

Research Article

# Management outcome of intestinal obstruction done by integrated emergency surgical officers and its associated factors in selected district hospitals of South Wollo Zone, North East Ethiopia in 2019 G.C

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## Abstract

**Background:** Intestinal obstruction (IO) is defined as a partial or complete blockage of the bowel that results in the failure of intestinal contents to pass through. It is a common cause of emergency surgical problems. IO has been the leading cause of acute abdomen in several African countries.

**Objective:** To assess surgical management outcome of intestinal obstruction by IESO professionals and its associated factors of intestinal obstruction in surgically treated patients at South Wollo zone.

**Method:** A cross-sectional study was done on 216 patients 'the data was collected from medical cards of the patient by using a pretested data abstraction format. Three nurses were involved in the process of data collection. The collected data was cleaned, coded and analyzed by SPSS version 23 statistical package. First descriptive statics was done for categorical and analyzed using frequencies and percentage. Multivariable logistic regression models was used to determine the association factors on the management outcome of intestinal obstruction when  $p$  - value < 0.05 and the strength of statistical association was measured by adjusting odds ratio and 95% confidence interval. Statistical significance was taken at  $p$  - value < 0.05.

**Results:** From all study participants about 177 (82%) of them had good surgical outcome. Study participants who were managed by 1-3 years of work experience of IESO  $\{(p = 0.004, \text{AOR (95\% CI)} = 7.2[1.89, 27.68]\}$ , preoperatively diagnosed as small bowel obstruction  $\{(p = 0.001, \text{AOR (95\% CI)} = 4.5[1.91, 10.40]\}$ , Surgery conducted at day time  $\{(p = 0.03, \text{AOR (95\% CI)} = 2.8[1.06, 7.16]\}$  had shown positive association with management outcome of intestinal obstruction conducted by IESO professionals.

**Conclusion and recommendation:** Majority patients with intestinal obstruction had good surgical outcome done by IESO professionals. Year of experience of IESO Workers, preoperative diagnosis and time of surgery of the respondents had shown positive association for the occurrence of chronic liver disease whereas. In this study we can conclude that surgeries of intestinal obstruction conducted by IESO professionals are as good as intestinal obstruction surgeries conducted by physicians so there is a need to train more IESO professionals to deliver decentralized surgical service for rural areas.

## More Information

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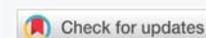
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**Keywords:** Intestinal obstruction; Management outcome; Surgically treated; IESO

**Abbreviations:** ASE: Abdominal Surgical Emergence. BLH: Black Lion Hospital; CAF: Chloramphenicol; CBC: Complete Blood Count; CV: Cecal volvulus; IO: Intestinal obstruction; IESO: Integrated Emergence surgery officers; IV: Intravenous; LBO: Large Bowel Obstruction; NGT: Naso Gastric Tube; RA: Resection and Anastomosis; SBO: Small Bowel Obstruction; SBV: Small Bowel Volvulus; SIV: Small Intestinal Volvulus; SSI: Surgical Site Infection; WU: Wollo University





## Introduction

Intestinal obstruction is the failure of propagation of intestinal contents, and may be due to a mechanical or functional pathology. Acute mechanical intestinal obstruction (IO) is one of the leading causes of surgical admissions in most emergency departments' worldwide and is a significant cause of morbidity and mortality, especially when associated with bowel gangrene or perforation [1,2].

Intestinal obstruction is one of the commonest abdominal surgical emergencies. When intestinal obstruction is not relieved in time, the patient may die hence; early diagnosis and prompt management are mandatory. The causes of intestinal obstruction are several and their relative incidence varies in different populations, between countries and has also changed over the decades. Several factors are described to be responsible for these differences. Socioeconomic factors and diet have mostly been incriminated to be responsible for the observed difference [3-5]. The leading causes of intestinal obstruction in Africans have mostly been hernia and volvulus whereas adhesions are most frequent in the developed world [6-8,10,11].

The plan of treatment is dependent on diagnosis and patient's condition at admission. Knowing common complications of intestinal obstruction and its outcome is important for care of the patients and prevention of complications [9].

