

Effect of patients (Recipients) Educational Strategy on Their Health Outcomes Post Liver Transplantation

Rowan Mohamed El-Sayed Morsy^١, Hanan Gaber Mohamed^٢, Samah El-Sayed Ghoniem^٣, Rawia Ali Ibrahim^٤

^١- Assistant lecturer of Medical Surgical Nursing, Faculty of Nursing, Benha University, Egypt,

^٢- Professor of Medical Surgical Nursing, Faculty of Nursing, Benha University, Egypt,

^{٣,٤} -Assistant professor of Medical Surgical Nursing, Faculty of Nursing, Benha University, Egypt,

Abstract

Background: Liver transplantation is a life-saving surgery includes removing a diseased or injured liver from patient, called recipient and replace it with a donated whole or partial healthy liver from another person, called a donor. **Aim of the study:** to evaluate the effect of patients (recipients) educational strategy on their health outcomes post-liver transplantation. **Research design:** Quasi experimental research design was used. **Setting:** The study was conducted in Liver Transplantation Unit of National Liver Institute, Menoufia University, Egypt. **Sample:** A purposive sample of patients who attended the previously mentioned unit through ١٢ months (n= ٥٠). **Tools:** three tools were used; (١) The General Data Questionnaire (٢) Recipients' Learning needs Assessment (٣) Recipients health outcomes. **Results:** shows the mean score of total information was ١٣.٩٢ ± ٢.٣٠ pre educational strategy implementation which improved to ٤١.٥٦ ± ٧.٢٦ and ٤١.٢٤ ± ٨.٥٧ immediate post and at discharge respectively, there was an improvement in the total mean score practice ١٣.٩٠ ± ١٨.٢١ from pre implementing educational strategy, to ٤١.٠٠ ± ٦.٧٣ and ٤٩.٤٨ ± ٥.٨٧ immediate post implementing educational strategy and at discharge, respectively. Also there was statistically significant improvement inpatients' health outcomes post educational strategy implementation at $p < ٠.٠٠١$. **Conclusion:** the recipients' learning needs of information and practice score about post-operative liver transplantation care significantly improved post implementing the educational strategy. Also, their health outcomes as health-related problems, physical examination, and activity of daily living improved with high statistically significance differences. **Recommendations:** The need for continuous educational and training programs for patients post liver transplantation for support them and improve health outcome. To generalize the findings, similar studies should be replicated on a large sample size in different geographic areas in Egypt.

Key words: Educational Strategy, Health Outcomes, Liver, Recipients, Transplantation .

Introduction

Chronic liver failure known as end-stage liver disease, where the liver is no longer able to maintain its functions which may ultimately lead to death (*Didilescu et al., 2020*). Liver Transplantation (LT) is considered one of the most complex procedures in modern surgery and is performed when conventional therapeutic resources are not sufficient to treat liver diseases. LT is a lifesaving intervention with around 90% of recipients currently surviving the first postoperative year and subsequent life expectancy now exceeding 20 years. LT typically means a rapid transition from living with end-stage liver failure to a state of health and improved vitality. (*Knihš et al., 2020*).

Orthotopic Liver Transplantation (OLT) is the treatment of choice for patients with end stage liver disease, acute liver failure, hepatocellular carcinoma and metabolic disorders. As a result of improvement in surgical and anesthesiological skills, advanced understanding of transplant immunology and better critical care management of complications, patients survive longer after liver transplantation. It has been gradually achieved one-year survival rates of 80-90%. During the early post-operative period, all patients undergoing OLT are admitted to the intensive care unit, as they need a management of both preexisting patient's conditions and post-operative complications, usually due to either adverse intra-operative or post-operative events. (*Damaskos et al., 2019*)

Liver transplantation process; Liver transplantation (LT) may be prescribed as a curative or life prolonging for appropriately selected patients with acute liver failure, advanced cirrhosis, hepatic malignancy, or inborn metabolic disorders. Given vast

improvements in surgical technique, organ preservation and procurement, and immunosuppression over the past several decades, modern LT is characterized by remarkable improvements in post-transplant patient survival, graft survival, and quality of life. (*Mahmud, 2020*)

The main complications in the immediate postoperative period are related to the function of the graft (dysfunction and rejection), the surgical technique, infections (bacterial, fungal, and viral), and systemic problems (pulmonary, renal, or neurological). In the long term, the complications are typically a consequence of the prolonged immunosuppressive therapy, and include diabetes mellitus, systemic arterial hypertension, de novo neoplasia, and organ toxicities, particularly nephrotoxicity. (*Gonzalez et al., 2022*).

Patient education strategy is an important aspect of patient care in transplantation. Successful education increases patient satisfaction and results in improved outcomes and adherence. Learning is defined as the process that allows individuals to permanently change their behavior. It happens when people respond to and receive stimuli from their external environment. When observing changes in learners' performance, this shows that learning has taken place (*Soultan et al., 2022*)

Transplantation outcomes are influenced by culture and differ significantly for minority patients compared to the general population. Obesity and type 2 diabetes mellitus (DM), factors contributing to nonalcoholic fatty liver disease requiring transplant, are notably more common in the Hispanic population (*Mahmud et al., 2019*).

Nurses perform learning activities for patients and their relatives concerning long-term measures to promote health. By doing so, patients are able to understand the rationale

and importance of following the therapeutic regimen proposed by the transplantation team, as well as to identify signs and symptoms that may unveil a health-related problem (*Peate & MacLeod, 2020*)

Significance of the study

Liver diseases in Egypt are common with multiple reported etiologies including Parasitic, viral, bacterial and metabolic causes. (*Alboraie et al., 2019*). Also, an estimated 8-10 million people suffer from viral hepatitis in Egypt. Hepatitis A virus (HAV) and hepatitis E virus (HEV) are the major causes of viral hepatitis in Egypt. Over 70% of the Egyptian population test seropositive for anti-HEV in the first decade of life. HEV mainly causes self-limiting hepatitis; however, cases of liver failure were reported in Egypt. Hepatitis B virus (HBV), hepatitis C virus (HCV), and hepatitis D virus (HDV) are the main causes of chronic hepatitis, liver cirrhosis, and liver cancer (hepatocellular carcinoma [HCC]) in Egypt which lead to liver transplantation. (*Elbahrawy et al., 2021*)

