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Effect of Implementation Decompensated Cirrhosis Discharge Bundle on Minimizing Readmission Rate within 30 Days

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Abstract

Background: The discharge care bundle was being developed to review the management of cirrhotic complications at discharge adopted from the European Association for the Study of the Liver and should be started at least 48 hours prior to discharge but can be done earlier. **Aim of the study:** To evaluate the effect of implementing the Decompensated Cirrhosis Discharge Bundle on minimizing readmission rate within 30 days. **Research design:** Quasi experimental design was utilized in the study. **Sitting:** This study was conducted in the gastroenterology intensive care unit at Alrajhy Liver Hospital, Assiut University. **The sample** needed for the study was estimated to be 180 patients. 90 in each group. **Three tools** were utilized for data collection: **Tool I** patient assessment sheet, **Tool II** Decompensated Cirrhosis Discharge Bundle, and **Tool III** Patient outcomes tool. **Results:** The present study showed that only 10.9% of patients from the study group readmitted within 30 days, compared to 29% for the control group after application of Decompensated Cirrhosis Discharge Bundle, and the main reason for readmission was hepatic encephalopathy for the study and control groups (37.50%, 56.20%), respectively. **Conclusion:** The implementation of Decompensated Cirrhosis Discharge Bundle was successful in reducing the number of patients readmitted. **Recommendations:** The iimplementation of Decompensated Cirrhosis Discharge Bundle will be used to guide junior doctors and nurses in the management of gastrointestinal intensive care unit patients.

Keywords: Decompensated Cirrhosis, Discharge Bundle, Patient's outcomes & Readmission.

Introduction

Hospital admissions for decompensated cirrhosis are common, and the complicated medical needs of these patients may result in longer hospital stays and a higher risk of death. **(Fagan, et al ; 2014), (McPherson S, et al, 2016), (Mansour, et al ; 2018), (Karlsen, et al ; 2021)**

Acute decline of liver function in a cirrhosis patient, known as decompensated cirrhosis, can present with jaundice, hepatic encephalopathy, coagulopathy, ascites, acute renal injury, and gastrointestinal bleeding. **(EASL; 2018)**

Individuals with cirrhosis are complicated and often have several problems that need to be managed continuously, including varices, hepatic encephalopathy, and ascites. Crucially, there are several evidence-based therapies for liver-related problems that have been demonstrated to enhance results. **(Mansour, et al; 2018), (Angeli, et al; 2018)**

Readmission within the first four weeks after discharge is frequent among patients with decompensated cirrhosis, most commonly for hepatic encephalopathy and ascites. Other reasons for readmission include acute kidney injury (due to over-diuresis) and electrolyte disturbance **(Scaglione, et al; 2017), (Williams,et al; 2020).**

A discharge bundle has been developed to review the management of cirrhosis-related complications at discharge, based on the recommendations from the European Association for the Study of the Liver (EASL), in an attempt to improve the quality of discharge and reduce the readmission rate **(Angeli, et al; 2018)**. A review of the patients' medical notes was carried out to explore if specific aspects of their management were addressed at discharge, including management of varices, hepatic encephalopathy, ascites, diuretics/electrolyte monitoring, and alcohol-harm reduction. In addition, we assessed the 30-days readmission rate, including the reason for readmission. "Potentially preventable" readmission was defined as that could have been avoided with improving discharge planning (e.g. a patient presenting with ascites to the emergency department rather than having day-case elective paracentesis) **(Smethurst, et al; 2022)**.

The Decompensated Cirrhosis Discharge Bundle (DCDB) was developed to standardize the management of patients at the time of discharge by providing a prehospital discharge checklist to be

completed by the intensive care unit (ICU) both medical and nursing staff to ensure that appropriate investigations and management were instituted according to EASL guidelines. Subsequently, the DCDB was reviewed by the BSG liver section and BASL and was endorsed following some minor modifications to provide detailed information about cirrhosis to help patients and their caregivers manage aspects of their care. **(Smethurst, et al; 2022)**.

The DCDB includes helpful information to empower patients and encourage self-management of complications such as ascites and hepatic encephalopathy**.** This checklist was completed by a member of the ward team. It was started a minimum of 48 hours before discharge, and was completed and documented at discharge letter. The information on the checklist were reviewed during the consultant ward-round before discharge **(Smethurst, et al; 2022)**.