Management of intestinal obstruction includes the correction of physiologic impairment, hypovolemia, and electrolytes depletion caused by obstruction. Mechanical IO can generally be relieved through conservative treatments like naso-gastric tube insertion, intravenous antibiotics, or intravenous fluid resuscitation; with certain exceptions like peritonitis, tumor, and abdominal sepsis caused by complications of an obstructive syndrome (perforation, ischemia, necrosis) that necessitates for further surgical exploration [17,18].

Difficulties in using the checklist, postoperative intra-abdominal infections, the inadequacy of training, and insufficient amount of anesthesiologists, nurses, and support staff were some of the challenges which lead to poor management outcomes [19-22].

Except few studies, in north and central Ethiopia [5,6] there are no adequate studies conducted on management outcome of intestinal obstruction and its associated factors. However up to researcher's knowledge there is no study conducted totally throughout in Ethiopia on management outcome of intestinal obstruction done by IESO (integrated emergency surgical officers who are non-physician surgical officers from nursing and other health professional origin) thus this study was aimed to assess intestinal obstruction management outcome done by IESO professionals and

associated factors of surgically treated patient at South Wollo zone, Amhara Regional State, in 2019 G.C.

## Methodology

### Study area and period

The study was conducted in South Wollo zone, South Wollo (Amharic: ደቡብ ወሎ) is one of 12 Zones in the Amhara Region of Ethiopia. It acquired its name from the former province of Wollo. South Wollo is bordered on the south by North Shewa and the Oromia Region, on the west by East Gojjam, on the northwest by South Gondar, on the north by North Wollo, on the northeast by Afar Region, and on the east by the Oromia Zone and the Argobba special woreda. Its highest point is Mount Amba Ferit. Towns and cities in South Wollo include Kombolcha, Hayq, Dessie, Wuchale, and Mekaneselam. Based on the 2007 Census conducted by the Central Statistical Agency of Ethiopia (CSA), this Zone has a total population of 2,518,862, an increase of 18.60% over the 1994 census, of whom 1,248,698 are men and 1,270,164 women; with an area of 17,067.45 square kilometers, South Wollo has a population density of 147.58. A total of 598,447 households were counted in this Zone, which results in an average of 4.21 persons to a household, and 574,378 housing units. South Wollo has a total of 7 district or rural hospitals. This study was conducted from January to March 2020.

**Study design:** Institutional based retrospective cross-sectional study design was conducted.

### Population

Source Population/target population of the study/

All surgically treated intestinal obstruction patients done by IESOs professionals at South Wollo zone.

**Study population:** Surgically treated intestinal obstruction patients performed by IESOs professionals at South Wollo zone, from January 01, 2019 to December, 2019 G.C was the study population.

**Inclusion criteria:** Surgically treated intestinal obstruction patients performed by IESOs professionals at South Wollo Zone.

**Exclusion criteria:** Those with incomplete records was excluded

### Sample size determination

The sample size was determined using formula for single population proportion based on following assumption

1. Estimated proportion (p) taken from previous study on incidence, Intestinal obstruction was the second most common cause of ASE with (17%). At Tikur Anbessa Specialized Hospital in Ethiopia [13].
2. Margin of error  $d = 5\%$



3. Confidence interval of 95% is assumed ( $Z_{2\alpha/2} = 1.96$ )

$$n = Z_{2\alpha/2}^2(P(1-P)/d^2)$$

Z = is the standard normal value corresponding to the desired level of confidence

D = margin of errors

P = is the estimated proportion of an attribute that is present in the population

$$N = Z_{2\alpha/2}^2(P(1-P)/d^2)$$

$$= (1.96)^2(0.17)(1-0.17)/(0.05)^2 = 216$$

So the sample size was = 216

### Sampling technique

All patients operated for intestinal obstruction during one year treated from January 01/2019 to December 31/2019 G.C and those have completed information was selected by systematic random sampling technique, that means card numbers of the patients are obtained from log book of the operation room operated for IO during the study period. Retrieving patient cards from card room and conduct chart reviewing; and then charts with incomplete information was excluded (Table 1).

