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RESEARCH

Cirrhosis and Alcoholic Hepatitis - DESCRIPTIVE STUDY ON HOSPITALIZATION EPISODES, ROMANIA, 2014-2023

Marius CIUTAN[1], *MD, Primary Care Physician in Public Health and Management*

Carmen SASU[1], *MD, Primary Care Physician in Public Health and Management*

[1]*National Institute for Health Services Management*

The correct use of the system based on grouping hospitalization episodes into diagnosis-related groups (DRGs) for the classification and management of patients with cirrhosis and alcoholic hepatitis is important for improving clinical outcomes and reducing hospital costs.

The data recorded over the last 10 years reveal territorial, evolutionary, and clinical or demographic variations in hospitalizations of patients classified under the diagnostic groups related to Cirrhosis and Alcoholic Hepatitis. This information can support decision-making by providing an updated and detailed view of the current situation, and the measures that can be identified should consider a set of specific preventive and therapeutic interventions.

Early identification of patients at risk of severe complications can contribute to the optimization of resources and the implementation of more effective interventions. Close monitoring of the incidence and trends in these diseases and the case management of these patients is necessary to efficiently manage resources and offer solutions to improve the care provided to patients with alcoholic liver diseases.

Keywords: liver cirrhosis, Alcoholic Cirrhosis, Alcoholic Hepatitis, Romania

I. INTRODUCTION

Liver diseases represent a major burden on healthcare systems globally, with cirrhosis and alcoholic hepatitis being two of the most common and severe liver conditions.

According to the "Global Burden of Disease (GBD)" study, in 2017, the estimated number of people with compensated cirrhosis was 112 million worldwide, corresponding to a global age-standardized prevalence of compensated cirrhosis of 1,395 cases per 100,000 inhabitants [1].

In Romania, according to the National Report on the Health Status of the Population [2], mortality from liver cirrhosis (total) showed a downward trend between 2007 and 2016, decreasing by 2.5‰ inhabitants, from 37.6‰ in 2007 to 35.1‰ in 2016. From 2007 to 2010, the rate increased annually, then significantly decreased in 2011, stabilizing around 35-36‰. Mortality rates among males, for both age groups (0-64 years and 65+ years), were higher than the national average, while female mortality rates were much lower than the national average for both age groups. There is little evidence available regarding hospitalizations for cirrhosis or alcoholic hepatitis.

In addition to excessive alcohol consumption, which is the primary risk factor for the development of these specific diseases, other factors may contribute to the onset or worsening of these conditions. These factors include genetic predisposition, poor nutrition, viral infections, and exposure to other toxins. Although not all individuals who consume alcohol develop hepatitis or cirrhosis, the risk increases significantly with the amount and duration of alcohol consumption.

Cirrhosis and alcoholic hepatitis are burdensome conditions at both the individual and societal levels, as they negatively affect patients' quality of life, increase mortality, and generate significant healthcare costs. The burden of these diseases is exacerbated by the fact that, in advanced stages, they can lead to liver failure, gastrointestinal bleeding, fluid accumulation in the abdomen (ascites), hepatic encephalopathy, and ultimately, death. Given the limited treatment options and poor prognosis, early diagnosis and optimal intervention based on disease stage are crucial.

Moreover, these diseases impose a substantial financial burden on the healthcare system. Treating patients with advanced alcoholic cirrhosis requires frequent hospitalizations, costly procedures, and, in some cases, liver transplantation. Indirect costs, such as lost productivity and the impact on families, are also significant.

This analysis aims to provide evidence on the level of hospitalizations and to identify hospitalization patterns within the diagnosis-related groups associated with Cirrhosis and Alcoholic Hepatitis.

II. OBJECTIVE

Identification at the national and regional levels of the geographic distribution of hospitalization episodes for patients classified under the diagnostic groups related to Cirrhosis and Alcoholic Hepatitis, as well as the temporal evolution of their numbers during the period 2014-2023.

