

Diagnosis, Management and Outcomes of Intestinal Obstruction at an Urban Tertiary Hospital in Sub Saharan Africa: a Cross-Sectional Study.

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Abstract

BACKGROUND: Intestinal Obstruction (IO) is among the commonest causes of acute abdomen worldwide and globally it remains a challenge because it is a major cause of morbidity and surgical financial expenditure. Clinically it presents with nausea, vomiting, colicky abdominal pain and cessation of bowel movements or passage flatus and stool. Diagnosis can be clinical but is confirmed usually by radiologic imaging. We studied the current diagnosis, management and outcomes of IO in Mulago Hospital

MATERIALS AND METHODS: This was a Prospective Descriptive Study in all the surgical units of Mulago from January to May 2014. Ethical approval was got in line with Helsinki declaration and then a pretested and validated questionnaire was used to collect data. Informed consent was got with eligible and consenting/assenting patients recruited among those patients of all ages and sex presenting with suspected Intestinal Obstruction. Uni-variate and bi-variate of the variables plus measurements of associations were done.

RESULTS: We enrolled 135 patients, excluded 25 and recruited 110 patient with more males than females i.e. 71.8% males and 28.2% females. Colicky abdominal pain, abdominal distension, and vomiting were the 3 commonest symptoms with abdominal distension, increased bowel sounds and abdominal tenderness as commonest signs. Majority of the patients were diagnosed radiologically (51%) and the rest (48.2%) clinically diagnosed accounting. "Dilated bowel loops" was the most frequent radiological sign. Return of bowel sounds occurred within 5 days of the POD, while opening of bowels on average, occurred on the 3rd POD. The mean day of discharge was the 5th POD and 73% of the patients were discharged by the 7th Post-Operative Day. The commonest unfavourable management outcome noted was prolonged hospital stay followed by wound sepsis (Surgical Site Infection) and Mortality

CONCLUSION: Majority of the patients were diagnosed radiologically (51%). surgical management was done for 72.7% of the cases and 27.3% conservatively managed. Prolonged hospital stay was the commonest unfavorable outcome of management

Background

Intestinal Obstruction (IO) refers to the interruption of forward flow of intestinal contents and can occur at any point from mouth to anal canal with clinical symptoms varying based on the level of obstruction [1]. It is among the commonest causes of acute abdomen worldwide and is characterized by abdominal pain which in 2006 was the most common reason for a visit to the emergency department in the USA accounting for 8 million (7%) of the 119 million visits [2]. IO is a common surgical emergency that is frequently encountered in abdominal surgery [3, 4] and it remains a challenge because it is a major cause of morbidity plus financial expenditure worldwide [5]. Clinical presentation of IO generally includes nausea, vomiting, colicky abdominal pain and cessation of bowel movements or passage flatus and stool, although the severity of these clinical symptoms varies based on the acuity and anatomic level of obstruction [1, 6]. Diagnosis is confirmed usually by radiologic imaging although, with negative

radiography and high index of suspicion, non-contrast Computed Tomography (CT) scan is recommended [1]. Management of uncomplicated obstructions can be conservative by fluid resuscitation to correct the metabolic derangements, intestinal decompression, and bowel rest. If there's evidence of vascular compromise or perforation then management is by surgical intervention [6].

Recent studies on IO in Uganda have only been documented in 2 non-governmental hospitals in 2 regions of Uganda [7, 8], yet the tertiary health care institution Mulago National Referral and Teaching Hospital (MNRTTH) which offers free services to patients doesn't have recent studies with the last documented IO study done by Macadam in 1961[9]. Also raw data from the Accident and Emergency (A&E) reveals that an average of 50 patients are admitted per month with a suspected diagnosis of IO [10].

We studied the current diagnosis, management and outcomes of IO in MNRTTH due to the paucity of data to guide current policy on decision making process, resuscitation measures, timing of surgery and choice of surgical procedure in our setting.

