high mortality rate calls for enhanced strategies to address this significant public health challenge. Further research and interventions are warranted to reduce the burden of intestinal obstruction in our context and improve patient outcomes.

2. Introduction

Intestinal obstruction (IO) is characterized by the partial or complete blockage of the small or large intestine.[1] It is a surgical emergency that poses significant challenges to hospitals worldwide.[2] This condition disrupts the normal passage of food, liquids, gas, or stool and has far-reaching implications for patient health and healthcare costs. Notably, in Africa, intestinal obstruc-

tion stands as a leading cause of acute abdomen cases, contributing to substantial morbidity and financial burdens on healthcare systems.[3] Geographically, the incidence and underlying causes of intestinal obstruction exhibit notable variations.[4,5] While postoperative adhesions have been traditionally common in Western countries, developing nations often contend with the prevalence of strangulated hernias, often attributed to factors such as poverty, limited awareness, and fear of surgical intervention.[6,7] However, managing intestinal obstruction in developing countries remains a challenge as a result of inadequate access to appropriate surgical facilities, coupled with shortcomings in aseptic techniques before, during, and after surgical procedures, contributing to less favorable prognosis for patients.[8,9] There is a compelling need to continuously assess and enhance the management and outcomes of intestinal obstruction to help improve patient outcomes and optimize the overall effectiveness of intestinal obstruction management in low and middle-income countries given the burden of intestinal obstruction on the healthcare delivery systems in these countries. This study therefore provides a comprehensive retrospective review of intestinal obstruction management and outcomes within the context of two hospitals in Cameroon. The overarching research goal was to provide valuable insights to help mitigate the overall burden of morbidity and mortality associated with intestinal obstruction. The aim was to shed light on the multifaceted aspects of intestinal obstruction, ultimately contributing to improved management practices and patient outcomes. Our hypotheses propose that intestinal obstruction is a significant contributor to acute abdomen cases, hernias represent the predominant causative factor, and mortality rates are substantial.

3. Methods

3.1. Study Design: We conducted a hospital-based retrospective review of medical records. Our focus was on surgical patients admitted for intestinal obstruction, and we examined records spanning from January 1st, 2017, to December 21st, 2022.

3.2. Study Period: The study was conducted over a four-month period, running from January 2023 to April 2023.

3.3. Study Area: Our study sites included the Regional Hospital of Buea, serving an approximate population of 1.5 million people, and the Yaoundé General Hospital, catering to over 2 million residents in the Yaounde metropolitan area.

3.4. Study Population: We included adult patients who were admitted to either hospital with intestinal obstruction, whether through referrals or as outpatients, during the designated study period.

4. Sampling

4.1. Sampling Method: We employed a multistage sampling method that consisted of three stages. Initially, we chose the two

Hospitals using convenience sampling. Subsequently, the probability proportionate-to-size method was utilized to calculate the necessary number of participants. Finally, we employed non-probability purposive sampling to select participants who met our inclusion criteria.

4.2. Rationale: We chose the Buea Regional Hospital and the Yaoundé General Hospital as our study sites to explore two distinct urban areas within different regions, each offering unique insights into the management of intestinal obstruction.

4.3. Data Collection: Our data collection methods primarily involved the review of hospital records and the completion of questionnaires to document the data.

5. Inclusion and Exclusion Criteria

5.1. Inclusion Criteria: We included all patient files related to intestinal obstruction cases during the study period.

5.2. Exclusion Criteria: We excluded incomplete files and files of patients under the age of 18 years.

6. Materials for Data Collection and Management

We employed data collection forms and relied on technology, including computers, USB flash drives, scientific calculators, and typing software, for efficient data collection and management.

7. Human Resources

Our research team included the Principal Investigator (EEYT), study supervisor (CMA), co-supervisor (NDM), statistician, and collaboration with various medical and para-medical professionals.

8. Study Procedure

Our study procedure adhered to rigorous ethical and administrative protocols, including obtaining ethical clearance from the University of Buea National Ethics Committee (ref: 2023/1939-02/UB/SG/IRB/FHS) and securing administrative authorization from the relevant healthcare authorities of the Buea Regional Hospital (Ref No.R11/MINSANTE/SWR/RDPH/PS334/366) and the Yaounde General Hospital (Ref: 225-23/HGY/DG/DPM/APM-TR)

9. Study Variables F

We considered socio-demographic data (age, sex, race), clinical data (comorbidities, causes of intestinal obstruction, presenting symptoms), and para-clinical data (biochemical and imaging data) as our study variables.

10. Data Management and Analysis

Data was meticulously coded, entered into a computer, and analyzed using statistical software. Results were summarized using means, standard deviations, and proportions. Statistical significance was determined using a 95 percent confidence interval with a margin error of less than 0.05.

11. Ethical Considerations

Our research was conducted with the utmost ethical considerations, beginning with ethical clearance and encompassing guidelines to ensure the confidential and ethical utilization of collected information solely for research purposes.