### Study variables

Dependent variable

- Management outcome of intestinal obstruction (favorable or unfavorable)

Independent variables

- Age
- Sex
- Religion
- Residence
- Occupation
- Cause of obstruction
- Procedure done
- Length of hospital stay

**Data collection procedures:** The data was collected by four trained BSc nurse, using operation room registration book and retrieved patients' records by using structured and pre-tested questionnaire.

**Instrument/tool:** Data was collected by using structured data collecting check list prepared and developed from different literatures for this purpose.

**Data collectors' selection and training:** To maintain the quality of the data, training was given for two supervisors and four data collectors for three days by the principal investigator about the confidentiality of the information and how to extract the data from cards and registered log-books as secondary data.

### Data collection method

The data collection method was recorded by document review. Two year records were used from records of patients operated for intestinal obstruction. First, the card numbers was collected from operation room registration book to get the main files of the patient in record room. Then, Socio-demographic characteristics, duration of symptoms, preoperative diagnosis, operative findings, surgical procedure done, length of hospital stay, and outcome of management was collected from the main file.

### Data quality management

The data was evaluated & checked for its completeness & consistency through pretest on data collection format. The supervisors & principal investigator performed immediate supervision on daily basis, & every completed questionnaire was checked for completeness & consistency. Finally, the completed data was cleaned before entering into SPSS version 20 by the principal investigator.

### Data processing, analysis, interpretation and presentation

The collected data was cleaned, coded and analyzed by SPSS version 20 statistical package. First descriptive statics was done for categorical and analyzed using frequencies and percentage. Binary logistic regression analysis was done to see if there is any significant association between selected variables. Multiple logistic regression models was used to determine the association factors on the management outcome of intestinal obstruction the strength of statistical association was measured by adjusting odds ratio and 95% confidence interval. Statistical significance was taken at  $p - value < 0.05$ .

### Ethical consideration

Data collection was started after the study was approved by the Institutional Ethics Review Committee of the College of Health Sciences of Wollo University and secured a permission letter from South Wollo zone. Confidentiality of the records have maintained throughout the study period. Reports will

**Table 1:** Sampling techniques used to select study subjects from district hospitals in South Wollo Zone, 2019.

S.no	Health facilities	Total Intestinal obstruction patients treated surgically/year	Proportionally allocated sample
1	Delanta Hospital	180	58
2	Wereilu Hospital	197	63
3	Jama Hospital	140	44
4	Akasta Hospital	160	51
Total		677	216



not including names and identifiers of patient. Operation theater staffs were informed.

### Operational definitions

**Length of hospital stay in day:** is the term to describe the duration of single episode of hospitalization. In patient days are calculated by subtracting the day of admission from the day of discharge.

**Prolonged length of hospital stay:** if the duration of time from admission to discharge is more than 8 days [12].

**Management outcome:** the condition of the patient after the procedure that means whether favorable or unfavorable.

**Unfavorable management outcome:** the condition of the patient after the procedure has been done that a patient develops postoperative complications or died in the hospital.

**Favorable management outcome;** the condition of the patient after the procedure has been done that a patient does not develops postoperative complications.

### Dissemination plan

The results of the study was presented to Wollo University, College of medicine and health sciences, School of nursing and midwifery & it will also get shared to South Wollo zone and Amhara regional health bureau, Dessie Administrative Town health department. Efforts was made to present the results on scientific conferences and peer reviewed journal publications was considered.

## Results

### Socio-demographic characteristics of respondents

Out of the total two hundred sixteen planned samples of patients of intestinal obstruction in four public hospitals of South Wollo zone, all of them were included in the study giving a response rate of 100 percent. The mean age of respondents was 45.5, out of the respondents 37% were within 35-55 age groups. From all respondents 62.5% were Farmers/house wives. Out of the total study participants with intestinal obstruction 93.1% of them were done by male IESO. From the total of the study subjects, 72.2% were lived in rural area. Out of the study participants 70.4% of them were Muslims.

From the study subjects 46.8% had managed by IESO of nursing background the rest 53.2% of them were managed by IESO with health officer background. Out of all 42.6% of the respondents were managed by IESO of less than one year experience (Table 2).