Materials And Methods

Study Setting

MNRTTH, located in Kampala, the Capital City of Uganda, is a 1500 bed tertiary hospital caring for approximately 140,000 patients annually, with an annual average of 48,000 patients transitioning through the A&E[11]. It has three surgical wards, with an A&E that triages patients into elective or emergency cases done in casualty theatre that records about 31 operations monthly for the relief of IO [10]. Also A&E records show that on average about 7 to 10 patients' with IO are seen per week by the Senior House Officer's (SHO's).

Ethical Approval and recruitment

Ethical approval was obtained from the Department of Surgery, Makerere University School of Medicine Research an Ethics Committee (SOMREC) and MNRTTH IRB to conduct a Prospective Descriptive Study in all the surgical units of MNRTTH.

It was a prospective descriptive cross sectional study of 110 patients selected by the convenient sampling method. The study population consisted of both male and female patients of all ages, who presented to the surgical units with, suspected IO.

Consent was got from all patients and for subjects below 18 years, a parent, legal guardian or Next Of Kin gave consent on their behalf.

Eligible and consenting patients were recruited with details of their demographics, symptoms and signs recorded.

Aspects of their resuscitation, investigations and treatment were recorded and monitored till discharge. The causes of IO, and the early management outcomes for the first 7 post-operative/post admission days, including deaths or up to discharge, whichever came first, were recorded.

Study Periods

The study was conducted from January 2014 and May 2014 where we recruited consented patients that met the inclusion criteria.

Study variables

The main variables of interest were clinical examination, radiologic findings, and management options focusing on favorable and unfavorable outcomes in the Post-Operative Day (POD) window.

Data management and analysis

A structured pretested and validated questionnaire was used to collect data. The data was cleaned, backed up and later analyzed in STATA version 10.1. Study statistics were reported using proportions, means, medians and inter-quartile ranges. Uni-variate and bi-variate analysis of the variables plus measurements of associations were done using Pearson Chi-X² values, *P* values and logistic regression. Presentation of data was by bar graphs, pie charts, Box-plots and Tables.

Results

We recruited 110 patients that met criteria or had outcomes of interest i.e. investigations suggestive of obstruction, or confirmation of diagnosis at laparotomy with favorable and unfavorable outcomes. Demographically there were more males than females i.e. 71.8% males and 28.2% females in a ratio of 2.6:1. The 3 commonest symptoms reported by the participants were; colicky abdominal pain, abdominal distension, and vomiting. The 3 commonest examination signs were; abdominal distension, increased bowel sounds and abdominal tenderness. Majority of the patients were diagnosed radiologically (51%) with clinical diagnosis accounting for 48.2%. However for the 80 cases eventually operated a higher majority (58.8%) were diagnosed clinically. See Table 1

Table 1
Mode of Diagnosis by choice of management

characteristic	Overall 110(100%)	Non-operative 30(27.3%)	Operative 80(72.7%)	p-value (non-operative vs. operative)
Diagnosis n (%)	57(51.8)	24(80.0)	34(41.3)	0.001*
Radiological	53(48.2)	06(20.0)	46(58.8)	
Clinical				

“Dilated bowel loops” was the most frequent sign found on both imaging modalities. Multiple air fluid levels were observed in 12.7% of the radiographs and faecal impaction was noted in 5.5% of the x-rays. On Sonography, reversed peristalsis was noted in 10% of the cases. The other signs were seen 5.5% of

the cases. Ultra sound Sonography exerted more influence on the choice of management when compared to plain radiography. ($p = 0.001$ vs. $p = 0.013$). *Shown in Table 2*