12. Results

12.1. Demographic Characteristics: In this study, a total of 3,855 patient files were consulted from patients admitted for acute intestinal conditions in the studied hospitals. Among these, 204 patient files met the inclusion criteria. The ages of the included patients ranged from 18 to 84 years, with a mean age of 46 years. Males comprised 51.47% of the patients, while females constituted 48.52%.

12.2. Clinical Features: Almost half of the patients (n=100, 49.0%) arrived at the hospital more than 48 hours after the onset of symptoms (Figure 1). The most prevalent presenting complaints were abdominal pain (n=157, 77.1%), followed by vomiting (n=137, 67.1%) and abdominal distension (n=114, 55.7%) (Figure 2).

12.3. Types and Aetiologies: Mechanical obstructions accounted for the majority (90.1%) of cases (Figure 3). Adhesions (50.9%), hernias (21.07%), and tumors (20.01%) were the leading aetiologies of intestinal obstruction (Figure 4). Colon cancer was the predominant tumor responsible for intestinal obstruction, representing 62% of all tumor cases (Figure 5). Small bowel obstruction (SBO) was observed in 78.43% of patients, while 21.56% had large bowel obstruction (LBO).

12.4. Management Modalities: In the management of intestinal obstruction, operative intervention was employed in 73% of cases, while the remaining 27% received conservative treatment.

12.5. Antibiotherapy and Analgaesics: Metronidazole (37.5%) and ceftriaxone (30.6%) were the most frequently used antibiotics (Figure 6), while tramadol (39.6%) and paracetamol (28.4%) were the most commonly administered analgesics (Figure 7). A statistically significant variance was observed in the selection of antibiotics among different institutions, as depicted in (Table 1). A statistically significant variance was observed in the selection of analgesics among different institutions (Table 2).

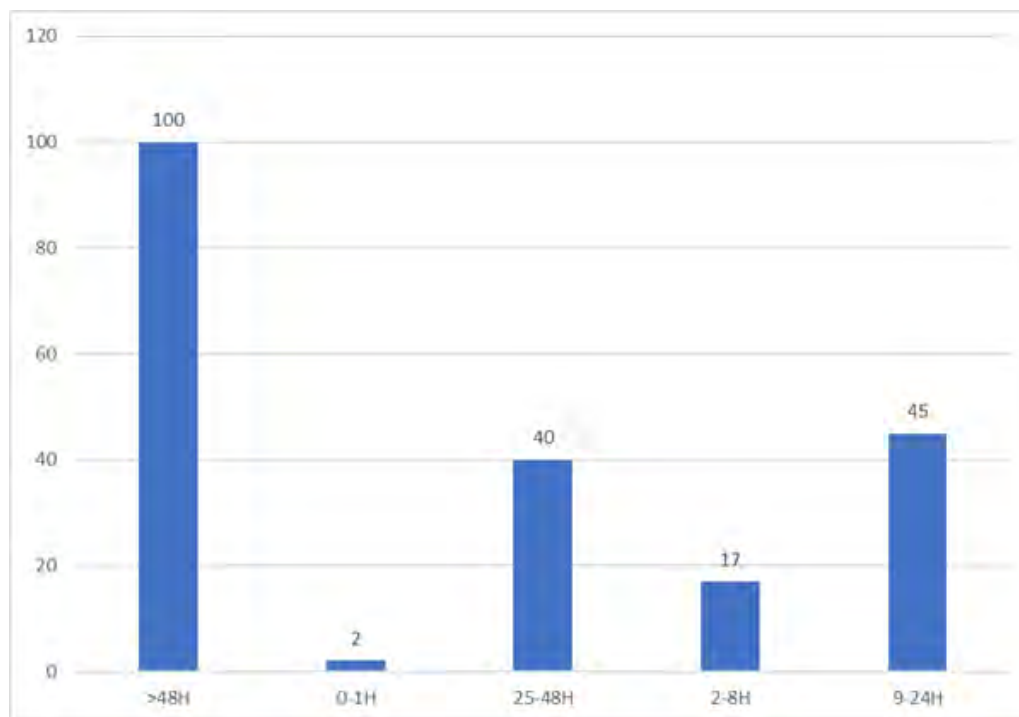


Figure 1: Time of arrival after symptoms onset (n=204)