### Clinical related factors for management outcome of Intestinal obstruction

The findings of this study had shown that from all respondents 68.1% were diagnosed with small bowel obstruction preoperatively. Out of the total study participants with intestinal obstruction 72.7% of them were managed

by resection and anastomosis. From the total of the study subjects, 51.4% were come to hospital within 24 hours. From the study subjects 35.9% of them had hematoma as complication after surgery and 30.8% of them had surgical site infection. Out of all 48.7% of the respondents were complicated within 4 days of undergoing surgery (Table 3).

**Table 2:** Socio-demographic characteristics among respondents in South Wollo Zone hospitals, September, 2020. (216).

Variables	Category	Frequency	Percent
Sex	Female	67	31
	Male	149	69
Age	18-35 years	77	35.6
	35-55 years	80	37
	>55 years	59	27.3
Religion	Orthodox	64	29.6
	Muslim	152	70.4
Residence	Urban	60	27.8
	Rural	156	72.2
Occupation	Farmer/house wife	135	62.5
	Government employee	25	11.6
	Private employee	4	1.9
	Merchant	38	17.6
	Student	14	6.5
Back ground of IESO Workers	Health officer	115	53.2
	Nurse	101	46.8
Year of experience of IESO Workers	≤ 1 year	92	42.6
	1-3 years	35	16.2
	> 3 years	89	41.2
Sex of IESO	Male	201	93.1
	Female	15	6.9
Age of IESO staff	18-34	182	84.3
	≥ 35 years	34	15.7

**Table 3:** Clinical factors among respondents in South Wollo Zone hospitals, September, 2020. (216).

Variables	Category	Frequency	Percent
Preoperative diagnosis	SBO	147	68.1
	LBO	69	31.9
Duration of sign and symptoms	≤ 24 hours	111	51.4
	1 day-3days	82	38
	> 3 days	23	10.6
Name of preoperative antibiotics	Ceftriaxone	37	17.1
	Ceftriaxone and metronidazole	34	15.7
	No Antibiotics	145	67.1
Intraoperative management	Untwisting volvulus	24	11.1
	Resection and anastomosis	157	72.7
	Hart man's colostomy	10	4.6
	Other managements	25	11.6
Postoperative antibiotic	Ceftriaxone	68	31.5
	Triple antibiotics	15	6.9
	Ceftriaxone and metronidazole	133	61.6
Length of hospital stay	< 8 days	113	52.3
	≥ 8 days	103	47.7
Post-operative complications (n = 39)	Hematoma	14	35.9
	Superficial SSI	12	30.8
	Deep SSI	3	7.7
	Anastomotic leak	4	10.2
	Facial dehiscence	6	15.3
Time of complication happened (n = 39)	Within 4 days	19	48.7
	4-8 days	12	30.8
	> 8 days	8	20.5
Final outcome at discharge	Favorable outcome	213	98.6
	Un favorable outcome	3	1.4

Other managements; Intestinal decompression, bowel rest.

Overall management outcome of intestinal obstruction respondents in public hospitals of South Wollo Zone, September, 2020, Dessie, Ethiopia ( $n = 216$ ) (Figure 1).

From the total of 216 patients undergoing surgery of intestinal obstruction 177(82%) of them had Good surgical outcome and 39(18%) of them had poor surgical outcome.

### Factor affecting management outcome of intestinal obstruction

Bi-variable analysis showed that there were significant association between management outcome of intestinal obstruction and sex, occupation, Back ground of IESO, Year of experience of IESO Workers, Sex of IESO, Age of IESO staff, preoperative diagnosis, intraoperative diagnosis, intraoperative management and Time of surgery. With