According to National Liver Institute records, **Shebin ELkoom ,Menoufia Governorate**, the total numbers of cases of liver transplantation during the year 2020 were around 40-50 cases and about 70-80 cases follow in the institute after liver transplantation in other centers. (**Statistical Office at Shebin ELkoom ,Menoufia University Hospital, 2021**). Many studies are important because of the difficulty and comprehensive nature of the transplantation process which requires the consistent provision of information and the high

prevalence of patients suffering from end-stage liver diseases

Aim of the study:

This study aimed to:

Evaluate the effect of patients(recipients) educational strategy on their health outcomes post-liver transplantation

Research hypothesis

H₁: The mean of recipients' learning needs of information score about post-operative liver transplantation care will be significantly higher post implementing the educational strategy than before.

H₂: The mean of recipients' learning needs of practices score about post-operative liver transplantation will be significantly higher post implementing the educational strategy than before.

H₃: The recipients who will be exposed to the educational strategy about post-operative liver transplantation care will improve significantly in their health outcomes as health-related problems, physical examination, and their activity of daily living than before.

H₄: There will be a significant relation between recipients' learning needs, health related problems, physical examination parameters, and activity of daily living pre and post implementing the educational strategy.

Subjects and Methods

Research design

A quasi-experimental pre and post intervention comparison research design was implemented to achieve the aim of the present study.

Study setting

This study was carried out at Liver Transplantation Unit of National Liver Institute, Menoufeya University, Egypt which considered the first center in the Middle East where liver transplantation takes place and it differentiates from other transplantation center by high attendance and following of patients from all over Egypt and Middle East.

Subject:

A purposive sample consisted of fifty patients with liver diseases who underwent liver transplantation surgery in the liver transplantation unit at national liver institute, Menoufeya University; Patients were enrolled in the study over a period of twelve months from the beginning of December, 2022 to the end of November, 2023.

The sample size was calculated according the following formula: **Stephen Thampson equation (Fearon et al., 2017):**

$$n = \frac{N \times p (1-p)}{\left((N-1) \times (d^2 + z^2) \right) + p (1-p)} = 50$$

Data Collection Tools

Three tools were used to collect data for this study as the following:

Tool I: The General Data Questionnaire: It was adopted from (*Mahmud, 2020*) to assess Recipients' demographic characteristics and medical history for patients with liver transplantation. It was collected by the researcher and consisted of the following parts:

Part I: Demographic characteristics of recipients: This part concerned with assessment of patients; demographic characteristics and included (7) questions as

age, gender, marital status, level of education, nature of work, residence and treatment costs.

Part II: - Recipients' medical history: This part aimed to assess patients' medical data of the past and current disease and its management as well as, the life style of the patients with liver transplantation and included (12) questions related to onset of diagnosis of liver failure, associated physical disorders, causes of liver failure, main complain when diagnosed, family history of liver disease, previous hospitalization due to liver disorders, previous medication, smoking, number of cigarettes per day, previous blood transfusion, number of transfused bags and sleeping alteration.

Tool II: Recipients' Learning needs Assessment. It was designed by the researcher after reviewing related and recent literature and aimed to assess patient's information and practical needs and consisted of two parts:

Part I: Recipients' informational needs Assessment Questionnaire.: It was adopted from (*Craig & Heller, 2021*) It aimed to assess patient's informational needs regarding liver transplantation pre and post educational strategy implementation. It included 22 open ended questions.

Scoring system : The correct and complete answers were given two score, correct but incomplete answers were given one score and the wrong answers were given zero score. These scores were summed-up and converted into a percentage, the total score was 44 marks equal 100% and categorized as the following

- Score >80% referred to good level of knowledge. Score 60%-≤ 80% referred to

average level of knowledge and score >60% referred to poor level of knowledge.

Part II: Recipients' practical Level Needs Observational Checklist (pre and post educational strategy implementation). It was adopted from (*Shedeed et al., 2021*) and aimed to assess the recipients' practices of different exercises used post-liver transplant that minimizes post-operative complications. It was observed by the researcher and include: early gradual ambulation, deep breathing exercise, cough exercise ,Burger Allen exercise , and wound care practices .

Scoring system :One mark given for each step correctly done and zero mark for not done

Tool III: Recipients health outcomes It was adopted from (*Donna , 2012 & Hablas et al., 2020 & Shedeed et al., 2021*) aimed to assess the recipient's health deviations post-operative liver transplantation as the items effect of the educational intervention that was given to the patients pre operatively and implemented by the patients post operatively. It included the following parts

Part I: Recipient's Health-related Problems: (Post-operative and follow up)
It include (4) sections as following :

First: Level of mobility included five levels as follow:-Level 1: Ability to walk quickly without support.

Level 2: One hand needs support in order to walk quickly.

Level 3: both hands needs support in order to walk quickly.

Level 4: Bedridden but not sedentary 100%, able to use a self-propelled wheelchair .

Level 5: Bedridden and 100% immobile, High risk of bed sores.

Second: Post transplantation rejection complication as vomiting and nausea, flue like symptoms

Third: Breathing problems as : (difficult breathing ,dyspnea, dry and wet cough)

Fourth: Cardiovascular problems as

1. Heart palpitations, Peripheral swelling, Dizziness when changing position to standing, Cold extremities, Delayed capillary refilling, and Cyanosis.
2. DVT: pain ,swelling ,redness, tenderness

Fifth: Skin problems as:

1. Skin color : Paleness or yellowing, redness, humidification, dry, moist, and scratches
2. wound infection: Pain at wound site, swelling around wound

Sixth: Elimination problems as: (defecation : diarrhea or constipation, urination: urinary retention , dysuria, and RBCs in urine)

Seventh: Pain assessment : It included the following two measures:

1-Numeric Pain Rating Scale (NPRS). It was adopted from (*Morsy et al., 2021*). It aimed to assess patients' pain intensity. It is an instrument which reflects the intensity of patients' pain, consisting of a 10 cm straight line, with 11-point ranges from '0' representing no pain to '10' representing (worst pain imaginable)

Scoring system for numeric pain rating scale:

The values on the pain scale correspond to the pain levels as follows:

0: was considered "no pain." 1-3: was considered "mild pain." 4-6: was considered "moderate pain." And 7-10: was considered "severe pain"

2-Subjective expressed pain characteristics: It aimed to assess the patients' experience of pain characteristics according to their description, it included (5) questions as follow: frequency, pain type and pain site . The studied patients were answered by select the proper characteristics according to their experienced to pain.