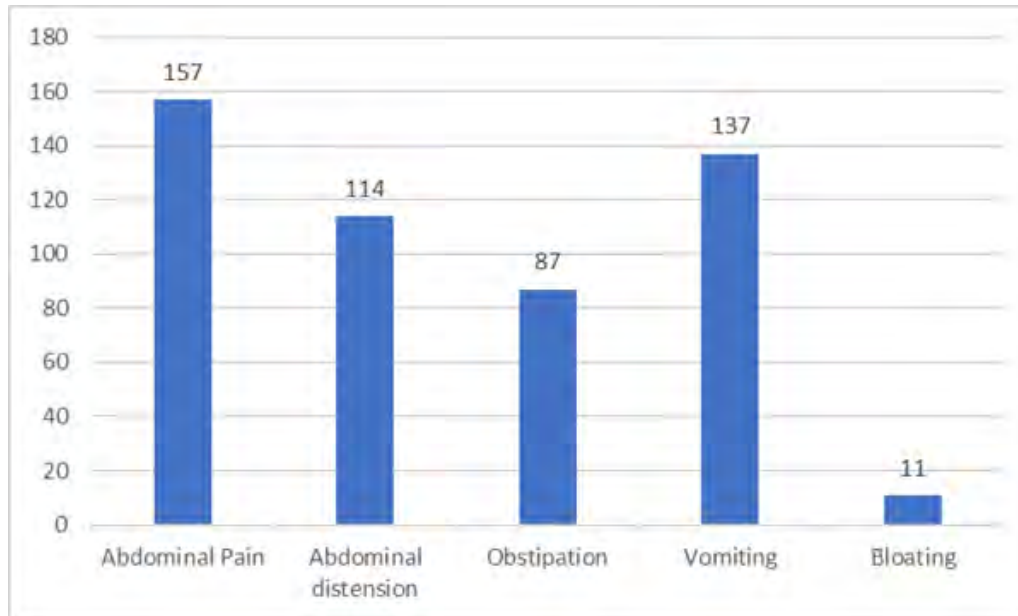


Figure 2: Presenting complaint (n=204)

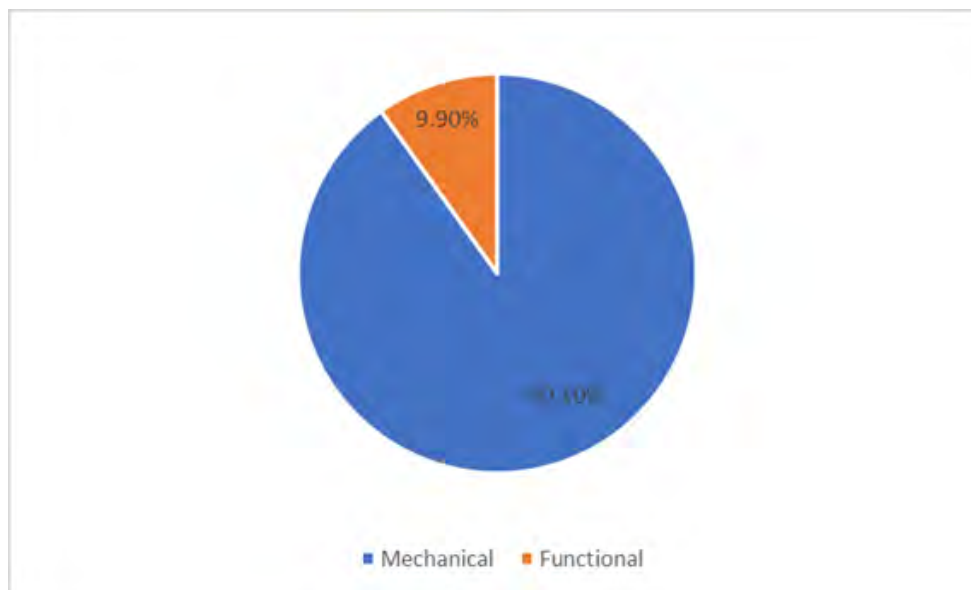


Figure 3: Types of intestinal obstruction

Table 1: Frequency distribution of antibiotics used per hospital

	Hospitals		P-Values
	Buea Regional Hospital (Frequency (Percentage))	Yaounde General Hospital (Frequency (Percentage))	
Ceftriaxone	132(98.5%)	54(77.1%)	0.0001
Cefuroxime	1(0.7%)	0(0.0.0%)	0.436
Metronidazole	110(82.1%)	66(94.3%)	0.016
Ciprofloxacin	0(0.0%)	1(1.4%)	0.203
Amoxicillin and Clavulanate	2(1.5%)	16(22.9%)	0.0001
Ampicillin	1(0.7%)	4(5.7%)	0.203
Gentamicin	2(1.5%)	35(50.0%)	0.0001

