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Evaluation of treatment costs for patients with cirrhosis in the public medical unit: an interview with medical staff

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Abstract

This research investigates how the costs associated with the treatment of patients with liver cirrhosis are managed in a public sector health facility. The study focuses on assessing and analyzing the experiences and opinions of healthcare professionals involved in the care of these patients, including doctors, nurses and administrators. The main method of data collection is semi-structured interviews, which provided a detailed insight into how costs are perceived, monitored and managed in practice.
The results of the interviews indicate the high costs of the drugs, equipment and medical procedures required to care for these patients, as well as the economic impact of the complications associated with the disease.

Keywords: *cirrhosis of the liver, costs, disease management, patient, efficiency*
J.E.L. classification: *D61, H55, I13*

Introduction

Cirrhosis of the liver is an advanced phase of chronic liver disease, characterized by a variety of causes that affect the structure and functioning of the liver. This condition can lead to serious complications such as portal hypertension, esophageal variceal bleeding, spontaneous bacterial peritonitis and hepatic encephalopathy. The management of these complications involves significant healthcare costs, so it is crucial to identify economically effective treatment strategies. This article investigates the economic impact of various therapeutic and prophylactic regimens used for complications associated with cirrhosis of the liver.

From an economic point of view, this is reflected in an increased number of patients who require continuous medical care and who bear the significant costs associated with the treatment of complications through the occurrence of decompensations and subsequent monitoring.

The use of beta-adrenergic blockers for prophylactic purposes for portal hypertension and variceal bleeding appears to provide economic benefits, but the most effective treatment regimen for initial bleeding is not clearly defined given the lack of an adequate cost comparison between pharmacological and surgical treatment. As for the prophylaxis of spontaneous bacterial peritonitis, there is not enough evidence to recommend a particular strategy.

Standard treatment for spontaneous bacterial peritonitis involves taking antibiotics, and their economic cost largely depends on the price of these drugs. However, the possibility of developing bacterial resistance to antibiotics and associated rates of therapeutic failure should be considered.

Nonabsorbable disaccharides are standard treatments for hepatic encephalopathy; However, due to their uncertain efficacy, rifaximin, a nonsystemic antibiotic, can be considered a more economically effective long-term treatment for hepatic encephalopathy, despite its high cost, proven efficacy and reduced risk of hospitalization.

Future studies evaluating the costs associated with cirrhosis of the liver and its complications, including the costs of screening, treatment, and maintenance therapy, as well as costs related to liver transplantation, its

success, and post-transplant quality of life, are essential to fully understand the economic burden of hepatic encephalopathy and all cirrhosis-related complications.

Literature review

Cirrhosis is a complex chronic liver disease of varying etiology, including chronic viral hepatitis, alcoholic liver disease, and MASLD. This disease causes damage to the liver (Heidelbaugh JJ, Bruderly M. 2006), with the consequence of resistance to hepatic blood flow due to fibrosis, leading to portal hypertension and the formation of portosystemic collaterals (Garcia-Tsao G, Lim JK. 2009: pp. 1802–1829), reducing blood flow through the liver and causing the accumulation of toxins in the systemic circulation. The symptoms of cirrhosis develop over a varied course, from the absence of symptoms in the early stages to severe complications such as esophageal variceal bleeding and hepatic encephalopathy, resulting from portal hypertension and reduced clearance of toxins.

The main objective of therapy for cirrhosis is to manage patients' symptoms and prevent associated complications, until it is possible to perform a liver transplant (Cardenas A, Gines P. 2005: pp. 124–133), until, at least theoretically speaking, liver transplantation is possible and indicated. Transplantation is indicated only under certain conditions and only according to a protocol for inclusion on the transplant list. Standard care strategies include appropriate screening and treatment of secondary complications of cirrhosis, such as portal hypertension, esophageal variceal bleeding, spontaneous bacterial peritonitis, and hepatic encephalopathy. Despite a relatively stable incidence of these disorders in recent years, the costs associated with hospitalization, screening, and treatment of these complications have increased, raising concerns about the economic burden of cirrhosis. (Lim YS, Kim WR. 2008:733–746)