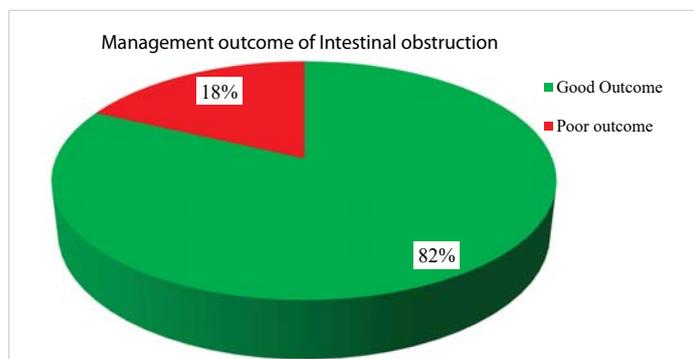


Figure 1: Overall management outcome of intestinal obstruction respondents in public hospitals of South Wollo Zone, September, 2020, Dessie, Ethiopia ( $n = 216$ ).

multiple logistic analyses only year of experience of IESO Workers, preoperative diagnosis and time of surgery of the respondents maintain their significant association with management outcome of intestinal obstruction. Multivariable analysis revealed that there was statistical association between management outcome of intestinal obstruction and year of experience of IESO Workers. Study participants who were managed by 1-3 years of work experience of IESO were 7.2 times more likely to have good surgical outcome as compared with those who were managed by IESO of more than 3 years of work experience.  $\{(p = 0.004, \text{AOR (95\% CI)} = 7.2[1.89, 27.68]\}$ . Study subjects who were diagnosed as small bowel obstruction preoperatively were 4.5 times more likely to have good surgical outcome as compared with subjects who were diagnosed as large bowel obstruction preoperatively  $\{(p = 0.001, \text{AOR (95\% CI)} = 4.5[1.91,10.40]\}$ . Study participants whose intestinal obstruction management were conducted at day time were 2.8 times more likely to have good surgical outcome as compared with subjects who had undergoing intestinal obstruction surgery during night time  $\{(p = 0.03, \text{AOR (95\% CI)} = 2.8[1.06,7.16]\}$  (Table 4).

### Discussion

This study was conducted with the intention to assess management outcome of intestinal obstruction and associated factors among patients with intestinal obstruction in public hospitals of south Wollo Zone hospitals. This study

Table 4: Factors affecting management outcome of intestinal obstruction among patients with intestinal obstruction in public hospitals of south wollo zone, September 2020, Dessie, Ethiopia.

Variable	Category	Outcome of intestinal obstruction		COR 95% CI	AOR 95% CI	p - value
		Good	Poor			
Sex	Male	126	23	1.7[0.84,3.52]	2[0.84,4.75]	0.1
	Female	51	16	1		
Religion	Orthodox	58	6	2.7[1.06,6.76]	1	0.03
	Muslim	119	33	1		
Occupation	Farmer/house wife	105	30	1	1	0.5
	Merchant	37	5	2.1[0.76, 5.85]		
	Government employee	35	4	2.5[0.82,7.60]		
Back ground of IESO	Health officer	90	25	1	1	0.1
	Nurse	87	14	1.7[0.84,3.54]		
Year of experience of IESO Workers	≤ 1 year	79	6	7[2.75, 18.0]	7[2.57,19.27]	0.0
	1-3 years	42	3	7.5[2.14,26.24]		
	> 3 years	56	30	1		
Sex of IESO	Male	163	38	1	1	0.18
	Female	14	1	3.3[0.42, 25.89]		
Age of IESO staff	18-34 year	147	35	1	1	0.2
	≥ 35 Year	30	4	1.8[0.59, 5.40]		
Preoperative diagnosis	SBO	132	15	4.7[2.26, 9.72]	4.5[1.91,10.40]	0.001
	LBO	45	24	1		
Intraoperative diagnosis	LBO	58	25	1	1	0.9
	SBO	119	14	3.7[1.77, 7.57]		
Intraoperative management	Untwisting the volvulus	22	2	2.1[0.35,12.67]	1	
	Resection and anastomosis	126	31	0.8[0.25, 2.42]		
	Hartman's colostomy	8	2	0.8[0.12,5.01]		
	Other managements	21	4	1		
Time of surgery	Day	97	7	5.5[2.32,13.23]	2.8[1.06,7.16]	0.03
	Night	80	32	1		

was the 1<sup>st</sup> in Ethiopia and since there were no IESO health worker in the world so the researcher can't compare with other findings of worldwide and in Ethiopia.