Part II: Physical Examination: (Post-operative and follow up)

It was concerned with clinical assessment investigation; it was observed as a baseline objective data assessment post operatively by the researcher and medical records. It included:

1-Vital Signs Assessment parameters to determine infection and orthostatic hypotension, and signs of rejection. It was adopted from (*Sapra et al., 2020 & Ball et al., 2023*)

2- Liver Function test values, it was adopted from (*Bertolini et al., 2020*)

3- Body mass index (BMI) :It aimed to assess the BMI of patients .It will categorize into four levels: Underweight (BMI < 18.5), normal weight (18.5 -< 24.9), overweight

(25.0-29.9) and obesity (BMI = 30 or greater it was adopted from (*Van et al., 2020*)

Part III: Barthel index for Activities of Daily Livings (ADL) : This tool was adopted from (*Donna, 2012*) to assess the patient's ability to perform activities of daily living independency. The scale composed of 10 categories "bowels control, bladder control, grooming, toileting, feeding, transferring, mobility, dressing, stairs climbing and bathing". Each category has 3 items "completely dependent, needs assistant and independent".

Scoring system for barthel index :

The scores responses for every item were as follows: Completely dependent was scored zero, need assistant was scored 1 and independent was scored 2.

The total scores of independency level ranged from 0-20, the higher scores reflect the higher independency level. It was categorized as the following:

- 0- 6 was considered "completely dependent". 7-13 was considered "needs assistance ". and 14-20 was considered "independent".

***Educational strategy program :**

The educational program was designed by the researcher through review of related literature. This program aimed to improve health outcomes for patients after liver transplantation by implementing an educational strategy for recipients

It included the following:

- **teaching strategies:** as discussion , demonstration and re-demonstration,

videos for clinical procedures, booklet and posters

- **specific objectives** : Define liver ,its function, liver transplantation.

Recognize discharge plan, health education for the patient, and the follow up after discharge. Suitable diet and medications after transplantation. Learn how to maintain the patient's psychological and social health. Apply deep breathing exercises and coughing exercises.

Tools validity:

The face and content validity of the tools were checked through a jury consisting of five experts in the field of medical surgical nursing from the faculty of nursing, Benha University. The experts reviewed the tools to check the relevancy, simplicity, clarity, comprehensiveness, and applicability of the questions. The consensus among experts regarding the questionnaire was 98 %, the observational checklist and patients' health outcomes assessment sheet was 99 % for most items. Also, a designed program which covered all items related to liver transplantation care for post liver transplantation patients' based on recent current literatures, it was revised by the same experts then all required modifications were done consequently and the final form of the tools was used for data collection.

Tools reliability:

In the present study, reliability had been tested using cronbach's alpha coefficient Reliability of the following

Table (1): Alpha Cronbach reliability

analysis for the study tools (as general).

Tools	Alpha	p
knowledge questionnaire	٠.٨٣٥	<٠.٠٠١
Checklist	٠.٩٤١	<٠.٠٠١
complications sheet	٠.٨٢٠	<٠.٠٠١
Barthel Index scale	٠.٨١	<٠.٠٠١
Pain scale	٠.٨٣	<٠.٠٠١

Ethical considerations:

The ethical research considerations in the study included the following:

- The study approval was obtained from the ethical committee of nursing faculty before initiating the study work.
- The researcher clarified the purpose and aim of the study to patients included in the study before data collection.
- Verbal consent was obtained from the patients to participate in the study.
- The researcher was assured maintaining anonymity and confidentiality of data.
- The patients were informed that they allowed to choose their participation in the study and they have the right to withdraw from the study at any time.

Pilot study:

A pilot study was conducted on ١٠٪ (٥ patients) of the study subjects in order to test the clarity and applicability of the study tools and the program, also to estimate the time required for each tool to be filled by the researcher as well as to identify any possible obstacles that may hinder data collection. Based on the results of the pilot study the necessary modifications were

done for more applicable tools to collect data. The patients selected for the pilot study were excluded from the study subjects. The pilot study was done two weeks before starting the study.

Fieldwork:

Data collection of the current study was carried out through twelve months, from the beginning of December, ۲۰۲۲ to the end of November, ۲۰۲۳. The researcher attended the setting four days (Saturday, Monday, Tuesday and Thursday) per week during afternoon shifts. - Each interview took a time of about ۳۰-۴۰ minutes. The precautionary practice measures for infection control as maintaining physical distance, wearing facemask, gloves and using alcohol aseptic solution for both the researcher and the patients included in the study. The study was conducted through four phases:

Assessment phase:

It was carried out for all studied patients by the researcher to collect data regarding recipients' sociodemographic characteristics and medical history as general characteristics information using **tool I**, then the researcher collected and observed the recipients' learning needs assessment (**pre-operative preparation period and pre implementing educational strategy**) using **tool II** and health outcomes assessment (health-related problems, physical examination, and activity of daily living scale) using **tool III** (**۲nd day of post-operative period**) as a baseline data assessment before implementing the instruction and practicing by the study patients postoperatively (post-liver transplantation)for comparing with post-assessment using the same tools.

Planning phase:

Once the initial assessment finished, an educational strategy was designed based on individual learning needs. The researcher set up teaching plan covering general and specific objectives. This program was developed from recent literatures, revised and modified based on the experts' comments, in order to be implemented using various methods. The program resources and facilities were allocated (printed material and location or site of session that best serve the learner). The researcher determined the timetable of sessions with the patients for starting program sessions.