Worldwide, cirrhosis of the liver affects up to 10% of the population, although precise estimation is difficult due to the fact that the disease can remain undetected until associated complications such as ascites, edema, hemorrhagic manifestations, jaundice and encephalopathy, jaundice, become apparent. Cirrhosis is among the leading causes of death globally, bringing with it morbidity and a significant decline in health-related quality of life, as well as a direct cost (excluding hepatitis C [HCV] virus) of approximately $1.4 billion in the US. The main causes of cirrhosis of the liver include HCV, hepatitis B virus and alcohol consumption, which indicates that the disease is preventable. Indeed, several practices have been implemented to reduce the risk of hepatitis infections, such as screening blood donors and pregnant women for infection, vaccination programmes for infants and high-risk populations, and instituting infection control practices in hospitals. (Wasley A, Grytdal S, Gallagher K. 2008: pp. 1–24) However, the cost of some of these programs may not justify their implementation, despite the fact that they could prevent chronic infections and thus cirrhosis. (Lavanchy D. 2009: pp. 74–81) In addition, even with a decrease in the number of new infections, the cost of managing elderly patients with chronic liver disease can be considerable. For example, in 2009, the per-patient cost of managing chronic HCV infection was estimated to increase 3.5-fold over the next 20 years.

Currently, the management of patients with cirrhosis focuses on treating underlying diseases, such as hepatitis C virus and/or hepatitis B virus infection, and managing associated symptoms while avoiding decompensation. Overall, according to data on the cost and use of healthcare, the number of hospital exits for chronic liver disease and cirrhosis has increased. The cost of hospitalization has increased. This significant increase in hospitalization costs can be attributed to overall inflation in health care spending and changes in therapeutic regimens for the treatment of cirrhosis-related diseases such as HCV, in addition to normal inflation rates.

More effective, albeit more expensive, treatment regimens can provide a greater chance of survival for patients, thus preparing them for a liver transplant. Economically, this is reflected in an increased number of patients requiring continuous medical care and bearing the significant costs associated with liver transplantation and follow-up.

In addition, patients on the liver transplant waiting list should undergo evaluation and treatment for complications associated with cirrhosis in order to maintain their overall health and prepare for surgery. Caring for these patients imposes significant costs on the healthcare system; In fact, the average annual cost for the treatment of patients with decompensated cirrhosis is considerably higher than that of patients with

compensated cirrhosis. (Brown RE, De Cock E, Colin X, Antonanzas F, Iloeje UH. 2004: pp.169–174) Therefore, economically efficient management of cirrhosis-related complications should be a priority.
Cirrhosis can remain clinically "silent" in approximately 40% of patients and can only be detected after a routine medical examination or investigation of the etiology of nonspecific symptoms. (Heidelbaugh JJ, Bruderly M. 2006: pp. 756–762) These patients are classified as having compensated cirrhosis and have a 5-year survival rate of approximately 90%. (Grewal P, Martin P. 2009: pp. 331–340) However, compensated cirrhosis may progress to a decompensated state, which may be associated with portal hypertension, variceal esophageal bleeding, spontaneous bacterial peritonitis, or hepatic encephalopathy. Without proper management of these complications and without a subsequent liver transplant, less than half of patients with decompensated cirrhosis survive for 5 years.
Portal hypertension, which is often the main cause of hospitalization in patients with cirrhosis and is clinically manifested, most often, by the appearance of ascites, edema and variceal bleeding.
Indirect costs, such as loss of productivity at work and car accidents caused by patients with minimal hepatic encephalopathy, also have an impact on the economic burden of cirrhosis-related complications and are, to date, unexplored. The cost of ineffective therapeutic and maintenance regimens, including expenses associated with decreased quality of life, increases the economic burden of cirrhosis-related diseases. Evaluating and using cost-effective therapeutic strategies to prevent the onset and stop progression and relapse of various cirrhosis-related complications are essential in reducing the economic impact of these disorders.

Research methodology

Study objective

The purpose of this study is to assess treatment costs for patients with cirrhosis in a public healthcare facility through interviews with medical staff. It aims to obtain detailed information about the management of patients with cirrhosis, identify the main cost components and evaluate the economic efficiency of different treatment regimens.

Study design

The study adopts a qualitative design, based on semi-structured interviews with medical staff in the public medical unit. The interview method was chosen to gain detailed and nuanced insights into cirrhosis costs and management directly from practitioners.
The following medical staff members were interviewed: 3 internists, 1 nurse, 3 nurses.
Participants were selected by a convenient sampling technique, given their availability and experience in the treatment of patients with cirrhosis.
A semi-structured interview guide has been developed to ensure that all relevant aspects are covered. The guide included questions about:

- The general cost structure of treatment for cirrhosis.
- Identification of the main types of costs (e.g. medicines, hospitalisation, diagnostic procedures).
- Economic efficiency of various treatment regimens.
- Challenges encountered in cost management.