The mean age of respondents was 45.5, out of the respondents 37% were within 35-55 age groups. From all respondents 62.5% were Farmers/house wives. Out of the total study participants with intestinal obstruction 93.1% of them were done by male IESO. From the total of the study subjects, 72.2% were lived in rural area. Out of the study participants 70.4% of them were Muslims. From the study subjects 46.8% had managed by IESO of nursing background the rest 53.2% of them were managed by IESO with health officer background. Out of all 42.6% of the respondents were managed by IESO of less than one year experience.

From all study participants about 177 (82%) of them had good surgical outcome. This result was similar to the study conducted in Gonder, Ethiopia (83.3%), higher than study in Eastern Ethiopia (79.7%) and lower than study conducted in Dilla Ethiopia [14-16]. This might be due to difference in sample size, socio-economic status of population, health service coverage of countries and year of study conducted.

This study ascertained that there is statistical association between management outcome of intestinal obstruction with year of experience of IESO Workers, preoperative diagnosis and time of surgery of the respondents.

Study participants who were managed by 1-3 years of work experience of IESO were 7.2 times more likely to have good surgical outcome as compared with those who were managed by IESO of more than 3 years of work experience.  $\{p = 0.004, \text{AOR (95\% CI)} = 7.2[1.89, 27.68]\}$ . This might be related to the fact that IESO professionals with medium working experience become less negligent and more careful to prevent surgical errors, which affects patient's surgical outcome positively. In other way, IESO professionals with higher working experience may face burnout leading to more negligent that leads to surgical errors that directly associated to unfavorable outcome.

Study subjects who were diagnosed as small bowel obstruction preoperatively were 4.5 times more likely to have good surgical outcome as compared with subjects who were diagnosed as large bowel obstruction preoperatively. This is almost similar study to another study conducted in Eastern Ethiopia which showed that pre-operative diagnosis of gangrenous LBO respectively were significantly associated with unfavorable outcome [16]. This might be due to the fact that patients with LBO have become more gangrenous due to gross distension of large bowel that leads to risk of bowel rupture which directly associated to hematoma, surgical site infection and peritonitis.

In this study there was statistical association between time of surgery and management outcome of intestinal

obstruction. Study participants whose intestinal obstruction management was conducted at day time were 2.8 times more likely to have good surgical outcome as compared with subjects who had undergoing intestinal obstruction surgery during night time. This might be due to the fact that surgeries under gone at night time have risks of complication because of fatigue and burnout of IESO professionals, Nurses and anesthesia personnels.

### Strength of study

- ✓ Four government hospitals were included to make the study representative since the surgical outcome of hospitals may be different.
- ✓ More data collectors were recruited and adequate training was given to keep quality of data collection.

### Limitations of study

- ✓ Difficulty of getting some variables since the data collection was through reviewing documents.
- ✓ Limitation of related literatures to compare and discuss some of the findings since this is new study that is only compared with surgical outcome of intestinal obstruction done by surgeon (physicians).
- ✓ Because the data are cross sectional, the direction of causal relationship between variables can't always be determining.

### Conclusion

Majority patients with intestinal obstruction had good surgical outcome done by IESO professionals. Year of experience of IESO Workers, preoperative diagnosis and time of surgery of the respondents had shown positive association for the occurrence of chronic liver disease whereas. In this study we can conclude that surgeries of intestinal obstruction conducted by IESO professionals are as good as intestinal obstruction surgeries conducted by physicians.

### Recommendation

- ✓ Ethiopian health minister and regional health officials should advance training of more IESO professionals to deliver decentralized surgical service to rural areas.
- ✓ More research should be carried out to investigate the level of surgical outcome for intestinal obstruction conducted by IESO professionals in broader social context and larger sample size.
- ✓ All academic higher educational health institutions should produce more IESO professionals to overcome shortage of surgeon physicians in Ethiopia.
- ✓ All nurses and health officers should show willingness to specialize by IESO.



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**Ethics approval and consent to participate:** Ethical approval was obtained from the Ethical Review Committee of Wollo University.

**Consent for publication:** All the participants consented to publish the study in this journal

**Competing interests:** The authors declare there is no competing interest.

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