Implementation phase:

(The program implementation): It included the following steps: ۱- The program implementation had been carried out in liver transplantation unit two days preoperatively and was conducted in ۴ sessions (two theoretical session and two practical sessions). Each session lasted about ۳۰-۴۰ minutes/ day for one patient/session considering time table for operation, including periods of discussion according to the patients' progress and feedback. Motivation, problem solving and reinforcement techniques were used to enhance active participation of the patient in the educational sessions..

➤ ۱st session: (introductory session) explanation of reasons and importance of the program and give an explanation about the definition of liver, function, causes of liver failure, definition , indications of liver transplantation , preparation for surgery ,diet , medication , post operative complications, ICU care.

➤ ۲nd session: Include applying deep breathing exercise, coughing exercises and spirometry test.

➤ ٣rd session: include applying buerger-Allen exercise, , gradual movement exercise.

➤ ٤th session: Include health teaching for the patient about discharge plan , follow up after discharge , back to work, marriage life after transplantation , patient health practices, personal hygiene , diet, medications , psychological and social health post transplantation.

Different teaching and learning methods were used during the sessions which included; discussion, demonstration and re-demonstration, instructional media include mobile videos and printed handout with pictures, which was presented in clear and concise form to learn patients postoperative liver transplantation care techniques. The program colored booklet was given to each studied patient in order to help them for reviewing and support teaching.

At the beginning of the first session, patients were oriented regarding the program contents, its purpose and impact on his condition and expected outcomes. Patients were informed about the time of the next session at the end of the sitting.

Each session was started by a summary about what has been discussed in the previous session and the objectives of the new session, using simple Arabic language, also the session ended by a summary of its contents and feedback was obtained from the patients to ensure that he/ she got the maximum benefit.

At the end of all sessions, the researcher asked them about their opinion on the program and their benefits from the subject. The researcher informed the patients that they will be evaluated by the researcher.

Evaluation phase:

This phase aimed to evaluate the effectiveness of recipients' educational strategies on their health outcomes post-liver transplantation, the researcher evaluated the recipient's information and practices post immediate the sessions as the outcome and on discharge by the same tools of data collection of preprogram implementation through the following phases:

Phase ١. Immediately post-test evaluation was performed after implementing the teaching nursing program preoperatively (following the teaching session) as the outcome and on discharge using **tool II** to evaluate the effectiveness of the program on patients' knowledge and practices & compare the changes in the studied patients' knowledge and practices

Phase ٢: Evaluation was done on ٢nd , ٤th , ٦th and ٨th postoperative day for following evaluation of patients' practice and health outcomes (tool II & III). * Comparing between pre and post data collected.

Phase ٣: The follow-up evaluation done on the ١st and ٣rd months post-discharge using **tool III** (health outcomes assessment). The researcher asked the recipients to follow them on the telephone and to be evaluated in the outpatients' clinic

Data Analysis

Data analysis was performed using the SPSS software (version ٢٠). For determining the normal distribution of quantitative variables was used to Kolmogorov-Smirnov test. Qualitative data was presented as a number and percent. Furthermore, quantitative data was described as mean or standard deviation, as appropriate. Chi-square test was used to examine the difference and relation between qualitative variables during different periods. Fisher's exact test was

applied on smaller sample sizes, alternative to the chi-square test, when the frequency count is < 5 for more than 20% of cells. Friedman test for differences on dependent quantitative variables between more than two related groups. Cochran test for differences on a dichotomous dependent variable between three or more related groups. For comparing the mean scores in two groups, Mann-Whitney test for non-parametric quantitative data and Kruskal-Wallis for more than two groups. Spearman-rho method was used to test correlation between numerical variables. Linear regression was used for multivariate analyses on activity of daily living as dependent factor. A p-value < 0.05 was considered significant, and < 0.001 was considered highly significant.

Results:

Table (1): shows Frequency distribution of the studied recipients regarding their personal data. It reveals that 70% of recipients were in the category 40-60 years old, with mean age 46.20 ± 0.98 . Males were more prevalent and constituted 80% of the studied patients and 90% of them were married. Regarding their educational level 50% had secondary education and 70% of them had manual work and 82% lived in rural areas. Concerning treatment costs, it was found that 70% of them were treated at state's expense.

Table (2) Shows mean score, standard deviation and significant difference of the studied recipient recipients' information pre and post educational strategies implementation. It illustrates that there was statistical significant difference between recipients' information pre and post educational strategies implementation at P

< 0.001 as evidenced by mean score of general concept about liver was 1.22 ± 0.41 and they improved to 0.24 ± 1.13 immediately and they had slightly declined to 1.02 ± 1.11 at discharge post educational strategy. Mean score of recipients information about liver transplantation was 3.10 ± 1.38 at pre educational strategy, they improved to 0.12 ± 1.03 and 1.20 ± 0.70 immediately post educational strategy implementation and at discharge, respectively. Regarding post liver transplantation complications, mean score was 2.00 ± 1.10 at pre educational strategy implementation, they improved to 0.94 ± 1.04 and 1.96 ± 1.70 post immediate educational strategy implementation and at discharge, respectively. Mean score of preventing complications was 1.70 ± 0.80 , which improved to 1.94 ± 1.44 post immediately, and they had slightly declined to 1.26 ± 1.96 at discharge post educational strategy implementation. Mean score of hospital discharge plan was 1.00 ± 1.80 at pre educational strategy implementation, they improved immediately post to 1.92 ± 2.74 and 2.38 ± 3.00 at discharge post educational strategy implementation. Mean score of total information was 13.92 ± 2.30 pre educational strategy implementation which improved to 11.06 ± 7.26 and 11.24 ± 8.07 immediate post and at discharge respectively.

Figure (1) illustrates Mean percent score of recipients' regarding to their total practice related to liver transplantation pre and post educational strategies implementation. It demonstrates the highest mean percent score 20.71 pre educational implementation was concerning wound care and increased

immediately post implementation and at discharge to 76.57 and 89.23 respectively. It was observed improvement regarding total practices, 25.27% at pre implementing educational strategy and then became 44.54% and 89.96% at immediate post implementing educational strategy and at discharge

Table (3): shows frequency distribution of the studied recipients regarding their health related problems pre and post educational implementation. It reveals post transplantation complications, it observed that the most common complications on 2nd day of transplantation were bleeding and vomiting with 28% & 24% of studied patients, respectively then it declined to 14% & 12% and 18% & 14% on the 4th day, respectively and disappeared completely at 1 month and 3rd month post transplantation. On the other hand, the most common general complications reported by patient were difficulty breathing and palpitation 26% & 16%, respectively, which declined to 10% & 8% and 10% & 0% at 4th day and 8th day post transplantation, respectively, but at follow up it was observed that these complications were disappeared.