III. METHODOLOGY

This study is a descriptive, retrospective study conducted on data reported by hospitals in Romania and included in the National DRG Database. It encompasses all continuous hospitalizations from 2014 to 2023 reported by hospitals in Romania that have a contractual relationship with the National Health Insurance House. According to the provisions of Order no. 1782/576/2006 regarding the registration and statistical reporting of patients receiving medical services in continuous hospitalization and day hospitalization, with subsequent amendments, the National Institute for Health Services Management (INMSS) collects and processes the minimum data set at the patient level for cases treated in both continuous and day hospitalization settings.

Data were selected using ICD-10-AM classification and hospitalization grouping with the Romanian

grouper RODRGv1.1. Records from observation sheets were extracted and analyzed, which were grouped into one of three DRG codes, namely:

- DRG H3011: Cirrhosis and Alcoholic Hepatitis with Catastrophic Complications
- DRG H3012: Cirrhosis and Alcoholic Hepatitis with Severe Complications

DRG H3013: Cirrhosis and Alcoholic Hepatitis without Catastrophic or Severe Complications

In accordance with the provisions of Law 190/2018 and Article 13 of EU Regulation No. 679/2016, personal data is deleted upon transmission to INMSS, and individual identification for analysis purposes is done using encrypted Personal Numeric Code (CNP). Patients' ages were calculated in completed years, as the difference between the admission date and the date of birth.

Data were processed using SQL Server Management Studio Express 2005 software, with further processing and analysis performed using SPSS and Excel programs. Analysis was conducted based on a series of demographic and socioeconomic variables such as age, length of stay, discharge status, etc., information included in the minimum data set reported in the DRG system by hospitals. Interpretation and presentation were done in the form of tables and charts.

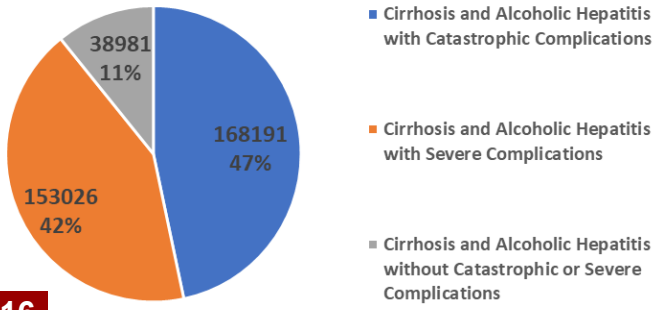
IV. RESULTS

The overall picture regarding the level and trend of Cirrhosis and Alcoholic Hepatitis was configured by calculating and analyzing the levels of indicators across different territories, as well as their temporal evolution (the last 10 years, specifically the period 2014-2023).

TEMPORAL EVOLUTION OF HOSPITALIZATIONS CLASSIFIED AS "CIRRHOSIS AND ALCOHOLIC HEPATITIS"

Total number of hospitalization episodes for patients with Cirrhosis and Alcoholic Hepatitis recorded in Romania from 2014 to 2023

Figure 1: Total Number of Continuous Hospitalization Episodes Reported by DRG Group for Cirrhosis and Alcoholic Hepatitis, 2014-2023, at the National Level



The total number of continuous hospitalization episodes for patients classified under the diagnostic groups related to "Cirrhosis and Alcoholic Hepatitis" during the period 2014-2023 was 360,198 episodes. Of these, the majority (47%) were coded as Cirrhosis and Alcoholic Hepatitis with Catastrophic Complications, over two-fifths (42%) as Cirrhosis and Alcoholic Hepatitis with Severe Complications, and just over one-tenth (11%) were grouped as Cirrhosis and Alcoholic Hepatitis without Catastrophic or Severe Complications. (*Figure 1)*

Temporal Evolution of Hospitalization Episodes for Cirrhosis and Alcoholic Hepatitis in Romania, 2014-2023

The trend over the last 10 years is somewhat decreasing, interrupted by a sharp decline during the COVID-19 pandemic, followed by a gradual return in the number of hospitalizations, though not yet reaching pre-pandemic levels (as of 2023).

Thus, at the beginning of the pandemic, the level was half of that of the first year of the analyzed period (2014). By 2023, the level is estimated to be two-thirds (68%) of the level recorded in 2014. (*Figure 2)*

Distribution of Hospitalization Episodes by County, 2014-2023

The territorial analysis highlights differences based on patient residence. At the county level, Bacău County stands out with the highest number of hospitalizations (2,534 hospitalizations in 2023) for patients categorized under "Cirrhosis and Alcoholic Hepatitis," whereas Covasna County reports the lowest number (187 hospitalizations in 2023).