Table 2
Radiological signs by choice of management

Radiological signs	Overall 33(30%)	Non-operative 30(27.3)	Operative 80(72.7)	p value
Plain x-ray	32 (29.1)	14 (46.7)	18(22.5)	0.013
Dilated bowel loops	29 (26.4)	12 (40.0)	17(21.3)	< 0.001
Multiple air levels	14 (12.7)	01(3.3)	13(16.3)	0.07
Faecal impaction	06 (5.5)	06 (20.0)	00(0.0)	0.047
Sonographic findings	33(30.0)	16(53.3)	17(21.3)	0.001
Dilated bowel loops	29 (26.4)	12 (40.0)	17(21.3)	0.047
Reversed/no peristalsis	11 (10.0)	05 (16.7)	06(07.5)	0.154
Doughnut sign	06 (05.5)	02 (06.7)	04(05.0)	0.732
Abdominal masses	06 (05.5)	05(16.7)	01(01.3)	0.002
Peritonitis	06(05.5)	00(00.0)	06(05.5)	0.161

Outcomes were categorized as favourable or unfavorable with the favourable outcomes being: return of bowel sounds, opening of bowel, NG-tube removal, drain removal and discharge by the 7th post-operative or post admission day (for non-operative management). The unfavorable outcomes included: wound sepsis, systemic sepsis, anastomotic leak, anemia, chest infections, prolonged hospital stay and death.

For the favourable outcomes; most post-operative events occurred within the first 10 days. Return of bowel sounds occurred within 5 days of the POD, while opening of bowels on average, occurred on the 3rd POD. The mean day of discharge was the 5th POD and 73% of the patients were discharged by the 7th Post-Operative Day (Fig. 1).

The commonest unfavourable management outcome noted was prolonged hospital stay followed by wound sepsis (Surgical Site Infection) and Mortality (Fig. 2).

Factors that were persistently associated with favorable outcomes, in the Uni-variate model, were fever ($RR = 0.19$, $p = 0.09$), Increased bowel sounds ($RR = 4.3$, $p = 0.001$). Absent bowel sounds and abdominal tenderness ($p = 0.001$ & $p = 0.014$) showed association with favorable outcomes at lower odds. Small Bowel Obstruction (SBO) is 3.17 likely to be associated with favorable outcomes ($p = 0.013$). *See Table 3.*

Table 3

Displays modified Cox regression analysis used to assess the significant factors associated with outcome ($p < 0.05$). These were selected for this further analysis.

Predictor of outcome	Relative- Risk	Confidence interval	P-Value
Symptom duration	1.83	0.289–12.07	0.528
24–48 hours	0.67	0.149–2.970	0.596
48–72 hours	0.52	0.132–2.012	0.340
> 72hrs at home	0.29	0.075–1.112	0.075
> 72hrs in health center			
Operative Vs. Non-operative management	0.21	0.067–0.650	0.007
Symptoms of IO	0.93	0.382–2.256	0.870
Abdominal pain	0.19	0.540–0.665	0.009
Fever	0.59	0.220–1.181	0.116
Vomiting	0.67	0.297–1.533	0.348
Relative constipation	1.33	0.537–3.280	0.540
Absolute constipation			
Signs	0.56	0.202–1.563	0.270
Abdominal distension	0.24	0.968 – 0.522	0.001
Absent bowel sounds	4.28	1.855–9.861	0.001
Increased bowel sounds	0.36	0.162–0.817	0.014
Abdominal tenderness	1.61	0.162–16.02	0.685
Percussion tenderness			
Sonographic signs of IO	0.398	0.113–1.402	0.152
Reversed peristalsis	0.333	0.053–2.088	0.241
Peritonitis	1.058	0.185–6.061	0.969
Abdominal masses			
Clinical Vs. Radiological diagnosis	0.762	0.346–1.674	0.498
Level of obstruction(SBO vs. LBO)	3.17	1.280–7.861	0.013

Predictor of outcome	Relative- Risk	Confidence interval	P-Value
Bowel status	0.50	0.155–1.611	0.245
Strangulation	0.20	0.059–0.723	0.014
Gangrene	0.44	0.090–2.189	0.319
Perforation	0.25	0.508–1.231	0.088
peritonitis			
Urethral catheterization	0.22	0.617–0.789	0.020

The choice of management, i.e. non-operative versus operative, greatly influenced outcome with more of the patients undergoing non-operative management experiencing favourable outcomes.