Table (4): shows correlation between total information and practice with health related problems, physical examination parameters and daily living activity among the studied recipient patients pre, post educational strategy implementation. It illustrates that there was a positive correlation between total information and total practice at pre & post educational implementation. But there was no correlation between health related problem, physical examination parameter, daily activity with total information and practice pre

educational implementation. While there were negative statistically correlation between total information and practice with moving ability and pain level at $P \leq 0.05$ post 3 month.

Table (1): Frequency distribution of the studied recipients regarding their personal data (N.=٥٠).

Personal data	(N.)	%
Age /year		
٢٠-< ٤٠	٢٠	٤٠.٠
٤٠-٦٠	٣٠	٦٠.٠
SD± \bar{x} □	٤٦.٢٠ ± ٠.٩٨	
Sex		
Female	١٠	٢٠.٠
Male	٤٠	٨٠.٠
Marital status		
Married	٤٥	٩٠.٠
Single	٥	١٠.٠
Educational Level		
Can't read and write	١٥	٣٠.٠
Secondary education	٢٥	٥٠.٠
University education	١٠	٢٠.٠
Nature of Work		
Manual work	٣٠	٦٠.٠
Mental work	١٠	٢٠.٠
No work/ Household	١٠	٢٠.٠
Residence		
Rural	٤١	٨٢.٠
Urban	٩	١٨.٠
Treatment costs		
Treatment at his own expense	١٠	٢٠.٠
Health insurance	١٠	٢٠.٠

At the state's expense	۳۰	۶۰۰
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Table (۶): Mean score, standard deviation and significant difference of the studied recipient recipients ' information pre and post educational strategies implementation (N=۰۰)

Recipients ' information	Pre-educational strategy (n=۰۰) $\bar{x} \pm SD$	Post educational strategy		Fr test	p-value
		Immediately Post educational strategy (n=۰۰) $\bar{x} \pm SD$	At discharge Post educational strategy (n=۰۰) $\bar{x} \pm SD$		
		$\bar{x} \pm SD$	$\bar{x} \pm SD$		
General concept about the liver (Total Score 6)					
Mean \pm SD	۱.۲۲ \pm ۰.۴۱	۰.۲۴ \pm ۱.۱۳	۴.۰۲ \pm ۱.۱۱	۹۰.۰۴۳	<۰.۰۰۱**
Post Hoc test	P۱=<۰.۰۰۱**	P۲=<۰.۰۰۱**	P۳=<۰.۰۰۱**		
Patient information about liver transplantation (Total Score ۸)					
Mean \pm SD	۳.۱۰ \pm ۱.۳۸	۰.۱۲ \pm ۱.۰۳	۴.۲۰ \pm ۰.۷۰	۳۳.۰۳۱	<۰.۰۰۱**
Post Hoc test	P۱=<۰.۰۰۱**	P۲=<۰.۰۰۱**	P۳=<۰.۰۰۱**		
Post liver transplantation complications (Total Score 8)					
Mean \pm SD	۲.۰۰ \pm ۱.۱۰	۰.۹۴ \pm ۱.۰۴	۴.۹۶ \pm ۱.۷۰	۸۰.۹۷۸	<۰.۰۰۱**
Post Hoc test	P۱=<۰.۰۰۱**	P۲=<۰.۰۰۱**	P۳=<۰.۰۰۱**		
Preventing complications (Total Score ۱۰)					
Mean \pm SD	۱.۶۰ \pm ۰.۸۰	۶.۹۴ \pm ۱.۴۴	۶.۲۶ \pm ۱.۹۶	۸۰.۸۷۰	<۰.۰۰۱**
Post Hoc test	P۱=<۰.۰۰۱**	P۲=<۰.۰۰۱**	P۳=<۰.۰۰۱**		
Hospital discharge plan (Total Score ۲۲)					
Mean \pm SD	۶.۰۰ \pm ۱.۸۰	۱۹.۲۴ \pm ۲.۷۴	۲۰.۳۸ \pm ۳.۰۰	۹۶.۱۳۶	<۰.۰۰۱**
Post Hoc test	P۱=<۰.۰۰۱**	P۲=<۰.۰۰۱**	P۳=<۰.۰۰۱**		
Total information (Total score ۰۴)					
Mean \pm SD	۱۳.۹۲ \pm ۲.۳۰	۴۱.۰۶ \pm ۷.۲۶	۴۱.۲۴ \pm ۸.۰۷	۷۷.۱۸۴	<۰.۰۰۱**
Post Hoc test	P۱=<۰.۰۰۱**	P۲=<۰.۰۰۱**	P۳=<۰.۰۰۱**		

* Significant at $p \leq 0.05$. **Highly significant at $p < 0.001$.

Fr: Friedman test, Sig. bet. Periods was done using Post Hoc Test (Dunn's)

P1: p value for difference between information pre and immediately post educational strategy implementation

P2: p value for difference between information pre educational strategy and at discharge

P3: p value for difference between information immediately post educational strategy and at discharge

Figure(1): Mean percent score of recipients' regarding to their total practice related to liver transplantation pre and post educational strategies implementation (N=50)