In 2023, the highest number of hospitalizations was reported for patients from the eastern part of the country (mainly the Moldova region) compared to the western part of the country (Caraș-Severin, Bistrița-Năsăud etc.). (*Figure 3)*

Demographic Aspects

- **Patient Gender**

Men had two-thirds more hospitalizations during the analyzed period in comarison with women. The trend by gender follows a similar pattern to the overall trend with a general decrease in hospitalizations and a sharp decline during the pandemic. (*Table 1)*

- **Patient Occupation**

Nearly two-thirds (64%) of hospitalizations during this period were for retirees, followed by the unemployed and those without occupation (18.6%), while employed individuals represented a much smaller share (12.1%). (*Table 2)*

- **Average Age of Hospitalized Patients**

The average age at admission did not vary over time or between genders. The average age at which patients

Figure 2: Evolution of the total number of hospitalization episodes reported for patients grouped under Cirrhosis and Alcoholic Hepatitis from 2014 to 2023, at the national level

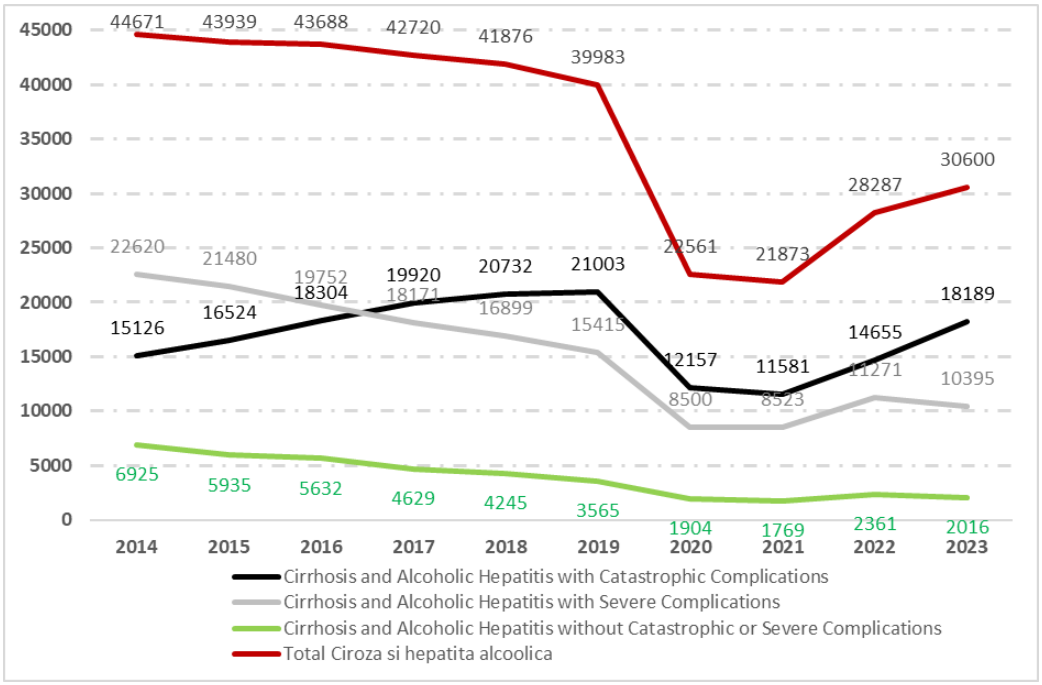
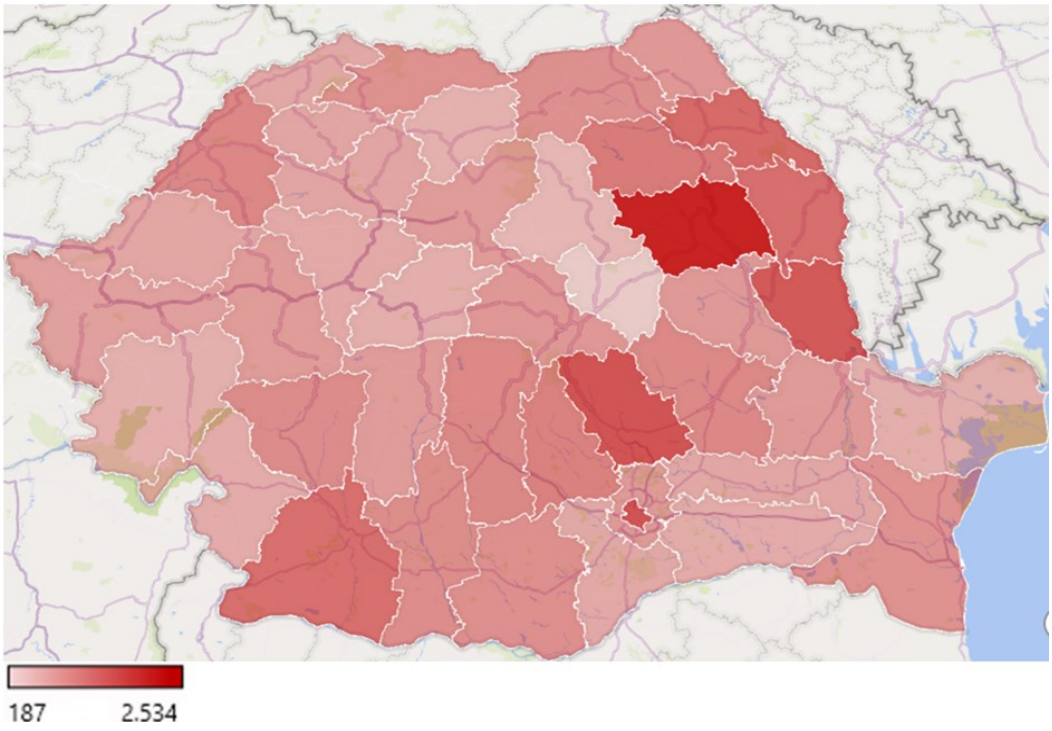