The results in Table 4 below show the recomputed odds ratio in a multivariate regression and unlike in the binary logistic regression, none of the factors independently predict the outcome, implying that they most likely act in association or in combination with one another, as their Relative Risk changes and the P value becomes statistically insignificant.

Table 4
Multi-variate analysis of statistically significant variables in the Uni-variate regression

Predictor of outcome	Relative- Risk	Confidence interval	<i>P</i> value
Choice of management(operative)	0.39	0.111–1.342	0.134
Level of obstruction	1.85	0.622–5.592	0.266
Signs of IO	0.28	0.599–1.335	0.111
Fever	1.35	0.176–10.34	0.770
Increased bowel sounds	0.48	0.058–3.946	0.493
Absent bowel sounds	0.72	0.255–2.035	0.530
Abdominal tenderness	6.99	0.545–89.81	0.140
Percussion tenderness			

Discussion

We studied the diagnosis, management and early outcomes IO in our local setting at MNRTH. Baseline demographics showed more males than females i.e. 71.8% males and 28.2% females. Radiological imaging was done for 51.8% while 48.2% were diagnosed clinically, this significant role of

clinical diagnosis is comparable to that in other African studies [12, 13, 14]. The modality of diagnosis influenced choice of management and the diagnostic value of radiographs was depicted in the strong statistical correlation between imaging and choice of management (Table 2), with X-rays having a $p = 0.013$, while Sonography had a $p = 0.001$. Studies have shown that there is also increasing reliance on radiological investigations when the immediate choice of management is conservative rather than operative because it's shown that a proportion of cases will resolve spontaneously [15].

We noted that Eighty (72.7%) of the participants who presented with IO were managed operatively with resection and anastomosis as the commonest procedure done on 28 (35.0%) followed by hernia repair at 23.8% and then Simple colostomy at 15% as the 3rd commonest procedure and laparotomy with colostomy was the least common procedure in the study. Seventy three (66.4%) cases had favourable outcomes while 37(33.6%) had associated morbidity and mortality. Prolonged hospital stay (30.4%) which was the commonest adverse outcome was comparable to regional studies that had similar findings [7, 8, 16, 17, 18].

The procedure most associated with prolonged hospital stay was resection and anastomosis, followed by ileostomy and we posit that this was so because cases diagnosed as “tumour” had to undergo radiotherapy treatment or staging investigations prior to definitive management. We also found out that mortality was the 3rd commonest postoperative complication at a frequency of 8.8% which was comparatively low compared to similar studies that showed rates of 12.9%, 19.7% and 20% [8, 17, 19, 20].

Our rates of non-operative management in this study (27.3%) compare differently to those in developed countries like USA (73%) and we postulate that could probably be attributed to the lack of alternative methods of non-operative management such as Gastrograffin use in adhesions, hydrostatic or pneumatic reduction of intussusception, as well as the lack of investigative capacity to confirm or rule out bowel ischemia in our setting [16, 21, 22].

This study was subject to limitations such as recall bias as some patient data was from records and POD follow up interviews of the operating surgeon or SHO, this may have affected some study variables collected.

Conclusion

In conclusion, majority of the patients were diagnosed radiologically (51%) with clinical diagnosis accounting for 48.2% however both remain complimentary IO diagnostic factors. 72.7% of the cases were surgically managed with 27.3% conservatively managed. Prolonged hospital stay was the commonest unfavorable outcome of management followed by wound sepsis and then death.

List Of Abbreviations

MNRTH: Mulago National Referral and Teaching Hospital

IO:	Intestinal Obstruction
SBO:	Small Bowel Obstruction
LBO:	Large Bowel Obstruction
POD:	Post-Operative Day
PAD:	Post Admission Day
SHO's:	Senior House Officers

Declarations

ETHICS APPROVAL AND CONSENT: We obtained ethical approval from Department of Surgery, Makerere University's SOMREC and MNRTH Research and Ethics Board. Informed consent was obtained from all adult study subjects and for those below 18, informed consent (assent) was by the parents, legal guardian or Next of Kin.