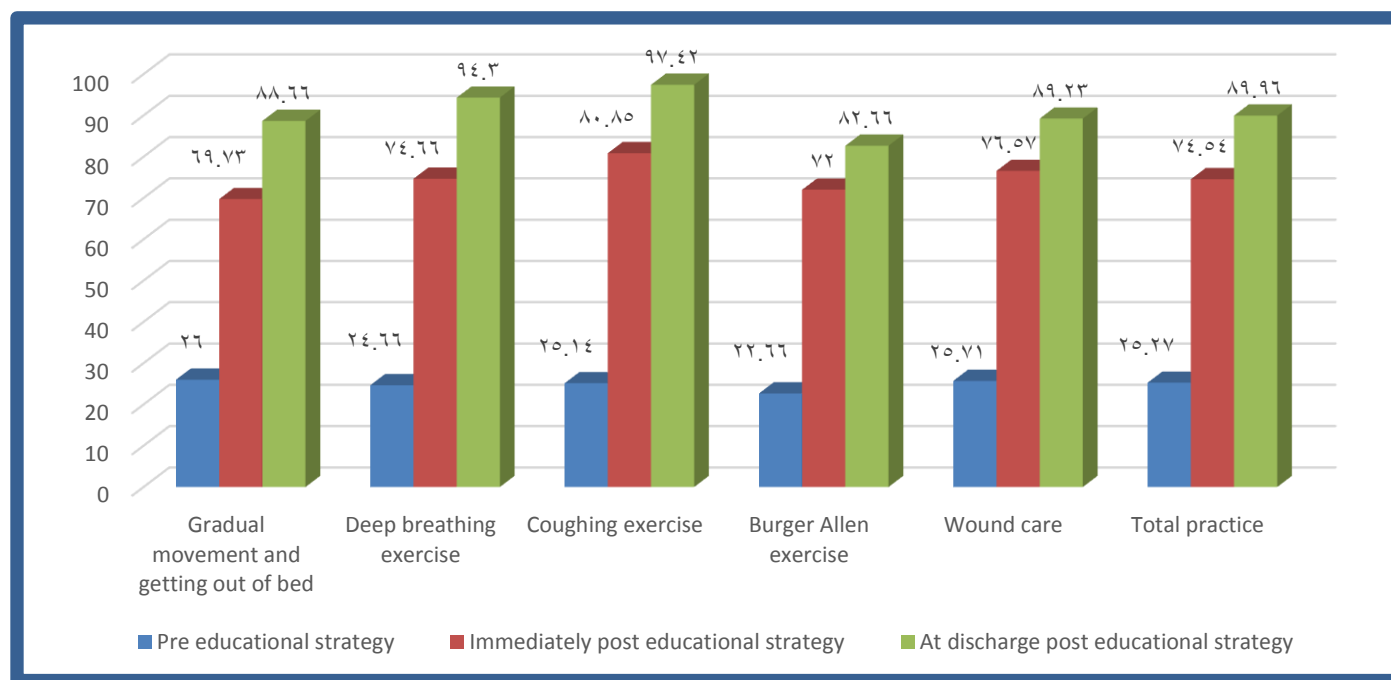


Table (3): Frequency distribution of the studied recipients regarding their health related problems pre and post educational implementation (N=50)

Recipients' health related problems	Baseline		Post educational strategy				Follow up				Q Test	P value
	7 nd day of operation		14 th day of operation		21 th day of operation		1 st month post operation		7 rd months post operation			
	No.	%	No.	%	No.	%	No.	%	No.	%		
Post transplantation rejection complications												
vomiting and nausea	12	24.0	9	18.0	7	14.0	0	0.0	0	0.0	22.980	<0.001*
flu like symptoms	0	0.0	0	0.0	7	14.0	4	8.0	4	8.0	13.846	0.008*
General post transplantation complications												
Bleeding	14	28.0	7	14.0	6	12.0	0	0.0	0	0.0	38.629	<0.001*
Breathing problems												
difficulty breathing	13	26.0	0	0.0	4	8.0	0	0.0	0	0.0	33.294	<0.001*
Dyspnea	9	18.0	0	0.0	0	0.0	0	0.0	0	0.0	23.807	<0.001*
Dry Cough	0	0.0	7	14.0	4	8.0	0	0.0	0	0.0	18.040	0.001**
Wet cough	0	0.0	10	20.0	3	6.0	0	0.0	0	0.0	32.696	<0.001*
Cardiovascular problems												
Heart palpitations	8	16.0	0	0.0	0	0.0	0	0.0	0	0.0	38.340	<0.001*

		*										
Peripheral swelling	*	...	*	...	∇	۱۴. *	ε	∧..	ε	∧..	۱۳.۸۴۶	...۸*
Dizziness when changing position to stand	o	۱.. *	∧	۱۶..	*	...	*	...	*	...	۲۶.۲۸۶	...۱**
Cold extremities	o	۱.. *	ε	∧..	۲	ε..	*	...	*	...	۱۶.۹۶۱	<...۱* *
Delayed capillary refilling	*	...	۳	۶..	۱	۲..	*	...	*	...	۱۸.۸۸.	...۱**
Cyanosis	ε	∧..	۲	ε..	۲	ε..	*	...	*	...	۱۰.۶۶۷	...۳۱*
DVT												
Pain	*	...	*	...	۶	۱۲. *	o	۱.. *	*	...	۲۱.۶۴۷	<...۱* *
Swelling	*	...	*	...	۲	ε..	ε	∧..	ε	∧..	۱۳.۷۱۴	...۸*
Redness	*	...	*	...	ε	∧..	۱	۲..	*	...	۱۲.۰۰۰	...۱۷*
Tenderness	*	...	*	...	ε	∧..	ε	∧..	ε	∧..	۸۴.۳۰۲	<...۱* *
Skin problems												
Paleness or yellowing	*	...	*	...	ε	∧..	ε	∧..	ε	∧..	۸۴.۳۰۲	<...۱* *
Redness	*	...	∇	۱۴..	۳	۶..	*	...	*	...	۱۲.۰۷۱o	<...۱* *
Sensation in extremities: numbness in the extremities	*	...	*	...	ε	∧..	۱	۲..	*	...	۱۲.۰۰۰	...۱۷*