Figure 3: Cartogram. Distribution of hospitalization episodes by county in Romania, 2014-2023



acces hospital care for specific treatments was 60 years. In general, women were 3-4 years older than men who were classified under one of the three DRGs for Cirrhosis and Alcoholic Hepatitis. The recorded differences were not statistically significant for comparisons by gender, year, or DRG group (t-test; p-value > 0.05). (*Table 3)*

Clinical Aspects

Primary Diagnosis

The main pathology for which resources were consumed during the hospitalization of these patients was analyzed based on the ICD-10 diagnosis code assigned by the attending physician. With minor differences between genders, the hospitalization pattern of patients classified under diagnostic groups for "Cirrhosis and Alcoholic Hepatitis" is characterized by the presence in the top 5 most frequent diagnoses of: K74.6 Other and unspecified cirrhosis of liver, K70.3 Alcoholic cirrhosis of liver, K71.7 Toxic liver disease with fibrosis and cirrhosis of liver, K70.1 Alcoholic hepatitis, K74.0 Hepatic fibrosis. At the lower end of the ranking are diagnoses such as: K74.3 Primary biliary cirrhosis, K74.4 Secondary biliary cirrhosis, K74.5 Unspecified biliary cirrhosis. (*Table 4)*

Discharge Status

In-Hospital Deaths Among Patients Classified Under DRGs for Cirrhosis and Alcoholic Hepatitis

Table 1: Number of hospitalizations for patients classified under DRGs for Cirrhosis and Alcoholic Hepatitis in Romania, Evolution 2014-2023

No. of hospitalizations	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Women	17874	17720	17582	17027	16111	14647	7648	6971	9132	9659	134371
Men	26797	26219	26106	25693	25765	25336	14913	14902	19155	20941	225827
Total	**44671**	**43939**	**43688**	**42720**	**41876**	**39983**	**22561**	**21873**	**28287**	**30600**	**360198**

Table 2: Occupation of patients classified under DRGs for Cirrhosis and Alcoholic Hepatitis in Romania, Evolution 2014-2023.