Significance of the study:

Liver cirrhosis is considered a global health issue, with cirrhosis-related complications leading to more than 400,000 hospitalizations and 27,000 deaths, annually. **(WHO, 2014).**

According to the World Health Organization, 17 million patients have hepatitis C-related cirrhosis worldwide, with annual mortality of 36,427. In addition, 76% of such patients are left with permanent disabilities **(CDC, 2016).**

Egypt had the highest global age-standardized, cirrhosis-related mortality rate during the period from 1990 to 2017 **(Sepanlou, et al, 2020), (Elbahrawy, et al, 2021).** In addition, Egypt had the highest global age-standardized prevalence rates of both compensated and decompensated cirrhosis per 100,000, which increased from 312.3 and 19.4 in 1990 to 340 and 26 in 2017, respectively. **(Fouad, et al, 2022)**

There is a wide range of approaches to managing individuals with liver disease, which has an impact on both result and mortality. Patients with decompensated cirrhosis experience both difficult hospital discharges and frequent readmissions. Decompensated Cirrhosis Discharge Bundle can assist reduce readmissions. According to Statistical reports from AlRajhy Liver Hospital of Assiut University, Egypt. Show that 330 patients of decompensated cirrhosis diagnosed were admitted to gastroenterology intensive care unit during the period between 2021 and 2023.

Aim of the study:

To evaluate the effect of implementing the Decompensated Cirrhosis Discharge Bundle on minimizing readmission rates within 30 days.

Research hypothesis:

In order to achieve the aim of this study, it was hypothesized that application of the Decompensated Cirrhosis Discharge Bundle will lead to minimizing patients' readmission rate within 30 days among patients admitted gastroenterology intensive care unit at Alrajhy Liver Hospital with decompensated cirrhosis.

Patients and Method

Research design:

This study used a quasi-experimental (study/control for patients) research design, which is intended to determine a cause-and-effect relationship between independent variable and a dependent variable. These type of design cover study/control and intervention without randomization. Which evaluate the impact of Decompensated Cirrhosis Discharge Bundle application on patients' outcomes in gastroenterology intensive care unit. Decompensated Cirrhosis Discharge Bundle are viewed as "interventions" in quasi-experimental designs, where a treatment comprising bundle components is evaluated for its efficacy in accomplishing the goals. **(White & Sabarwal, 2014)**

Study Variables:

- The independent variables were the Decompensated Cirrhosis Discharge Bundle.
- The dependent variables were the patient's readmission within 30 days.

Setting:

The study was carried out in the gastroenterology intensive care unit at AlRajhy liver hospital, which has 10 beds in two separate rooms, two physicians, three head nurses, 20 staff nurses, and six nurse assistants. The flow rate of patients is approximately 4 patients per day, and the nurse-patient ratio is 1:3.

Sample:

The target population consisted of patients diagnosed with **decompensated cirrhosis** admitted to the gastroenterology intensive care unit. Participants were divided into two groups:

- **Control Group:** Patients receiving routine hospital care without the implementation of the discharge bundle.
- **Study Group**: Patients receiving care that included the **Decompensated Cirrhosis Discharge Bundle (DCDB)** intervention.

Inclusion Criteria:

- Patients diagnosed with decompensated cirrhosis (ascites, varices, hepatic encephalopathy) admitted to the gastroenterology intensive care unit.
- Age above 18 years.
- Willingness to participate and provide informed consent.

Exclusion Criteria:

- Patients in palliative care or terminal stages of liver disease.
- Patients who left the hospital against medical advice.
- Patients with significant comorbidities affecting outcomes (e.g., advanced heart failure).
- Patients admitted gastroenterology ICU with previous liver transplant.
- Patients admitted gastroenterology ICU second time at data collection time.

The sample size for this study was determined using Epi Info 7 software. We based our calculations on the mortality rates observed in a previous study of decompensated liver cirrhosis patients. **(Wei Fen Tay, et al, 2018)** Specifically, we noted a mortality rate of 20% prior to the implementation of a clinical care bundle and a subsequent rate of 5% following its implementation.

$$p = \frac{p_1 + rp_2}{1+r}$$

$$n \geq \frac{\left[Z_{1-\alpha/2}\sqrt{(r+1)p(1-p)} + Z_{1-\beta}\sqrt{rp_1(1-p_1)+p_2(1-p_2)}\right]^2}{r(p_2-p_1)^2}$$

Alpha (α): Type 1 error rate

Beta (β): Type 2 error rate

p1: Expected proportion of outcome in group 1

p2: Expected proportion of outcome in group 2

r: Sample size ratio Group 2 / Group 1

Using these figures, we aimed for a two-tailed comparison of proportions with the following parameters:

- *Mortality Rate (Control Group): * 20% (pre-implementation)
- - *Mortality Rate (Intervention Group): * 5% (post-implementation)
- - *Confidence Level: * 95% (α = 0.05)
- - *Power: * 80% (β = 0.20)

Utilizing these inputs, the sample size was calculated to be 180 patients in total, divided evenly between the two groups (90 patients in the control group and 90 patients in the study group), 35 patients from control group and 17 patients from study group died before completion DCDB. This sample size was deemed adequate to detect a statistically significant difference in mortality rates between the two groups.