Wound infection												
Pain in wound site due to infection	.	...	∇	۱۴.۰	۳	۶.۰	.	...	.	...	۲۸.۰۰۰	<...۱* *
Swelling around wound	.	...	ε	۸.۰	ε	۸.۰	.	...	.	...	۱۳.۷۱۴	...۸*
Redness of the wound	.	...	ε	۸.۰	ε	۸.۰	.	...	.	...	۱۳.۷۱۴	...۸*
Humidification:	.	...	∇	۱۴.۰	۳	۶.۰	.	...	.	...	۲۸.۰۰۰	<...۱* *
Dry	.	...	∇	۱۴.۰	۳	۶.۰	.	...	.	...	۲۸.۰۰۰	<...۱* *
Moist	o	۱.۰	ε	۸.۰	۲	ε.۰	.	...	.	...	۱۶.۹۶۱	<...۱* *
Scratch	.	...	.	...	.	...	ε	۸.۰	ε	۸.۰	۱۳.۷۱۴	...۸*
Elimination Problems												
A-Defecation												
Diarrhea	.	...	۳	۶.۰	۲	ε.۰	.	...	.	...	۹.۶۸.	...۲*
Constipation	.	...	∇	۱۴.۰	∇	۱۴.۰	.	...	.	...	۳۳.۶۴.	<...۱* *
B- urination process												
Urinary retention	o	۱.۰	o	۱.۰	۲	ε.۰	۲	ε.۰	.	...	۶۲.۶۸.	<...۱* *
Dysurea	.	...	۲	ε.۰	۲	ε.۰	.	...	.	...	۱۰.۰۰۰	<...۱* *
RBCs in urine	۲	ε.۰	.	...	.	...	.	...	.	...	۷۷.۴۴.	<...۱* *

* significant at $p < .05$. **Highly significant at $p < .001$. Q : Cochran's test

Table (4): Correlation between total information and practice with health related problems, physical examination parameters and daily living activity among the studied recipient patients pre, post educational strategy implementation (N= 50)

Variables		Baseline				Post three months			
		Total information		Total Practice		Total information		Total Practice	
		r-test	P-value	r-test	P-value	r-test	P-value	r-test	P-value
	Total Practice	0.309	0.018*	-	-	0.449	0.001**	-	-
Health related problems	Incidence of complications	-0.120	0.407 ^{n.s}	-0.273	0.000	-0.273	0.000	-0.293	0.000*
	Moving ability	-0.264	0.074 ^{n.s}	-0.124	0.397 ^{n.s}	-0.393	0.000*	-0.441	0.000*
	Pain level	-0.030	0.810 ^{n.s}	-0.018	0.919 ^{n.s}	-0.379	0.007*	-0.014	<0.0001**
ADL/Physical examination parameters	Heart rate	0.120	0.407 ^{n.s}	0.269	0.009 ^{n.s}	0.273	0.000	0.496	<0.0001**
	Respiratory rate	0.092	0.027 ^{n.s}	0.070	0.730 ^{n.s}	0.417	0.000*	0.417	0.000*
	Systolic pressure	0.184	0.200 ^{n.s}	0.124	0.397 ^{n.s}	0.330	0.019*	0.363	0.010*
	Diastolic pressure	0.184	0.200 ^{n.s}	0.047	0.747 ^{n.s}	0.441	0.001**	0.441	0.000*
	Albumin level	0.269	0.009 ^{n.s}	0.092	0.027 ^{n.s}	0.273	0.000	0.441	0.000*
	Total protein level	0.008	0.761 ^{n.s}	0.120	0.407 ^{n.s}	-0.379	0.007*	0.427	0.000*
	Bilirubin	0.037	0.797 ^{n.s}	0.126	0.384 ^{n.s}	0.363	0.010*	0.320	0.023*
	Prothrombin time	0.024	0.874 ^{n.s}	0.017	0.911 ^{n.s}	-0.273	0.000	0.281	0.048*
	Daily living activity	0.004	0.978 ^{n.s}	0.217	0.130 ^{n.s}	0.496	<0.0001**	0.623	<0.0001**

rs: Spearman coefficient n.s not significant *: Statistically significant at $p \leq 0.05$ **: Highly Statistically significant at $p \leq 0.001$

Discussion

Regarding age, the current study revealed that about two thirds of studied patients were in the category forty to sixty years old with mean age 46.2 ± 0.98 . From the researcher point of view, this might be due to end stage of liver disease which common in old age as a result of chronic cirrhosis and liver failure for long time that necessitating liver transplantation when conventional therapeutic resources are not sufficient to treat liver disease . This result is agreement with study was conducted by *Gratien et al.*, (2019) who study about " Personalized adapted physical activity before liver transplantation: acceptability and results " and reported that the mean age of the studied sample was 51 ± 12 years.

As regard to sex, the current study results showed that the majority of the studied patients were male. From researcher point of view, that might be due to nature of life in urban areas ,as most men work in agriculture and at risk of contracting schistosomiasis and hepatitis, lack of awareness of the correct use of medications and liver diseases are common in male than female. This finding is agreement with *Kothari et al.*, (2017), who studied about "Inpatient rehabilitation after liver transplantation decreases risk and severity of 30-day readmissions, California, United States" and found that more than half of studied patients were males.

Concerning their marital status, the result revealed that most of the studied patients were married. It may be attributed to the Egyptian culture which encourages early marriage. This is in agreement with a study by *Nader & Hafez* (2014) titled " Health Needs Management Program and Compliance with Therapeutic Regimen among Postoperative Liver Transplant Recipients " and found majority of the studied sample were married.

As regard to educational level, the current study showed that almost one half of the studied patients had secondary education. This finding disagreed with *Abdelrahim*, (2017) reported that less than one third of the studied patients were illiterate.

Regarding to nature of work , the current study showed that more than half of study sample had manual work. Also, *Abdullah et al.*, (2021) who

study " Quality of Life among Elderly Patients with Chronic Liver Diseases at Al-Rajhy Liver Hospital, Assiut University" revealed that more than half of the studied patients were manual workers (farmers)

pertaining to residence, the current study findings revealed that the majority of the studied patients lived in rural areas. This result accepted by *Magdy et al.*, (2022) who revealed that the majority of patients were lived in rural areas..

Concerning their treatment costs, the results of the current study revealed that more than half of the studied patients received treatment at the state's expense. From the researcher point of view, this might be due to the governmental financial support to the patients for surgery and medications costs. Accepted by *Mokbel et al.*, (2020) who study " Biopsychosocial needs of patient after Liver transplantation during follow up period " and discovered that the majority of the studied sample did not have enough income and received their treatment at the state's expense.