Occupation	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total	% Total
Unemployed	31853	30832	29805	28402	26987	25223	13073	11706	15425	17245	230551	64,0%
Job seeker	6254	6275	6965	7256	7714	7817	4901	4942	6620	6797	65541	18,2%
Employee	310	243	192	184	155	152	78	63	133	101	1611	0,4%
Self-employed	4675	4776	4729	4902	4949	4652	2926	3252	4202	4690	43753	12,1%
Pupil/ Student	163	163	146	170	150	155	103	137	170	184	1541	0,4%
Farmer	98	57	72	52	54	52	27	42	47	59	560	0,2%
Business owner	56	46	22	29	28	25	7	7	12	22	254	0,1%
NULL	13	23	21	22	26	14	10	17	15	22	183	0,1%
Unemployed	1249	1524	1736	1703	1813	1893	1436	1707	1663	1480	16204	4,5%
Total	**44671**	**43939**	**43688**	**42720**	**41876**	**39983**	**22561**	**21873**	**28287**	**30600**	**360198**	100,0%

Table 3: Average age at admission for hospitalizations of patients classified under DRGs for Cirrhosis and Alcoholic Hepatitis in Romania, Evolution 2014-2023

Code DRG	DRG Group	Sex	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
H3011	Cirrhosis d Alcoholic Hepatitis with Catastrophic Complications	F	63	64	64	64	64	63	63	62	62	63	63
		M	59	59	59	59	59	59	59	59	59	59	59
H3012	Cirrhosis d Alcoholic Hepatitis with Severe Complications	F	63	63	64	64	64	64	63	62	63	63	63
		M	59	60	60	60	60	60	60	59	59	59	60
H3013	Cirrhosis d Alcoholic Hepatitis without Catastrophic or Severe Complications	F	61	62	62	63	63	62	63	59	61	62	62
		M	57	58	58	58	58	58	57	58	58	58	58
Grd Total			**60**	**61**	**61**	**61**	**61**	**61**	**60**	**60**	**60**	**60**	**61**

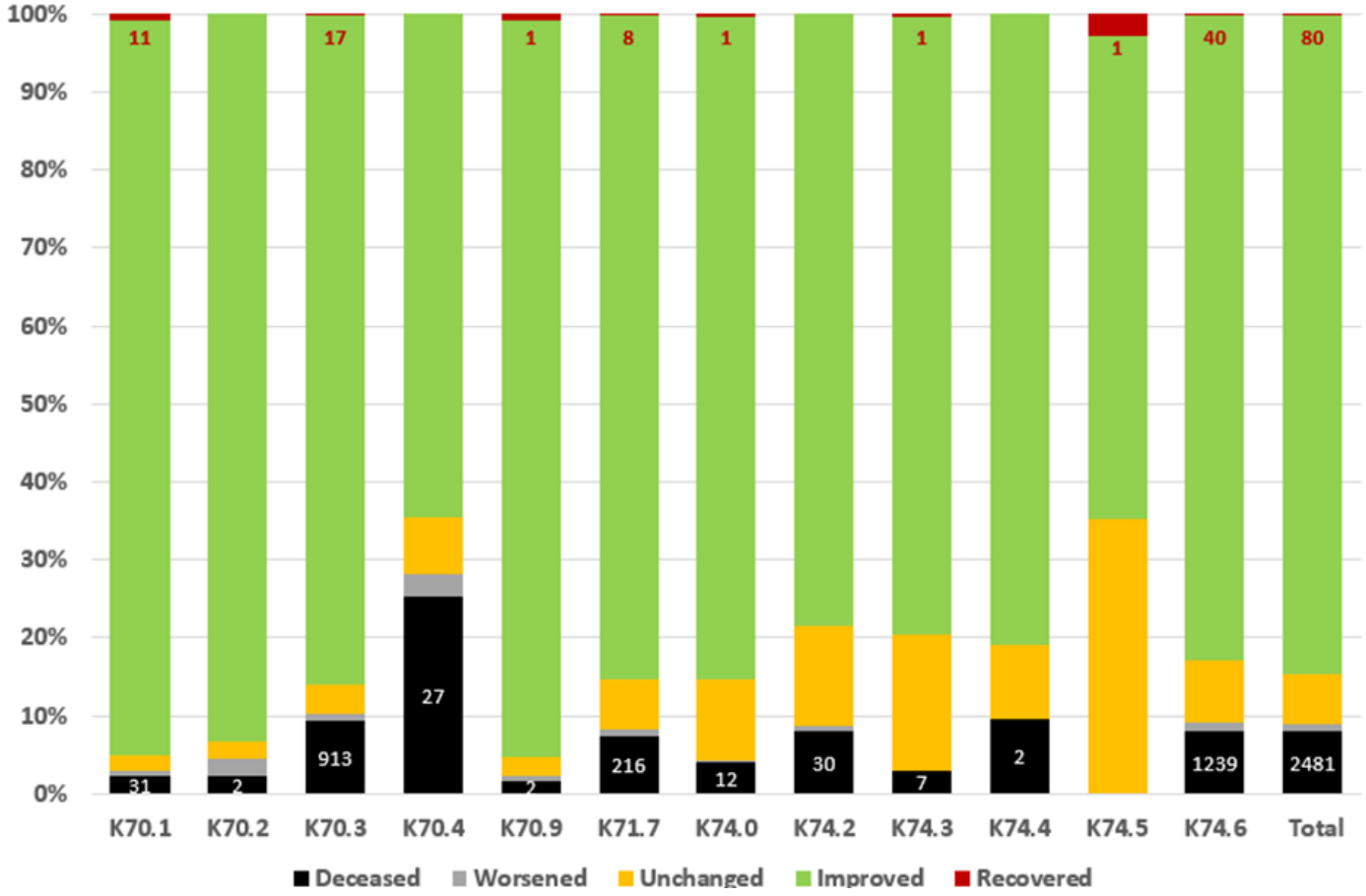
Table 4: Primary diagnosis for hospitalizations of patients classified under DRGs for Cirrhosis and Alcoholic Hepatitis in Romania, Evolution 2014-2023