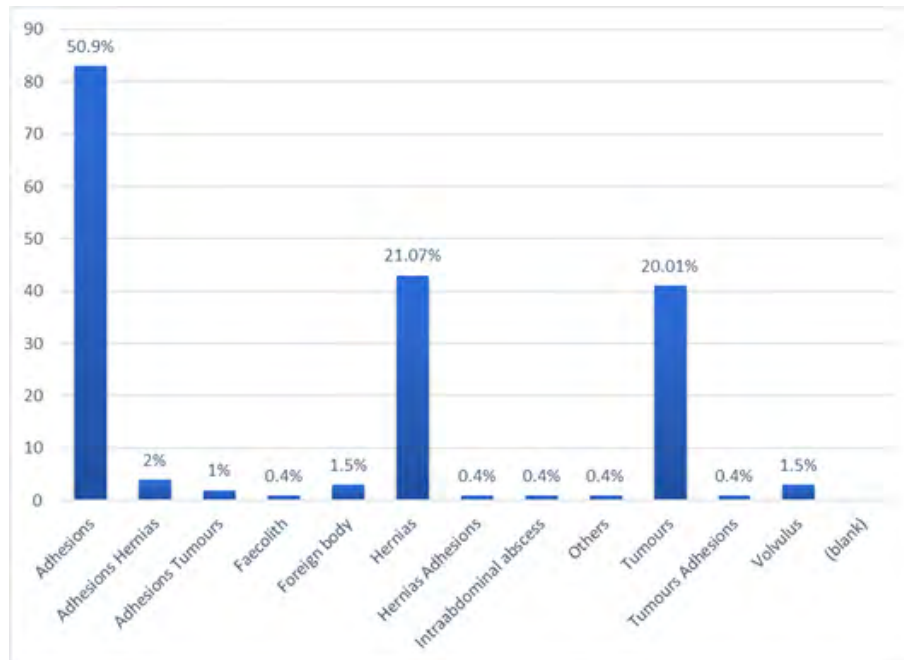


Figure 4: Aetiologies of intestinal obstructions

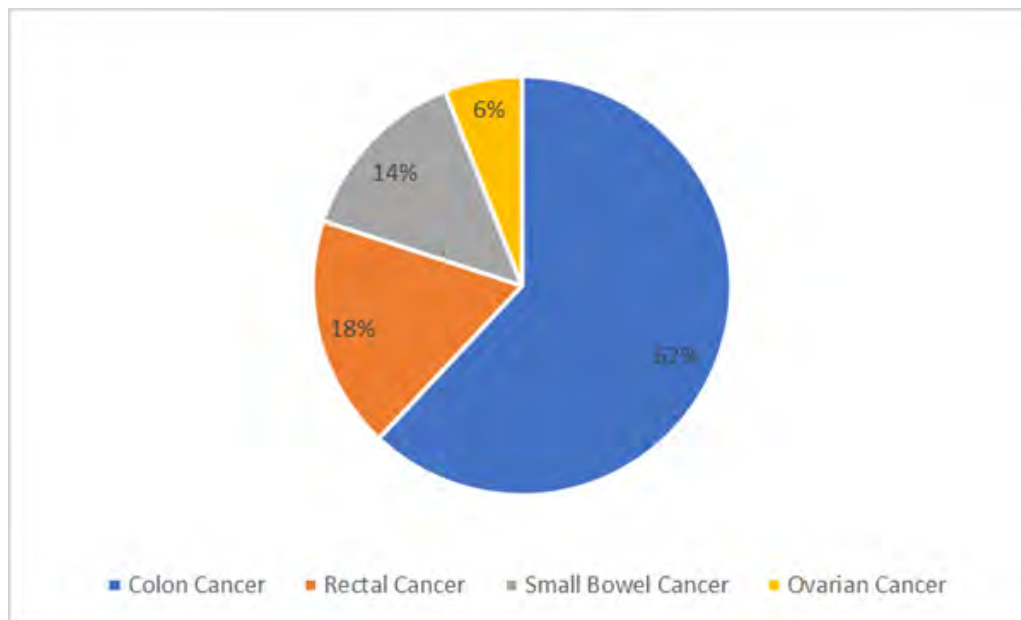


Figure 5: Malignant aetiologies of intestinal obstruction (n=25)

Table 2: Frequency distribution of analgaesics used per hospital

	Hospitals		P-Values
	Buea Regional Hospital (Frequency (Percentage))	Yaounde General Hospital (Frequency (Percentage))	
Tramadol	60(85.7%)	40(93.0%)	0.241
Diclofenac	1(0.7%)	8(18.6%)	0.149
Paracetamol	14(20.0%)	30(69.8%)	0.0001
Metamizole	11(15.7%)	4(9.3%)	0.334
Acupan	12(17.1%)	22(51.2%)	0.0001