CONSENT FOR PUBLICATION: The authors give consent for publication

AVAILABILITY OF DATA AND MATERIALS: The data supporting the findings of this study, other than *that is available within the article*, are available upon request from the corresponding author

COMPETING INTERESTS: The authors declare that they have no conflict of or competing interests either financial or non-financial.

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DUPLICATE PUBLICATION: This is an original manuscript whose work is not under consideration elsewhere, copyright has not been breached in seeking publication and the publication has been approved by all co-authors and responsible authorities at MNRTH

AUTHOR CONTRIBUTION:

- Dr. AMN: developed this idea from conception, proposal development, data collection and manuscript writing as this was her thesis for her masters in Surgery.
- Dr. SCK and PO(RIP) gave surgical supervisory oversight that helped oversee the proposal development and final proposal preparation
- Dr. TSL worked with Dr. AMN worked hand in hand to develop this into a final proposal through to data collection and manuscript writing for this submission.

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Figures

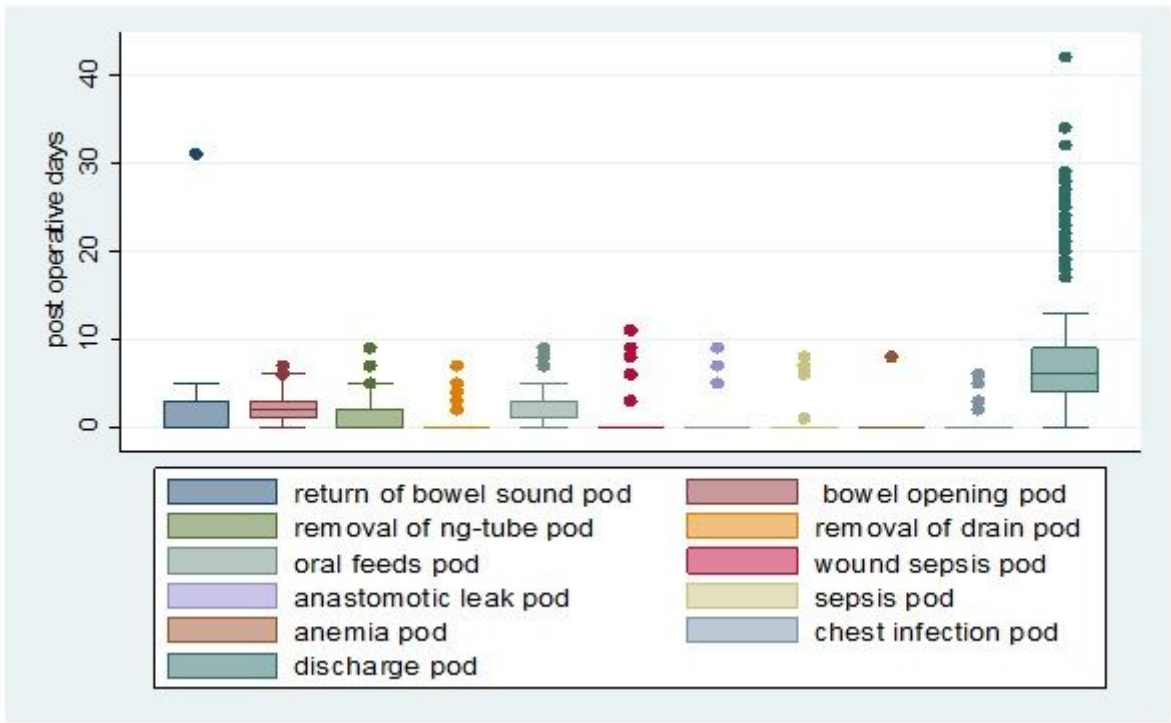


Figure 1

Box plot showing post-management events by Post-operative/ admission day

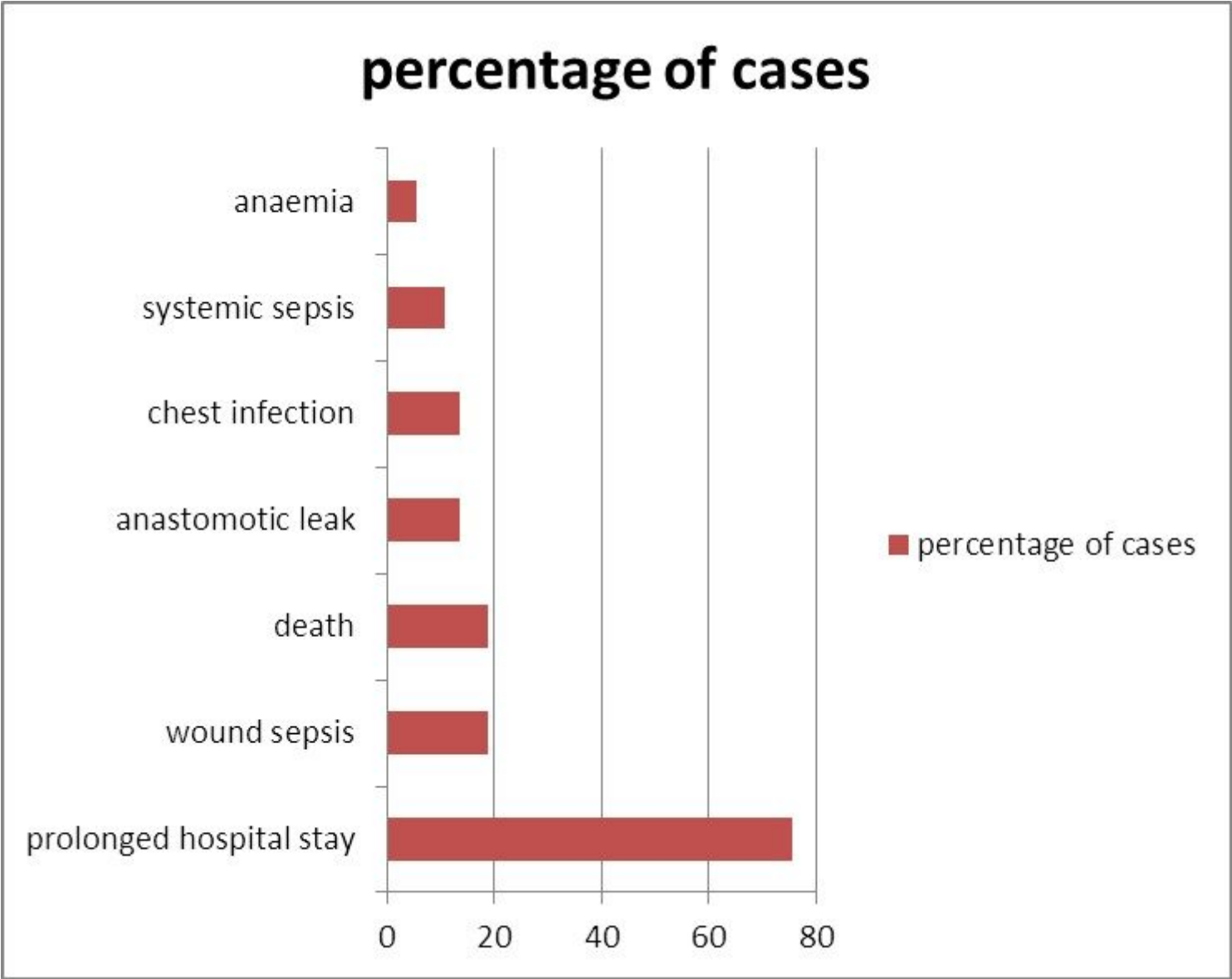


Figure 2

Bar graph showing percentage distribution of unfavourable outcomes.