Gender	Code ICD10	Principal Diagnosis	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Women	K74.6	Other and unspecified cirrhosis of the liver	12435	12547	12242	11798	10863	9714	5051	4364	5409	5652	90075
	K70.3	Alcoholic cirrhosis of the liver	2674	2490	2555	2619	2711	2672	1501	1577	2253	2322	23374
	K71.7	Toxic liver disease with fibrosis and cirrhosis of the liver	611	763	891	867	900	824	534	501	693	864	7448
	K70.1	Alcoholic hepatitis	765	667	642	614	634	488	193	185	267	222	4677
	K74.0	Hepatic fibrosis	493	397	443	399	269	202	93	106	115	153	2670
	K74.3	Primary biliary cirrhosis	361	320	298	276	266	295	110	112	200	209	2447
	K74.2	Hepatic fibrosis with hepatic sclerosis	225	258	275	309	290	261	72	58	109	147	2004
	K70.2	Alcoholic fibrosis and sclerosis of the liver	100	93	85	55	62	71	23	14	26	19	548
	K70.4	Alcoholic liver failure	76	64	33	29	35	40	17	28	21	26	369
	K70.9	Unspecified alcoholic liver disease	55	37	37	30	34	39	27	11	16	12	298
	K74.5	Unspecified biliary cirrhosis	46	40	48	16	21	29	18	9	15	23	265
	K74.4	Secondary biliary cirrhosis	33	44	33	15	26	12	9	6	8	10	196
Men	K74.6	Other and unspecified cirrhosis of the liver	13430	13622	13561	13579	13235	12970	7947	7565	9113	9708	114730
	K70.3	Alcoholic cirrhosis of the liver	7710	7259	7215	7137	7692	7819	4444	4946	6729	7415	68366
	K70.1	Alcoholic hepatitis	2941	2420	2378	2140	2122	1943	917	711	1029	1098	17699
	K71.7	Toxic liver disease with fibrosis and cirrhosis of the liver	1056	1287	1396	1471	1494	1570	1101	1173	1643	2030	14221
	K74.0	Hepatic fibrosis	638	589	612	475	283	244	118	115	141	147	3362
	K74.2	Hepatic fibrosis with hepatic sclerosis	265	300	324	339	396	326	135	154	205	226	2670
	K70.9	Unspecified alcoholic liver disease	218	225	204	178	202	171	76	68	108	118	1568
	K70.2	Alcoholic fibrosis and sclerosis of the liver	261	250	227	178	183	152	83	79	71	70	1554
	K70.4	Alcoholic liver failure	172	169	98	112	94	86	54	58	83	81	1007
	K74.3	Primary biliary cirrhosis	55	36	34	31	24	17	10	18	13	26	264
	K74.4	Secondary biliary cirrhosis	30	39	27	30	20	22	8	2	5	11	194
	K74.5	Unspecified biliary cirrhosis	21	23	30	23	20	16	20	13	15	11	192
			44671	**43939**	**43688**	**42720**	**41876**	**39983**	**22561**	**21873**	**28287**	**30600**	**360198**