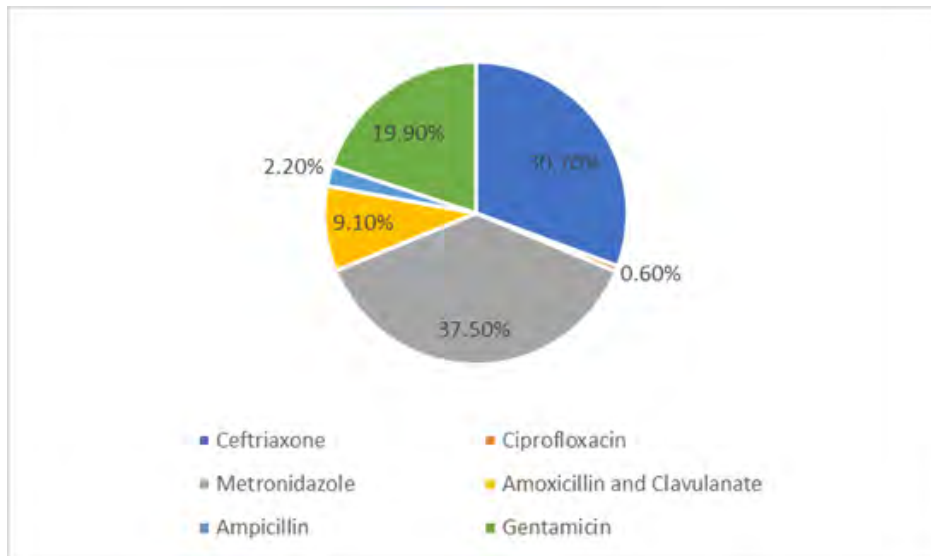


Figure 6: Antibiotics used in the management of intestinal obstruction

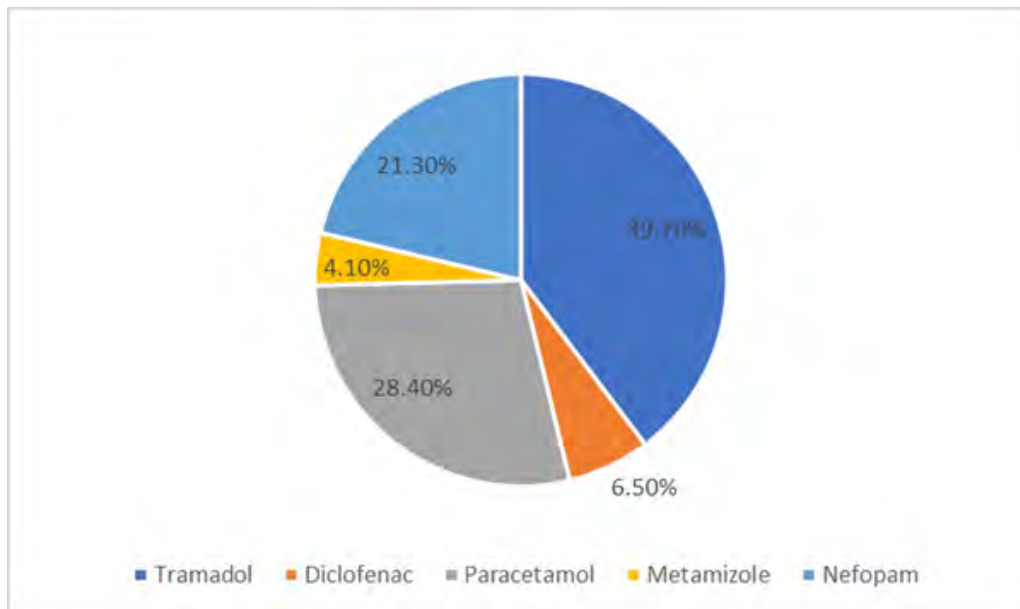


Figure 7: Analgesics used in the management of intestinal obstruction

13. Types of I.V. Fluids

The distribution of I.V. fluids showed that normal saline (44.3%) was the predominant choice, followed by dextrose and Ringer’s lactate at 31.5% and 24.1%, respectively.

13.1. Outcome of Intestinal Obstruction: Complications were noted in 89 (45.7%) cases. Dehydration was the most prevalent complication (Figure 8). Patients had a mean hospital stay of 13.73 ± 7.7 days. Twenty-four patients died (11.8%), while 156 (76.5%) cases were discharged, 12 (6%) were transferred, and 10 (5%) were referred to other facilities. Two patients (0.7%) left against medical advice.

13.2. Mortality Rate: The mortality rate differed between the two hospitals, with a rate of 15.67% in the Buea Regional Hospital and 4.23% in the Yaoundé General Hospital (Table 3).

13.3. Causes of Death: Among the 24 cases of fatalities, septic shock (54.16%) emerged as the leading cause of death, followed by sepsis (16.66%) and acute respiratory failure (12.5%) (Figure 9).

13.4. Predictors of Poor Outcome: A Chi-square test was done to identify the association between poor outcomes of IO and independent variables. It was found that patients who came late (>24H) were about four times more likely to develop poor outcomes compared to patients who came early (OR=4.3 at 95% CI). It was also found that operative management, the type of obstruction (LBO), an age >55y/o, and the presence of sepsis as a complication, were all associated with poor outcomes (Table 4). Sex was not found to be a predictor of poor outcomes (OR=1.13 at 95% CI).