The current study revealed that there was statistical significant difference between recipients' information pre and post educational strategies implementation . This finding was consistent with *Elshamy et al.*, (2014) who reported that more than two third of the study participants had good knowledge post instruction.

Supported by *Nader & Hafez*, (2014) who reported that there were highly statistically significant differences between the result of the pre & post program satisfactory scores of knowledge among study subjects regarding meaning , indication , complications of liver transplantation.

Also, there was improvement in mean score of total information between pre educational strategy implementation & immediate post and at discharge. It might contributed to using different educational strategies which helps the recipients to acquire knowledge about liver transplantation as discussion , demonstration and re-demonstration, videos for clinical procedures, booklet and posters . This result in the same line with *Shedeed et al.*, (2021) who

revealed that; more than half of the studied patients had poor knowledge pre implementation of HHC model and more than three fifths of the studied patients had good knowledge post implementation of HHC model. Also, Accepted by *Magdy et al.*, (2022) who revealed that there was an improvement in mean scores of studied patients' total knowledge regarding self-management post program implementation compared to pre program implementation.

Concerning total practices, the current study illustrated that there were statistically significant differences regarding the overall practices at pre implementing educational strategy , compared to immediate post implementing educational strategy and at discharge . The rational of practice improvements among the study recipients may be a result of the provision of direct demonstration, re-demonstration, and follow- up of practical content in instructional booklet which was given to the study recipients. These findings in the same line with *El-Shafiey et al.*, (2019) who demonstrated higher total and subtotal post mean practice scores regarding deep breathing and coughing exercises, using incentive spirometer, range of motion exercises, and breast self-examination during post implementation periods with significant statistical difference at the following P values = < .05.

This finding was supported by *Al Saaid et al.*, (2019) showed that there was a highly significant difference among compliance of the study subjects between pre and post counseling sessions regarding physical activity and minority of the study subjects had unsatisfactory practice regarding physical activity pre session that improved to most of study subjects had satisfactory level of practice post session.

Regarding total mean score of practice , the current study revealed that there were statistically significant differences regarding the overall practices related to Gradual movement and getting out of bed after the operation, Deep breathing exercise, Coughing exercise, Burger Allen exercise and Wound care at pre implementing educational strategy , compared to immediate post implementing educational strategy and at discharge as p value= <.001. This study finding agreed *Elshamy et al.*, (2018), reported that there was significant improvement of the studied

patients total medication adherence pre and post instruction.

Concerning post transplantation complications , the current study revealed that almost one quarter of the studied patients had bleeding on 3rd day post transplantation. Accepted by *Thompson et al.*, (2014) who study " Risk factors associated with reoperation for bleeding following liver transplantation" and illustrated that almost one quarter of the studied patients had experienced bleeding at bleeding in the ICU .

Regarding nausea & vomiting , the current study showed that all most on quarter of the studied patients had suffered from vomiting on 3rd day post operative. In the same line with *Jarrett et al.*, (2022) titled " Nausea, Vomiting, and Dyspepsia Following Solid Organ Abdominal Transplant" showed that more than one third of the studied sample had suffered from nausea & vomiting and it was the most common finding.

Owing to general complications , the current study presented that more than one quarter of the studied patients had difficulty breathing on 3rd day post operative . In accordance with *Feltracco et al.*, (2013) who study " Early respiratory complications after liver transplantation" and reported that the minority of liver transplant patients required ventilatory support due to pulmonary complications, and more than one third had to be reintubated. Accepted by *Bozbas et al.*, (2008) who study " Pulmonary complications and mortality after liver transplant" and illustrated that pulmonary complications were detected in less than half of liver recipients.

Regarding correlation between total information and total practice of the study recipient, It was noticed that that there was a positive correlation between total information and total practice at pre & post educational strategy implementation. From the researcher point of view, this might be attributed to the fact that the knowledge was the basic of practices which affect positively on their practices.

This study finding is agreed with *Elshamy et al.*, (2014) who reported that there was a positive association between total patients' knowledge and patient compliance to immunosuppressive therapy post liver transplantation patient after exposure to instructions was highly statistical significant .In accordance with *El-mahdy et al.*, (2014) revealed that there was statistical significant difference between score of knowledge of studied group about chronic hepatitis and their educational level .

The present study showed that there was no correlation between health related problem, physical examination parameter, daily activity with total information and practice pre educational strategy

conclusion

According to the results of this study, it concluded that:

The recipients' learning needs of information and practice score about post-operative liver transplantation significantly improved post implementing the educational strategy. Also, their health outcomes as health-related problems, physical examination, and activity of daily living improved with high statistically significance differences ($P < 0.001$), Moreover , there was a positive correlation between total information and total practice at pre & post educational implementation. While there were statistically correlation between health related problem, physical examination parameter, daily activity with total information and practice pre educational implementation. Which supported the research hypotheses.

Recommendations

In the light of the results of this study, the following points are recommended

- ✚ The need for continuous educational and training programs for patients post liver

implementation. This finding is disagreed with with *Shedeed et al.*, (2021) and stated that there were positive statistically significant correlations between the studied patients` total quality of life and total practices and total knowledge pre and post implementation of HHC model .

There were negative statistically correlation between total information and practice with moving ability and pain level. Supported by *Reaza& Rodríguez*, (2014) who studied " Effectiveness of nursing educational interventions in managing post-surgical pain. Systematic review" found that nursing educational interventions reduce mobility problems, improve adherence to treatment after surgery and improve relief of post-surgical pain

transplantation for support them and improve health outcome.

- ✚ Activating the educator role of the nurse in all health care centers to raise awareness among people about the importance for need early diagnosis, proper treatment, adherence to medications, and follow-up.
- ✚ Continuous education for LT patients about self-management to manage symptoms and improve their QOL.
- ✚ Providing rehabilitation plan for recipient of LT include: providing social support post transplantation, preparing to return to their occupational activities, coping strategy with working sites, self -care management, and their nutrition for maintaining the ideal body weight.
- ✚ To generalize the findings, similar studies should be replicated on a large sample size in different geographic areas in Egypt.

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