Table 5: Discharge status of patients classified under DRGs for Cirrhosis and Alcoholic Hepatitis in Romania, 2023

Code ICD10	Principal Diagnosis	In-hospital deaths per 100 hospitalizations	Deceased	Worsened	Unchanged	Improved	Recovered	Total
K74.6	Other and unspecified cirrhosis of the liver	49,9%	1239	153	1234	12694	40	15360
K70.3	Alcoholic cirrhosis of the liver	36,8%	913	83	358	8366	17	9737
K71.7	Toxic liver disease with fibrosis and cirrhosis of the liver	8,7%	216	21	190	2459	8	2894
K70.1	Alcoholic hepatitis	1,2%	31	9	26	1243	11	1320
K74.2	Hepatic fibrosis with hepatic sclerosis	1,2%	30	2	48	293		373
K70.4	Alcoholic liver failure	1,1%	27	3	8	69		107
K74.0	Hepatic fibrosis	0,5%	12	1	31	255	1	300
K74.3	Primary biliary cirrhosis	0,3%	7	0	41	186	1	235
K70.2	Alcoholic fibrosis and sclerosis of the liver	0,1%	2	2	2	83		89
K70.9	Unspecified alcoholic liver disease	0,1%	2	1	3	123	1	130
K74.4	Secondary biliary cirrhosis	0,1%	2	0	2	17		21
K74.5	Unspecified biliary cirrhosis	0,0%		0	12	21	1	34
Total		100,0%	2481	275	1955	25809	80	30600

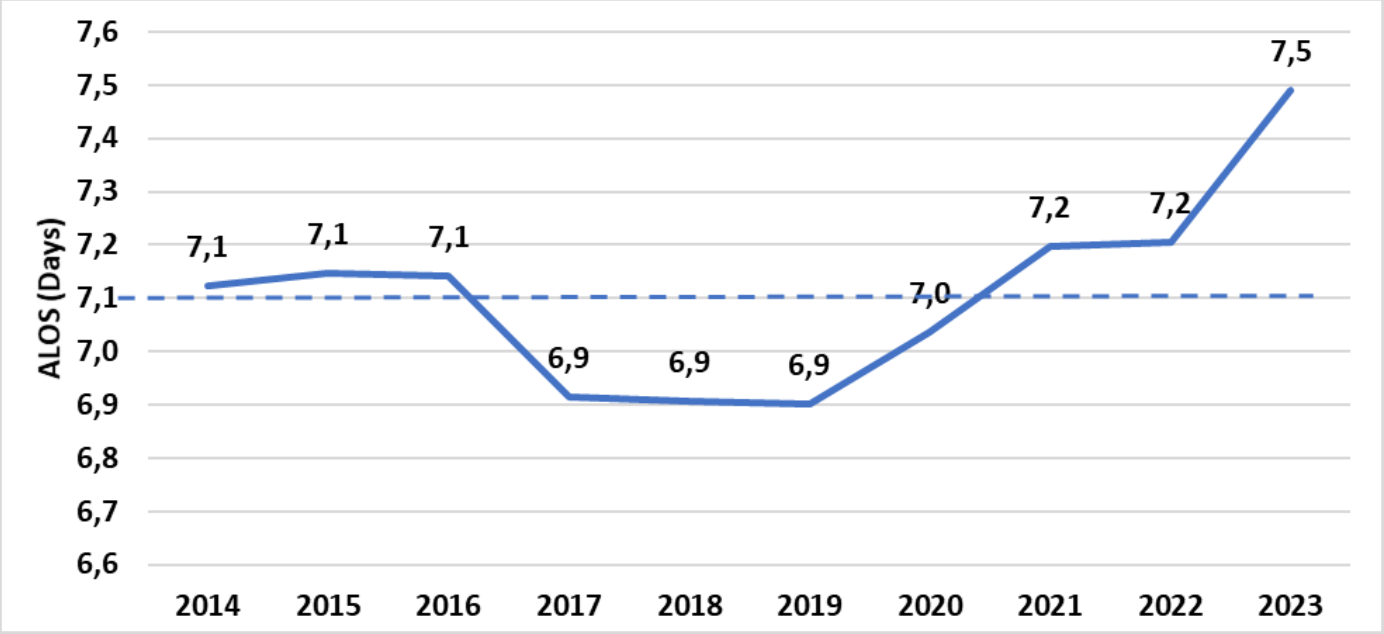
Table 6: In-hospital deaths among patients classified under DRGs for Cirrhosis and Alcoholic Hepatitis, Evolution 2014-2023, Romania.