Interviews were conducted in a private and comfortable environment for participants to encourage openness and honesty. Each interview lasted between 30 and 45 minutes and was audio-recorded with the consent of the participants. Audio recordings have been transcribed in full for further analysis.
Data were organized into major themes and sub-themes to describe participants' perspectives on cirrhosis costs and management in detail.
The study was approved by the ethics committee of the medical unit. All participants provided informed consent prior to participation. The confidentiality and anonymity of participants were ensured throughout the study.

Since only a small number of people were interviewed (3 internists, 1 nurse and 3 nurses), the results cannot be generalized to all public health facilities or to all cases of cirrhosis. The study provides detailed but limited insights into the experiences and knowledge of these specific participants.
Participants may have subjective perspectives and experiences that can influence their responses. There is also the possibility of responses influenced by the desire to present a positive image of their practices.
The study uses a qualitative methodology which, although providing detailed and in-depth information, does not allow precise quantification of costs. Further analyses could benefit from being complemented by quantitative data for a more comprehensive assessment.This qualitative study explores the costs and management of treatment for patients with cirrhosis within a public healthcare facility through interviews with healthcare professionals. The information obtained provides valuable insights into the cost structure, challenges encountered and economic efficiency of different treatment regimens, contributing to a better understanding of how resources can be optimized in the treatment of cirrhosis.

Results

Financial analysis article summary: treatment costs for patients with cirrhosis

Table no. 1: Treatment costs

Treatment element	**Unit cost**	**Daily quantity**	**Daily cost**
Human Albumin Albunorm	85 lei / 50 ml	100 ml	170 lei
Silimarina	N/A	N/A	N/A
Arginine Sorbitol Infusion Solution	46 lei / 500 ml	1000 ml	92 lei
Vitamin B Group	N/A	N/A	N/A
Lactulose	35 lei / bottle	1 bottle	35 lei
Amino Acids and Mineral Solutions	75.5 lei / 1000 ml	2000 ml	151 lei
Total			**448 lei**

Observations:

- **Silimarina**: Not available in the hospital pharmacy, must be purchased by the patient/relatives.
- **Vitamin B Group**: Not available in the hospital, unknown cost.
- **Lactulose**: Available only in private pharmacies, the hospital uses only saline solutions for enemas.

Total daily cost: 448 lei (excluding Silimarina and Vitamin B Group).

Request and reimbursement procedure analysis

When the hospital pharmacy does not have a necessary medication, the doctor must initiate a procedure to request it. The procedure includes the following steps:

1. The doctor completes a necessity referral explaining the reasons for the request.
2. The referral is signed by the head of the department and then by the medical director.
3. The referral goes to the pharmacy, which decides whether to release the medication or not.
4. If the pharmacy cannot release the medication (out of stock and unable to procure it), the relatives are instructed to purchase it from an external pharmacy with an invoice.
5. The relatives can submit a reimbursement file, which will be approved at the hospital's purchase price.

Table no. 2: Treatment elements and costs

Treatment element	Unit cost hospital	Daily quantity	Daily cost (lei)	External cost (lei)	Hospital reimbursement (lei)
Human Albumin Albunorm	85 lei / 50 ml	100 ml	170 lei	130 lei / 50 ml	4 x 85 lei (340 lei)
Silimarina	N/A	N/A	N/A	Variable cost	Purchase cost
Arginine Sorbitol Infusion Solution	46 lei / 500 ml	1000 ml	92 lei	N/A	N/A
Vitamin B Group	N/A	N/A	N/A	Variable cost	Purchase cost
Lactulose	35 lei / bottle	1 bottle	35 lei	35 lei / bottle	Purchase cost
Amino Acids and Mineral Solutions	75.5 lei / 1000 ml	2000 ml	151 lei	N/A	N/A
Total			**448 lei**		

Reimbursement example:
For human albumin Albunorm:

- The patient buys 4 bottles at 130 lei each: 4 x 130 lei = 520 lei
- The hospital reimburses: 4 x 85 lei = 340 lei

Request and reimbursement procedure

- **Necessity referral:**
  - The doctor prepares the explanatory referral for the necessary medication.
  - The referral is signed by the head of the department and the medical director.
- **Pharmacy decision:**
  - The pharmacy decides whether to release the requested medication.
  - In case of refusal, relatives are instructed to purchase the medication externally.
- **External purchase and reimbursement:**
  - Relatives purchase the medication from an external pharmacy and keep the invoice.
  - Relatives submit the reimbursement file to the hospital.
  - The hospital approves the reimbursement at the hospital's purchase price, not the external purchase price.