Tools of the study:

The researcher created three tools for data collection based on relevant literature.

Tool I patient assessment sheet:

This tool, developed by the researcher based on an extensive literature review, is designed for patient assessment and is divided into 2 parts. **(Cargill, et al, 2017), (Wei Fen Tay, et al, 2018).**

Part I: Demographic data:

patient`s code, age, sex, level of education, address, occupation and marital status.

Part II: Clinical and medical data:

Reason for gastroenterology ICU admission, history of medical diseases, history of chronic disease, and adherence to medication (antibiotic).

Tool II Decompensated Cirrhosis Discharge Bundle tool:

This tool adopted from the European Association for the Study of the Liver (EASL). A **Discharge Care Bundle** is a structured set of practices or interventions designed to improve the transition of care when a patient is discharged from the gastroenterology ICU. It aims to prevent readmissions and ensure that patients have the necessary support, education, and resources to continue their recovery at home.

This bundle had checklist that was completed by a member of the team. It was started a minimum of 48 hours prior to discharge or earlier and was completed alongside the discharge letter. The information on the checklist were reviewed by the consultant prior to discharge, including management of ascites, varices, hepatic encephalopathy, diuretics/electrolyte monitoring, and alcohol harm reduction. In addition, the researcher assessed 30-day readmission rates, including the presenting.

Tool III Patient outcomes tool:

This tool was developed by the researcher after reviewing recent relevant literature. **(Cargill, et al, 2017), (Smethurst, et al; 2022), (Kalo, et al; 2022)** This tool was help to identify patients who are at high risk of being readmitted, allowing for targeted interventions to reduce that risk. It includes the following components:

- Discharge criteria from the gastroenterology intensive care unit (transfer to ward, discharge to home, or death).
- Number of patients readmitted within 30 days' post-discharge.
- Reason for readmission.

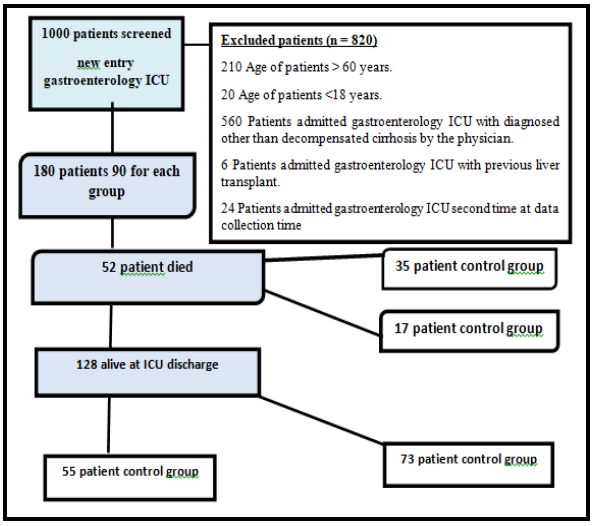

Figure (1): Flow chart of the study

Methods:

The study was conducted throughout three main phases, which are the preparatory phase, implementation phase, and evaluation phase.

Preparatory phase:

- The Ethics Committee of the Faculty of Nursing approved the study on November 27, 2022, under approval ID 1120220492.
- Permission to conduct the study was obtained from the hospital responsible authorities after explanation the aim of the study.
- The tools utilized in this study (I, III) were developed by the researcher based on a comprehensive review of the relevant literature, including works by **(Cargill, et al, 2017), (Wei Fen Tay, et al, 2018), (Smethurst, et al; 2022), (Kalo, et al; 2022).**
- **Content validity** of the tools were assessed through a review conducted by a panel of five experts, which included three professors from the Critical Care and Emergency Nursing Department at the Faculty of Nursing, Assiut University, and two professors from the Gastroenterology Department at the Faculty of Medicine, Assiut University. The panel evaluated the content validity of the tools, and necessary modifications were made based on their feedback.

CVI of tool I was (0.823) while CVI of tool III was (0.795)

- **The reliability** of Tool I and Tool III was evaluated using Cronbach's alpha test, yielding values of 0.791 and 0.803, respectively. These values indicate high reliability of the tools used in the study.
- **A pilot study:** was done on 10% of the total study subjects (18 patients) to assess the clarity and applicability of the tools and estimate the time needed to complete each form. The necessary modifications were made based on the pilot study's result. Pilot subjects were later excluded from the main study sample.

Ethical consideration:

Ethical approval for this study was granted by the scientific research ethics committee at the Faculty of Nursing, Assiut university approved the study on November 27, 2022, under approval ID 1120220492. The researchers explained the objectives and the aim of the study to the patients included in the study. They were informed whether to participate and have the right to withdraw from the study at any time without giving any reason. The study followed the common ethical principles in this research. The confidentiality and anonymity of the patient under study were assured.