Over 95% of patients with these conditions who died during hospitalization had one of the three most frequent primary diagnoses at discharge: K74.6 Other and unspecified cirrhosis of the liver (accounting for over half of the deaths, 49.9%), K70.3 Alcoholic cirrhosis of the liver (over a third of the deaths, 36.8%), and K71.7 Toxic liver disease with fibrosis and cirrhosis of the liver (8.7% of deaths). (Table 5)

The analysis of the number of deaths among patients, based on the primary diagnosis, highlights conditions (H74.5 Unspecified biliary cirrhosis) for which no deaths have been recorded in the last 10 years, as well as conditions for which nearly a quarter of hospitalized patients died during continuous hospitalization episodes (H70.4 Alcoholic liver failure). *(Table 6)*

Figure 4: Average length of hospital stay for Cirrhosis and Alcoholic Hepatitis, Evolution 2014-2023



Average Length of Hospital Stay

On average, from 2014 to 2023, a hospitalization episode for patients classified under diagnostic groups for "Cirrhosis and Alcoholic Hepatitis" lasted 7.1 days (ALOS = Average Length of Stay). The trend in ALOS over recent years has been around 7 days, with slight, non-significant decreases from 2017 to 2019, followed by slight increases from 2020 to 2023, reaching a peak of 7.5 days on average in 2023. (*Figure 4)*

V. DISCUSSION

The evidence recorded for this period indicates territorial, temporal, and clinical or demographic variations in hospitalizations for these patients. This evidence can support decision-making by providing a snapshot that needs to be updated and detailed at the time of decision-making. The identified measures should consider a range of specific preventive and therapeutic interventions.

For these conditions, prevention is key to reducing the incidence of cirrhosis and alcoholic hepatitis. Education on the risks of excessive alcohol consumption and the promotion of a healthy lifestyle are essential for preventing these diseases. Awareness campaigns can also contribute to reducing alcohol consumption and the early detection of liver problems.

Treatment for alcoholic hepatitis and cirrhosis varies depending on the stage of the disease. In the early stages, lifestyle modifications, such as abstinence from alcohol and a balanced diet, can significantly improve prognosis. Hospitalization can alleviate symptoms but comes at a high cost to both the patient and the system. All care must be well integrated into an effective case management plan to avoid advanced stages, for which treatment options are limited, and liver transplantation often becomes the only viable solution.

VI. CONCLUSIONS

The classification of hospitalizations based on consumption plays a crucial role in managing and estimating the resources needed, and the insights derived from resource consumption analysis can form the basis for planning early interventions that can significantly impact patients' quality of life and reduce treatment costs.

Cirrhosis and alcoholic hepatitis generate significant costs for the healthcare system, especially in the presence of catastrophic complications, which additionally lead to increased hospitalization duration and resource use for treating these patients. These resources vary significantly depending on the severity of the disease (intensive care unit care, surgical interventions, and other costly treatment resources). At the system level, early identification of patients at risk of severe complications can help optimize resources and implement more effective interventions.

In the future, careful monitoring of the incidence and trends of these diseases and how case management is conducted for these patients is essential to manage resources effectively and improve the care provided to patients with alcoholic liver conditions. Strategies in prevention and treatment will contribute to reducing the burden of these diseases at the individual, healthcare system, and societal levels.

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