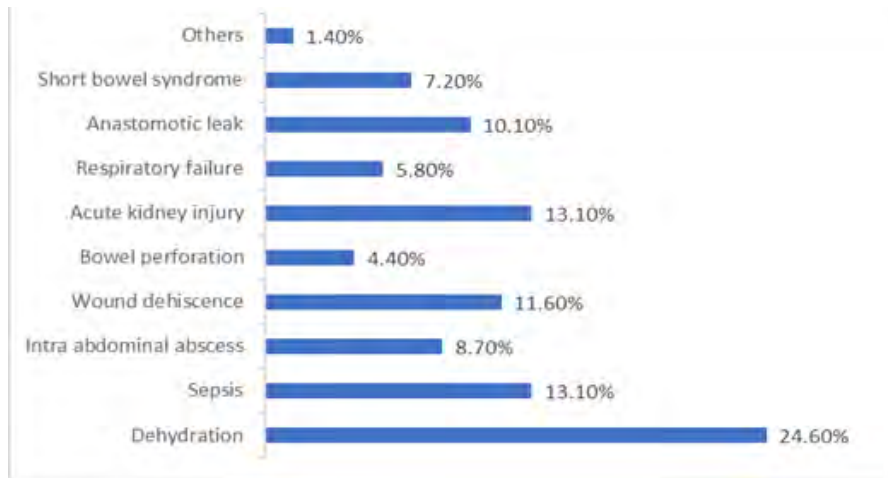


Figure 8: Complications of intestinal obstruction

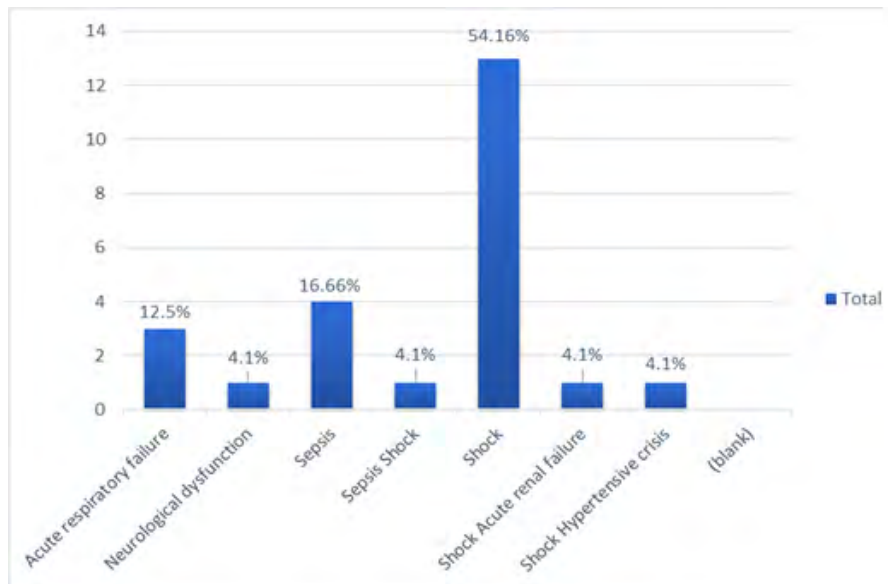


Figure 9: Causes of death

Table 3: Number of deaths

	Death	Total	Mortality Rate (%)	P-Value
BRH	21	134	15.67	0.028
YGH	3	70	4.23	0.028

Table 4: Factors associated with poor outcome

Variables	Categories	Discharged n (%)	Deceased n (%)	OR	p-value
Time of arrival after symptoms onset	<24H	92 (59.0)	6 (25)	4.31	0.028
	>24H	64 (41.0)	18 (75)		
Surgical management	No	51 (27.0)	4 (16.6)	1.97	0.28
	Yes	129 (73.0)	20 (83.3)		
Type (Location) of Obstruction	SBO	149 (93.1)	11 (6.8)	5.6	0.569
	LBO	31 (70.4)	13 (29.5)		
Age	<55 y/o	72 (94.7)	4 (5.5)	3.33	
	>55y/o	108 (84.3)	20 (15.6)		
Sepsis	Yes	26 (74.23)	9 (25.7)	3.55	
	No	154 (91.12)	15 (8.8)		
Sex	Male	92 (87.6)	13 (12.3)	1.13	
	Female	88 (88.8)	11 (11.1)		