Data collection:

Data were collected in approximately nine months. The study was conducted during the period from January 2023 to September 2023 with 180 patients of decompensated cirrhosis in the Gastroenterology ICU at AlRajhy Liver Hospital.

Implementation phase:

- The researcher allocated the study sample into two groups: a control group and a study group. During the initial interview, the researcher greeted the patients, introduced herself, and explained the purpose of the study to those who agreed to participate prior to any data collection.
- According to above mention Figure (1) patients number (90 patients in the control group and 90 patients in the study group), 35 patients from control group and 17 patients from study group died, then the number became (55 patient control group/73 patient control group).
- **For both groups**: the patient was assessed using **(Tool I), and (Tool III).**
- **For the control group**: the researcher assessed patients who were receiving routine hospital care.
- **For study Group**: Baseline review of the management of patients with decompensated cirrhosis during the discharge period from January 2023 to September 2023 from the gastroenterology intensive care unit at AlRajhy liver hospital Individual patients were only included once during the data collection period using **Tool (II).**
- **Study Group**: Patients receiving care that included the **Decompensated Cirrhosis Discharge Bundle (DCDB)** intervention.

Bundle Components:

Instruction to the gastroenterology intensive care unit team:

- The researcher gave teaching sessions for nurses and junior doctors concerning the use of DCDB.
- A comprehensive data collection tool was developed to review the management of cirrhotic

complications at discharge based on the recommendations from the European Association for the Study of the Liver (EASL).

- The patient's electronic health record reviews to identify if specific aspects of their management were addressed at discharge, including management of ascites, varices, hepatic encephalopathy, diuretics/electrolyte monitoring, and alcohol harm reduction were excluded from the bundle in the current study due to religious culture in Egypt regarding alcohol use.

Patient Assessment in the gastroenterology ICU:

- Comprehensive clinical assessment of each patient prior to discharge using standardized tools.
- The patient before discharge was referred to a nutritional clinic consultant to give a dietary program at home.
- The patient before discharge does laboratory investigation (CBC, liver and kidney function test, and electrolyte).

For patient with ascites:

- The doctor was assessing the patient before discharge need for paracentesis, and readmissions could have been avoided with improved discharge planning (e.g., a patient presenting with ascites to the outpatient clinic and admission for paracentesis).
- Patients with ascites who have had an episode of SBP should be considered for antibiotics (secondary prophylaxis).

For Patients with encephalopathy:

- Patient with a previous un-provoked episode of encephalopathy should be on lactulose and rifaximin unless contraindicated.

For patient with gastrointestinal bleeding:

- Patient follow up regular band ligation schedule at endoscopy unit to prevent unpredicted attack of hematemesis.
- Patients should be offered primary prophylaxis (beta-blockers or banding) for medium/large varices and small varices with red signs. Patients who have had banding for a variceal bleed should have a repeat OGD at 4 weeks.

Discharge Bundle for patient teaching:

- Creation of a personalized discharge plan for each patient, including medication management, dietary instructions, and follow-up appointments.
- Emergence situation for arriving at the hospital (un-provoked episode of encephalopathy, predicted attack of hematemesis, electrolyte disturbance, severe abdominal pain).
- Regular monitoring of kidney function and electrolytes after discharge to prevent disturbance.

Education and Counseling:

- Patient and caregiver education on managing cirrhosis symptoms (e.g., ascites, hepatic encephalopathy) and preventing complications.
- Educate the patient and family regarding the diagnosis, medication, and contact with another family, regular follow-up, and emergency arrival at the hospital at any time.

Follow-up Care:

- Scheduling of follow-up appointments and ensuring communication between hospital staff and outpatient care providers.
- Review your medication list at every clinic visit.
- Discuss and update your Child-Pugh score and MELD score at each clinic visit. These scores are ratings that tell how sick your liver is and how urgently you need a transplant.
- Ask about liver transplant when needed.

Medication Reconciliation:

- Review and confirmation of patient medications at discharge, with instructions on adherence and potential side effects.
- Take diuretics (spironolactone alone or with furosemide) prescribed, to decrease ascites, and have regular blood tests to check for kidney health.
- Before the patient discharge the researcher give him a booklet contained all the patient instruction

Post-Discharge Monitoring:

- Regular monitoring of liver function, kidney function, and electrolyte balance after discharge.
- patients' medical needs and recommend follow-up care.
- Patients were evaluated within 30 days' post discharge as determined by electronic health record reviews and written records, which included discharge letters, revascularization reviews, and some other applicable documentation.
- Telephone calls had been made to identify those patients who had decompensated cirrhosis during 30 days' post discharge and attended any private medical sector for management.