This analysis reflects the complexity of obtaining and reimbursing medications for cirrhosis patients when these are not available in the hospital pharmacy. It also highlights significant cost differences and reimbursements between external purchase prices and hospital-set prices.

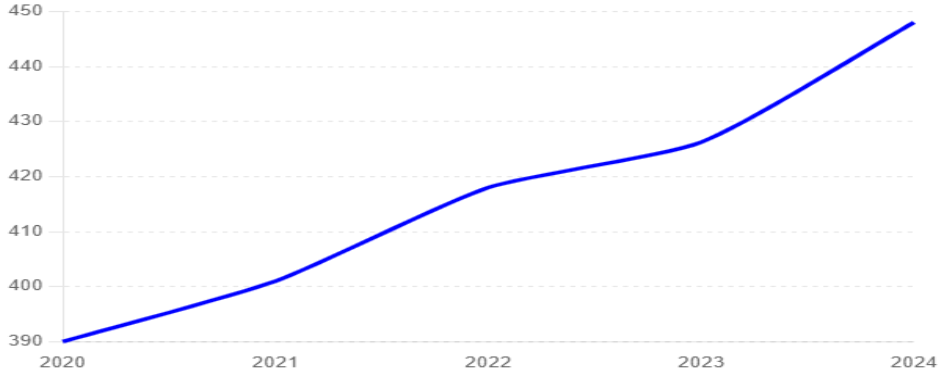

Figure no. 1: Evolution of daily treatment cost for cirrhosis patients from 2020 to 2024

The graph illustrates a constant increase in treatment costs over these years.

Table no. 3: Monthly average treatment costs for cirrhosis patients

Year	Monthly average cost (lei)
2020	11,700
2021	12,030
2022	12,540
2023	12,786.90
2024	13,440

These values reflect monthly treatment costs for each year, considering the daily cost multiplied by 30 days.

Table no. 4: Annual cost increase percentages

Period	Annual Increase (%)
2020-2021	2.82%
2021-2022	4.24%
2022-2023	1.97%
2023-2024	5.11%

Summary of increase in daily treatment costs (2020-2024).
The daily cost for cirrhosis treatment increased from 390 lei in 2020 to 448 lei in 2024. The possible reasons for this increase include:

- **Inflation and price increase:**
  - Annual increases in medication and medical supply prices due to general inflation, higher raw material prices, and production costs.
- **Updated treatment protocols:**
  - New and more effective but expensive medications and procedures introduced in annual treatment protocol updates.
- **Availability and supply issues:**
  - Supply problems and stock shortages leading to urgent purchases from alternative suppliers, often at higher prices. This aspect is also reflected in the request and reimbursement procedures, potentially involving additional costs for patients and the hospital.
- **Health policy changes:**
  - Legislative changes and regulations imposed by health authorities can influence medication and medical service prices. Additional taxes or reimbursement scheme changes can impact daily treatment costs.
- **Increased demand for specialized treatments:**
  - As the number of diagnosed cirrhosis patients and other liver conditions increases, the demand for specialized treatments and medical resources grows, putting pressure on the health system and leading to higher costs to meet patient needs.

These factors together contribute to the continuous increase in daily treatment costs for cirrhosis patients. Analyzing these causes is essential for efficient resource management and ensuring patient access to necessary treatments.
Medical staff statements:
Dr. M. I., internist:

- Albumin, Silimarina-based supplements, Vitamin B group, ammonia-fixers, and arginine are essential for cirrhosis patients.
- The lack of reimbursement for these medications is a major problem for low socio-economic status patients, leading to health deterioration.

Dr. A. P., internist:
- The lack of reimbursement for essential medications is a significant barrier in cirrhosis patient care.
- Patients with limited financial resources cannot afford supplements, worsening disease complications and negatively impacting their quality of life.

Dr. E. V., internist:
- Lack of reimbursement and low income lead to difficulties in administering necessary treatments, including albumin and arginine, essential in severe decompensations.
- Addressing this issue at the public health policy level is crucial to improving access to treatments.