14. Discussion

Our study investigated the clinical management and outcomes of patients experiencing intestinal obstruction, unveiling a multifaceted therapeutic landscape. While operative management, administered to 73.0% of patients, traditionally serves as the primary approach for addressing mechanical obstructions [10], a significant 27.0% of our cases received conservative treatment encompassing nasogastric tube decompression, intravenous (IV) antibiotics, and IV fluid resuscitation. This distribution raises crucial questions regarding the appropriateness of each strategy in diverse clinical scenarios. While surgery remains life-saving for clear mechanical obstructions, the noteworthy proportion of patients successfully managed conservatively underscores the importance of precise patient selection and a nuanced comprehension of the underlying etiology. This also highlights the imperative for further research aimed at establishing clear guidelines and criteria for selecting between operative and conservative approaches, ultimately striving to enhance outcomes and reduce unnecessary surgical interventions. Moreover, our study observed that operative management, highly favored for its direct resolution of mechanical obstructions, proved effective in a substantial number of cases. Nonetheless, the presence of 27.0% of patients undergoing conservative treatment underscores the significant role played by non-operative approaches in intestinal obstruction management. This departure from findings in a study conducted in Somalia [11], where 95.1% of patients underwent operative management, illuminates the diverse spectrum of cases within our study population. Specifically, our study identified a higher prevalence of functional obstructions, which, unlike mechanical obstructions, often responded favorably to conservative measures such as nasogastric tube decompression, intravenous antibiotics, and IV fluid resuscitation. This underscores the necessity of tailoring management strategies to the specific etiology of intestinal obstruction and underscores the importance of individualized patient care to optimize outcomes, all while acknowledging regional variations in clinical presentation and management practices.

The selection of intravenous fluids and antibiotics is a pivotal aspect of comprehensive patient management within the context of intestinal obstruction.[12] Our study findings shed light on the prevalent choices made by healthcare practitioners. Notably, normal saline, constituting 44.3% of the total fluids administered, emerged as the primary fluid of choice, aligning with established clinical guidelines emphasizing its utility in resuscitation. Dextrose (31.51%) and Ringer's lactate (24.16%) were also commonly utilized, collectively highlighting the widespread adoption of crystalloids as the cornerstone for intravenous resuscitation in these patients. This preference for crystalloids emphasizes the importance of maintaining electrolyte balance and adequate hydration in the face of intestinal obstruction, recognizing their role in fluid replacement and addressing potential electrolyte imbalances that

can accompany the condition. However, individual patient needs and clinical circumstances should always inform the choice and administration of intravenous fluids and antibiotics, reinforcing the significance of tailored, patient-centered care within the broader framework of management strategies. Antibiotherapy is a cornerstone of patient management.[12] Metronidazole (37.5%) and ceftriaxone (30.6%) emerged as the predominant antibiotics of choice. This strategic antibiotic selection was carefully tailored to address the specific microbial dynamics induced by intestinal obstruction. In the intricate environment of this condition, anaerobic bacteria, notably *Escherichia coli*, tend to flourish. Metronidazole, a key component of the antibiotherapy regimen, was chosen for its effectiveness in targeting and mitigating the proliferation of these anaerobic pathogens, addressing a critical aspect of the infection dynamics. Furthermore, the significant disparity observed in the use of ceftriaxone, metronidazole, amoxicillin-clavulanate, and gentamicin between Yaounde General Hospital and Buea Regional Hospital sheds light on the influential role of local factors and institutional practices in shaping antibiotherapy decisions. This contrast underscores that healthcare decisions are not solely guided by established guidelines but are profoundly influenced by the unique characteristics and priorities of the healthcare institution and the patient population it serves. This contextual awareness emphasizes the need for a tailored approach to patient management, where antibiotic choices are thoughtfully considered in light of both clinical guidelines and the specific microbiological landscape encountered in different healthcare settings.

Pain management is important for patient care and it is aimed at ensuring comfort and overall well-being. In our study, it was predominantly achieved through the administration of two key analgesics: tramadol (39.64%) and paracetamol (28.4%). This choice of analgesics sheds light on the careful consideration needed to address the diverse spectrum of pain experiences encountered by patients suffering from intestinal obstruction. Tramadol, chosen as the primary analgesic in a significant proportion of cases, effectively targets and alleviates severe abdominal pain, which is a common and distressing symptom associated with this condition. [13] Its inclusion in the analgesic regimen highlights the imperative to provide relief from acute and intense pain, as this can significantly impact a patient's quality of life and overall experience during their healthcare journey. Concurrently, the utilization of paracetamol demonstrates the consideration given to patients with milder to moderate pain levels and concurrent fever. Paracetamol proves well-suited for addressing these specific needs, offering pain relief without the potent effects of stronger analgesics. This dual approach, combining tramadol and paracetamol, exemplifies the nuanced approach required to effectively manage the multifaceted nature of pain in patients with intestinal obstruction. It ensures that pain relief strategies are tailored to the individual's specific pain intensity and clinical presentation, ultimately enhancing

their overall well-being and comfort throughout their treatment. Shifting our focus to patient outcomes, it becomes evident that a comprehensive understanding of the repercussions of management strategies is imperative in the context of intestinal obstruction. Examining these outcomes reveals valuable insights into the healthcare system's performance and the patient experience. The mean hospital stay, which averaged 14 ± 7 days in our study, closely aligns with findings from comparable research.[14] This statistic underscores the significant burden placed on healthcare resources while treating intestinal obstruction. The duration of hospitalization, often longer than two weeks, implies not only a considerable investment in medical personnel and facilities but also a profound impact on the lives of patients and their families. It emphasizes the need for meticulous planning and resource allocation within healthcare systems to address the challenges posed by this condition effectively. Furthermore, this shows the importance of ongoing research and innovation to streamline treatment protocols, reduce hospital stays, and ultimately improve patient outcomes while maintaining the quality of care.