Evaluation phase:

Study and control groups followed up on patient outcomes to evaluate the effect of DCDB on patients' outcomes by using **Tool (III).**

- Discharge criteria from gastroenterology ICU (transferee to word, discharge to home, die).
- Number of patient readmissions within 30 days.
- Reason for readmission

Statistical analysis:

The collected data was organized, categorized, coded, tabulated, and analysed using the Statistical Package for Social Sciences (SPSS) version 26. Data was presented in tables and figures using frequency, percentages, mean, and standard deviation. Univariate analysis using chi-square for qualitative variables, and t-test for quantitative variables was carried out. Statistical significance was considered at P-value < 0.05.

Result:

Table (1): Percentage distribution/Mean & SD of study and control groups related to Socio-demographic & Clinical data:

		Study group "n=90"		Control group "n=90"		P value
		N	%	N	%	
Age*	Mean ±SD	60.12±12.71		59.08±14.63		0.61
Gender	Male	68	75.6%	51	56.7%	0.007**
	Female	22	24.4%	39	43.3%	
Reason of admission/ Decompensated Cirrhosis cause	Infection	9	10.0%	7	7.8%	0.14
	GIB	39	43.3%	28	31.1%	
	HE	31	34.4%	30	33.3%	
	HE-AKI	0	0.0%	1	1.1%	
	HE-ascites	3	3.3%	10	11.1%	
	HE-GITB	8	8.9%	12	13.3%	
	GIB-Ascites	0	0.0%	2	2.2%	

**Data are presented as mean± SD; the rest of data are presented as frequency and percentage.*
***=Statistically Significant. GIB: Gastrointestinal bleeding; HE: Hepatic encephalopathy; AKI: Acute kidney injury.*

Table (2): Percentage distribution of Study and Control groups related to DCDB (Ascites):

		Study group "n=90"		Control group "n=90"		P value
		N	%	N	%	
Ascites present	yes	62	84.9%	33	60%	0.001**
Previous SBP	yes	27	43.5%	15	45.5%	0.001**
Prophylactic antibiotics	yes	27	43.5%	14	42.4%	0.001**
Current management of ascites	Diuretics	46	74.2%	28	84.8%	0.005**
	Paracentesis	23	37.1%	14	42.4%	0.010**
*Weight at discharge	Mean ± SD	77.2361±9.09185		79.1698±12.04916		0.30
*Paracentesis: Predicted interval	Mean ± SD	2.9744±1.41748		4.2340±1.41748		0.001**

**Data described are presented as mean ± SD; the rest are presented as frequency and percentage.*
***Statistically Significant. SBP: Spontaneous bacterial peritonitis. Kg: kilogram.*

Table (3): Percentage distribution Study and Control groups related to DCDB (Renal function):

		Study group "n=90"		Control group "n=90"		P value
		N	%	N	%	
Discharge creatinine, sodium and potassium	yes	73	100%	32	58.2%	0.001*
Frequency of urea, Ca, Mg monitoring in the community	yes	72	98.6%	31	56.4%	0.001*
Once ascites is controlled that diuretics can be reduced to the lowest effective dose and by whom	yes	72	98.6%	28	50.9%	0.001*

*Data described are presented as frequency and percentage. *Statistically Significant.*

Table (4): Percentage distribution of Study and Control groups related to DCDB (Hepatic Encephalopathy):

		Study group "n=90"		Control group "n=90"		P value
		N	%	N	%	
Encephalopathy present	yes	30	41.1%	27	49.1%	0.008*
Lactulose	yes	30	100%	27	100%	0.008*
Rifaximin	yes	29	96.7%	16	59.3%	0.006*

*Data described are presented as frequency and percentage. *Statistically Significant.*

Table (5): Percentage distribution of Study and Control groups related to DCDB (Portal hypertension):

		Study group "n=90"		Control group "n=90"		P value
		N	%	N	%	
Varices	yes	44	48.9%	30	54.5%	0.01*
Grade of varices	grade I	7	15.9%	6	20%	0.04*
	grade 2	27	61.4%	18	60%	
	grade 3	10	22.7%	6	20%	
Red signs	yes	29	65.9%	16	53.3%	0.005*
Primary prophylaxis	yes	28	63.6%	19	63.3%	0.01*
Is patient on a B Blocker	yes	28	63.6%	19	63.3%	0.01*
If banding done is a repeat OGD required	yes	19	43.2%	14	46.7%	0.01*
Secondary prophylaxis	yes	14	31.8%	8	26.7%	0.01*
Is repeat OGD required for banding	yes	14	31.8%	8	26.7%	0.01*
Is patient also on a B-Blocker	yes	14	31.8%	8	26.7%	0.01*
For all patients on beta-blockers: Has advice been given about titrating dose?	yes	43	97.7%	14	46.7%	0.01*

Data described are presented as frequency and percentage. **Statistically Significant.*
OGD: Esophagogastroduodenoscopy.