Nurse A. G.:
- Many patients abandon their treatments due to high costs of non-reimbursed supplements like Silimarina and Vitamin B group.
- It's painful to see patients who could benefit from these supplements but cannot afford them.

Nurse I. R.:
- The lack of reimbursement for essential medications directly affects cirrhosis patients, leading to low treatment adherence and worsening health.
- We must find ways to support these patients, perhaps through special funding or medication donation programs.

Nurse M. D.:
- Providing adequate care for cirrhosis patients is extremely difficult when they cannot afford necessary supplements.
- We need to improve access to these essential medications.

Nurse E. M.:
- Patients with limited financial resources cannot afford recommended treatments, worsening their health.
- Making these treatments more accessible is essential to prevent severe complications.

These responses highlight the urgent need to improve medication reimbursement policies to support cirrhosis patients, especially those with limited financial resources. Equal access to essential medications and treatments is crucial for preventing severe complications and improving patient quality of life.

Conclusions

Following interviews with medical staff in the public health unit, several critical aspects related to cost management and treatment accessibility for patients with cirrhosis of the liver were highlighted:

- Alcohol consumption, the leading cause of cirrhosis among patients interviewed, led to job losses for many of them. The loss of employment has worsened patients' financial situation, limiting their ability to access the treatments needed to manage the disease.
- Patients of low socioeconomic status cannot afford essential medicines such as silymarin supplements, B vitamins, ammoniofixers, and injectable and drinking arginine because they are not compensated. This contributes to the worsening of their health, as the lack of proper treatment leads to severe complications and subsequent higher medical costs.
- Cirrhosis-associated clotting disorders, caused by decreased coagulation factors and thrombocytopenia, make venous access and intravenous treatment difficult. These complications are aggravated by non-compliance with recommended treatment, largely due to lack of compensation for drugs and the uninsured status of some patients.
- Patients who could afford to purchase treatment experienced milder forms of EH, demonstrating an inverse relationship between EH severity and socioeconomic status. This underlines the importance of access to appropriate treatment to prevent severe complications of cirrhosis.
- Cost-effective management and affordability of treatment are essential to improve the quality of life of patients with cirrhosis and reduce the economic burden on the healthcare system. It is imperative to

develop compensation strategies and support programs for patients of low socioeconomic status to prevent serious complications and higher subsequent costs.

- Health professionals play a crucial role in assessing and managing cirrhosis complications, educating patients on the importance of following treatment, and helping them access available resources.

These conclusions highlight the need for more effective health policies that ensure equitable access to treatment for all patients with cirrhosis, regardless of their socio-economic status, and thus reduce the economic and medical burden of this disease.

Future research perspectives

- Investigating the impact of financial and social support programs on affordability and adherence to treatment for patients with cirrhosis. Studies could assess how financial aid, social counseling, and reintegration programs influence treatment outcomes and patients' quality of life.
- Conducting studies evaluating the cost-effectiveness of uncompensated medications such as silymarin supplements, B vitamins, ammonium fixatives, and arginine. These studies could demonstrate the economic and clinical benefits of compensating these drugs, helping to improve health policies.
- Developing innovative and cost-effective strategies for managing cirrhosis-related complications such as coagulation disorders and hepatic encephalopathy. Studies could look at the effectiveness of new therapies and venous access techniques compared to traditional methods.
- Exploring the relationship between patients' socioeconomic status and cirrhosis outcome. Research could reveal how economic factors influence disease progression, severity of complications and treatment outcomes, providing key data for the development of targeted interventions.
- Evaluating the impact of education and awareness programs on treatment adherence and prevention of cirrhosis complications. Studies could look at the effectiveness of educational campaigns, support groups and medical counseling in improving patients' disease management.
- Investigating the role of telemedicine and remote monitoring technologies in the management of cirrhosis. Research could assess how these technologies can improve access to care, continuously monitor patients' conditions, and reduce costs associated with hospitalizations.

Studying mechanisms of resistance to standard treatments and developing personalized therapies for patients with cirrhosis. This research could lead to the discovery of predictive biomarkers and the adjustment of treatments according to the individual characteristics of patients.By addressing these research perspectives, the medical community can advance in understanding and effectively managing cirrhosis, thereby helping to improve patients' quality of life and reduce the economic burden on the healthcare system.

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