Additionally, our findings revealed that 76.47% of all patients successfully completed their treatment and were discharged, indicating the potential for favorable outcomes in a significant majority of cases. However, it is essential to recognize that this condition presents multifaceted challenges as made evident by complications affecting a substantial 43.63% of cases, shedding light on the intricate nature of intestinal obstruction. Dehydration emerged as the most prevalent complication, impacting 24.64% of patients, followed by sepsis and acute kidney injury (AKI) at 13.04%. This pattern of complications aligns with previous research, such as a study by Atalay et al. [15] in Ethiopia in 2021, which reported similar findings. These complications can be attributed to the compressive effects of intestinal obstruction on lymphatic vessels, leading to bowel wall lymphoedema. Elevated intraluminal pressure results in reduced venous and arterial blood flow, severe fluid loss, dehydration (which can progress to hypovolemic shock and even death), and disturbances in electrolyte balance.[16] Managing patients with intestinal obstruction goes beyond resolving the primary issue; it necessitates vigilant monitoring and intervention to address these associated complications effectively. This underscores the need for a holistic approach to patient care, one that considers not only the mechanical aspects of obstruction but also the potential systemic consequences, ensuring a comprehensive and well-rounded treatment strategy. Furthermore, our study explored the factors influencing outcomes for patients with intestinal obstruction. We did not find sex to be a predictor of poor outcomes. This finding emphasizes that the challenges posed by this condition affect both genders equally, suggesting that gender does not significantly influence the clinical course or response to treatment. However, other factors did emerge as potential indicators of adverse results. Patients who arrived late, defined as presenting more

than 24 hours after symptom onset, were four times more likely to experience poor outcomes. This points out the critical importance of early identification of intestinal obstruction by patients. There is a need to organize strategies aiming at reducing the delay in seeking care (first delay) through advocacy campaigns [17]. Additionally, our study identified several other factors associated with poor outcomes, including the choice of operative management, the presence of large bowel obstruction (LBO), sepsis, and an age exceeding 55 years. These findings emphasize the intricacies of surgical interventions in cases of intestinal obstruction and suggest the necessity for specialized care and tailored approaches, especially for older individuals.[18]. Equally pivotal in our study's findings is the reported mortality rate of 11.76%, a figure that is marginally higher than what has been observed in similar studies in Uganda.[3] This statistic shows the gravity of the challenges posed by intestinal obstruction and the importance of addressing this condition effectively in the Cameroonian setting. Shock, in its various forms including hypovolemic and septic shock, played a dominant role in 54.16% of our fatalities, with sepsis contributing to 16.66%. These figures emphasize the life-threatening nature of complications that can arise from intestinal obstruction, particularly when interventions are not timely and comprehensive.

15. Limitations

This retrospective study conducted within a single-country setting and focused on specific hospitals does present some limitations that must be acknowledged. These include the potential for data inaccuracies due to the retrospective design and variations in record-keeping practices. Additionally, the modest sample size may affect statistical power, and there is a possibility of unmeasured confounding variables influencing outcomes and management choices. Furthermore, the study's exclusive focus on clinical features, management, and outcomes may not encompass all relevant aspects of the topic, and its inability to account for temporal changes in medical practices may limit its applicability to current healthcare standards within the specific context studied. While recognizing these limitations is essential for interpreting the study's results accurately, it also underscores the need for future research efforts aimed at addressing these constraints. Larger, prospective investigations conducted in diverse healthcare contexts may provide a more comprehensive understanding of the subject matter and enhance the generalizability of the findings.

16. Conclusion

Intestinal obstruction is a leading cause of acute abdominal pain admissions. This study evaluated adult intestinal obstruction management and outcomes in urban Cameroonian hospitals. Postoperative adhesions were the primary cause, followed by hernias and colon cancer. Predominant IV fluids included normal saline, dextrose, and Ringers lactate, while ceftriaxone and metronidazole were common antibiotics. Tramadol and paracetamol were

the primary analgesics. Most cases received surgical treatment, and the majority were discharged after successful management. Dehydration was the primary complication, followed by sepsis, contributing to a high mortality rate. Shock (hypovolemic and septic) was the main cause of death, with patients over 55 years, late presentation (>24 hours), large bowel obstruction, and surgical management associated with adverse outcomes.

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18. Author Contribution

NDM conceptualized the study, investigated, curated, analyzed, and visualized the data, and administered the project. MNN and ACM supervised the study and administered the project. EEYV and YZ wrote the original manuscript draft and visualized the data. EME wrote the original manuscript. All authors have read and approved the final manuscript.

19. Declaration of Conflicts of Interest

The authors declare no conflict of interest.

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