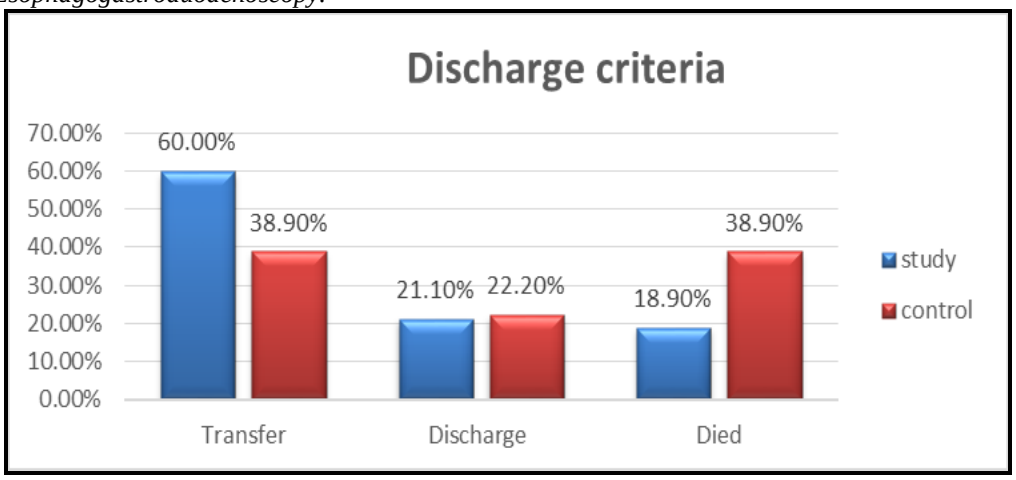

Figure (2): Percent distribution of the study and control groups related to discharge criteria

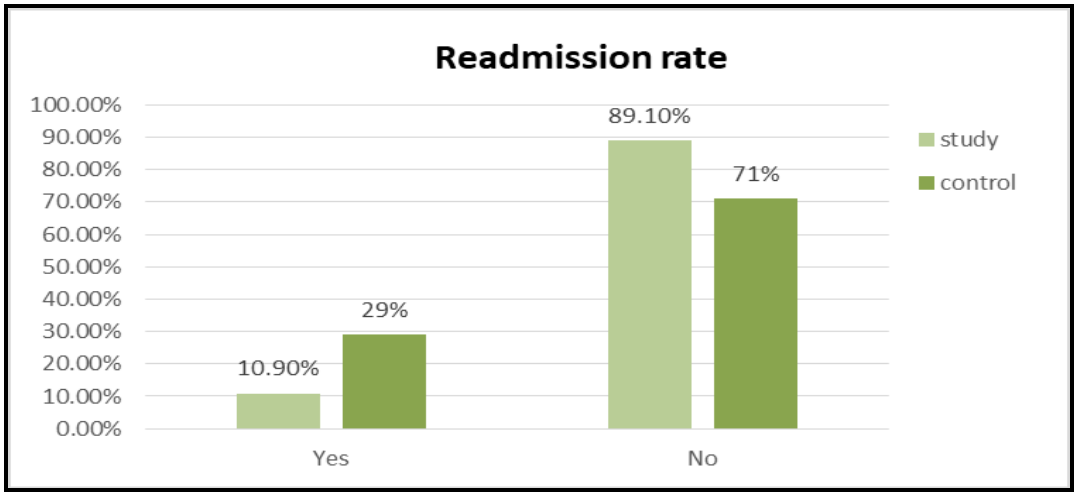

Figure (3): Percent distribution of the study and control groups related to readmission rate within 30 days

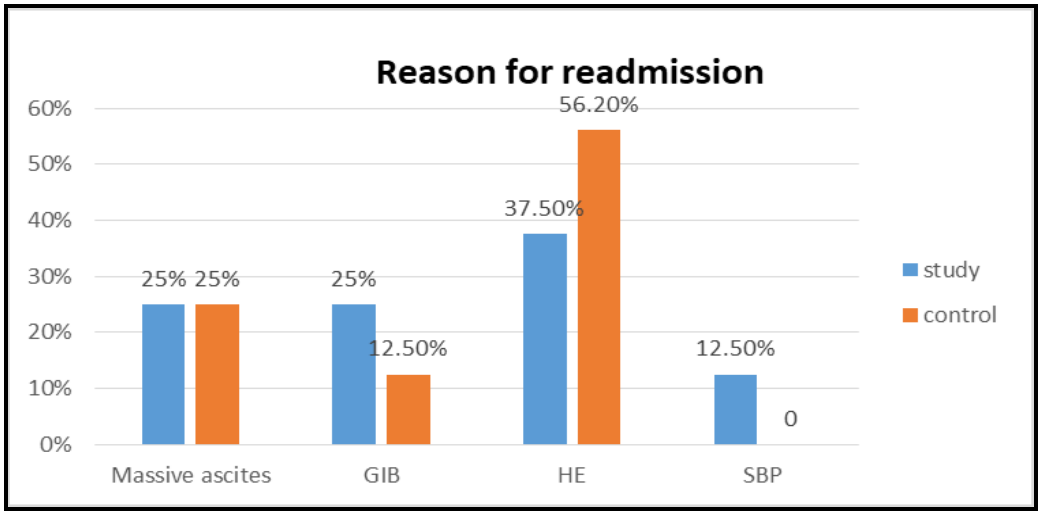

Figure (4): Percent distribution of the study and control groups related to the reason for readmission

Table (1): Shows the socio-demographic and clinical data of the study population. Male gender dominated in both the study and control groups (56.7%, 75.6%) respectively. The most common reason for decompensation in both control and study group was GIB in the study group (43.3%), while was HE in the control group (33.3%).

Table (2): Shows decompensated cirrhosis discharge care bundle among the study population ascites. Ascites were present in 84.9% of the patients in the study group compared to 60% of the patients in the control group. Previous SBP was reported in 43.5% of the patients in the study group compared to 45.5% in the patients of the control group. The use of prophylactic antibiotics with nearly equal among the patients of both groups (43.5% in the patients of the study group and 42.4% among those in the control group. Current management of ascites with diuretics was among 74.2% of the patients in the study group compared to 84.85% of those in the control group, while current management of ascites with paracentesis was 37.1% in the patients of the study group compared to 42.4% in those of the control group.

Table (3): Illustrates decompensated cirrhosis discharge care bundle among the study population: renal function. Patient discharge creatinine, sodium, and potassium were performed for all the patients in the study group compared to only 58.2% of the patients in the control group. Frequency of urea, Ca, and Mg monitoring in the community was 98.6% in the study group compared to only 56.4% in the control group.

Table (4): Demonstrate decompensated cirrhosis discharge care bundle among the study population: hepatic encephalopathy. Encephalopathy was detected among 41.1% of the patients in the study group compared to 49.1% of those in the control group. All patients in both the study and control groups received lactulose. Rifaximin was used by 96.7% of the patients in the study group compared to 59.3% of those in the control group.

Table (5): Illustrates decompensated cirrhosis discharge care bundle among the study population: portal hypertension. Varices were detected in 48.9% of the patients in the study group compared to 54.5% of those in the control group. Grad 2 varices were the most frequent in both study and control groups, 61.4% and 60%, respectively. Red signs were detected among 65.9% of the patients in the study group compared to 53.3% of those in the control group. Primary prophylaxis was equally provided for the patients of both study and control groups (63.6% and 63.3%, respectively).

Figure (2): The patient outcomes following the application of the care bundle in the study population showed notable differences between the study and control groups. Specifically, 21.1% of patients in the study group and 22.2% in the control group were discharged to home. Additionally, 60% of patients in the study group and 38.9% in the control group were transferred to the department. Mortality was also significantly lower in the study group, with 18.9% compared to 38.9% in the control group.

Figure (3): Reveals the patient outcome after the application of the care bundle of the study population. Regarding readmission rate**,** the patient's readmission rate in the study group HE main reason for readmission was hepatic encephalopathy for the study and the control group.

Figure (4): Reveals the patient outcome after the application of the care bundle of the study population.

Regarding the reason for readmission**,** showed that only 10.9% of patients from the study group readmitted within 30 days compared to 29% for the control group after the application of DCDB.

Discussion:

The socio-demographic data of the studied patients revealed that more than two-thirds of the study group and more than half of the control group were male, with a statistically significant difference (P = 0.007). The mean age was 59.08 years for the control group and 60.12 years for the study group. This finding may be explained by the fact that males tend to discover conditions such as HCV and other diseases more frequently than females, possibly due to factors such as traveling abroad, spending long hours outside the home for work, and facing community exposure more than women. This finding aligns with **(Dyson, et al**; **2016)**, who reported data on 228 patients from three centers, showing that 59% were male with a median age of 53 years. Similarly, **(Kalo, et al; 2022)** reported that 66% of the studied patients were male, and **(Smethurst, et al**; **2022)** found that 62% of the studied patients were male, with a median age of 55 years.

Regarding causes of Decompensated Cirrhosis, the present study shows that the most common reasons for decompensation among the studied group were gastrointestinal bleeding and hepatic encephalopathy, due to patients not following the instructions regarding medication, nutritional to the hepatic patients, regular follow-up, and endoscopy band ligation schedule. Disagreeing with the present study, **(Shahzaib, et al**; **2012), (Dyson, et al; 2016)** reported that ascites was the major presentation of the patients, hepatic encephalopathy and upper gastrointestinal bleeding each accounting for a further admission. While **(Smethurst, et al**; **2022)** reported that, 70% had ascites and 43% had HE at the time of admission.

As regards Ascites, the current study found that the majority of patients in the study group were suffering from ascites, and near to half of them had a history of previse SBP and were receiving prescribed prophylactic antibiotics. Also, most of them were treated with diuretics, the finding could be attributed that patients with ascites who had an episode of SBP should be considered for antibiotics, and diuretics therapy used to control ascites, this finding was in agreement to **(Kalo, et al, 2022)** who reported that, primary and secondary SBP prophylaxis with co-trimoxazole was relatively low and also 73.4% of patients with ascites, were treated with diuretics.

The current study shows a significant difference (P=0.001) for a patients with ascites receiving a scheduled follow-up outpatient clinic after discharge and paracentesis, from the researcher's point of view it may be related to the admission of the patient for paracentesis session for one day only, which help to prevent farther complication due to ascites, this finding disagreeing to **(Kalo, et al, 2022)** who reported, 44% of patients presenting with ascites had an inpatient paracentesis while only 21.9% of patient who receives a scheduled follow-up outpatient intervals post-hospitalization paracentesis appointment on discharge latter.

Regarding electrolyte monitoring on discharge, the result of the current study demonstrates significant improvement inpatient discharge creatinine, urea, sodium and potassium, calcium, magnesium documentation, and monitoring in the discharge sheet in the study group compared to the control group, this finding may be interpreted that renal function and electrolyte monitoring prevent occurrence of disturbance in electrolyte and renal function, these finding similar to those by **(Smethurst, et al, 2022)**, who reported that there were significant improvements in care about electrolyte monitoring (61% Vs. 36% p=0.012) and improvement in documentation of creatinine in the discharge summary (66% vs 6% p<0.001), and **(Gallacher, et al, 2021)** who reported that there improved documentation/monitoring of renal function post-discharge.

Regarding antibiotic administration, the current study reveals that the majority of patients in the study group showed significant improvement in management with **rifaximin**, compared to only half of the control group, with a statistically significant difference (P = 0.006). The researcher attributes this finding to the frequent empirical use of rifaximin due to the high prevalence of infections as an underlying cause. These results contrast with those of **(Gallache, et al, 2021)**, who reported that encephalopathy management was already effective before the implementation of the discharge care bundle (DCDB), resulting in no significant change in outcomes. However, **(Kalo, et al, 2022)** found that most patients with hepatic encephalopathy were treated with either lactulose (62.2%) or rifaximin (40.4%).

Regard portal hypertension, the current study found that nearly half of lived patients in the study group were diagnosed with varices, and about two-thirds of them were offered primary prophylaxis, with statistical significance in the control group, the researcher view that patients should be offered primary prophylaxis, these finding were in contrast to **(Gallache, et al, 2021)** who report management of variceal bleeding were reasonably good before the DCDB so no real change was seen in his study, and **(Kalo, et al, 2022)** who reported that treatment with

NSBB post-discharge is common and reduces mortality.

Regarding mortality rate: the current study results shows a significant decrease in mortality rate in the study group VS control group. From a research point of view, it can be caused by the application of care bundle which helps to improve patient outcomes, this finding similar to **(Kalo, et al; 2022)** who reported that the in-hospital mortality rate was decreased to 9%. While (**The Trainee Collaborative for Research and Audit in Hepatology**; **2023)** reported the mortality was higher in patients where the bundle was used. **(Bosch, 2017)** reported, the introduction of the care bundle did not influence admission mortality, which was 16% before and 19% after bundle implementation that in contrast with the current study.

Regarding readmission within 30 days, the results of the current study demonstrate a significant decrease in readmission rate in the study group compared with the control group with a significant difference (P value 0.008), from the researcher's point of view, it is related to following pre-discharge instruction regard nutrition, medication, follow up, this finding was not in accordance with **(Smethurst, et al; 2022)** who reported that readmission rates and potentially preventable admissions were similar between patients with and without a bundle, and **(Kalo, et al; 2022)** who reported that 65 patients (37%) were readmitted within 30 days of discharge.

Considering readmission within 30 days, the results revealed that hepatic encephalopathy was the main cause of readmission in both the study and control group with a significant difference (P value 0.003) this may be due to the patient after hospital discharge not follow the instruction and neglect taking medication, his finding not in agreement with **(Williams, et al; 2020)** who reported that ascites is the most common reason for readmission within 1month.

Conclusions:

The implementation of the Decompensated Cirrhosis Discharge Bundle (DCDB) reduced the number of patient readmissions. Hepatic encephalopathy was the main reason for readmission in both the study and control groups.

Recommendations:

The bundle remains a valuable tool for guiding junior doctors and nursing staff in the management of decompensated liver disease in the gastroenterology ICU. Training and education on the DCDB should be provided to junior doctors and nursing staff during shift changes to ensure the adoption of the care bundle.

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