Sociodemographic and clinical characterization in hospital discharges of patients diagnosed with epilepsy Chile 2015-2019. Hospital discharges due to epilepsy in Chile

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ABSTRACT

Introduction: *Epilepsy is a chronic neurological pathology that causes psychological and neuro-cognitive alterations and affects socioeconomic aspects, which makes it an important public health problem.* ***Objective:*** *To describe sociodemographic and clinical characteristics in hospital discharges of patients diagnosed with epilepsy in Chile during the 2015-2019 five-year period.* ***Method:*** *Descriptive cross-sectional study. The Statistical Report of Hospital Discharges of the Ministry of Health of Chile was used, a single database was constructed based on the records of hospital discharges diagnosed with epilepsy. (G.40).* ***Results:*** *57.8% of hospital discharges corresponded to men and the age range of 45 to 59 years represented the highest proportion. At the national level, the majority health forecast was FONASA with 84.8%, a figure similar to that of care in public health establishments. The classification of unspecified type epilepsy (G40.9) was the most prevalent, the average days of hospitalization was 7.6 days, with a mortality rate of 6.3 per 1,000 hospital discharges and a hospitalization rate of 15.7 per 100,000 inhabitants.* ***Conclusion:*** *From the neurological diseases, epilepsy is the most frequent pathology of hospital discharges nationwide, with a higher incidence in adulthood, which is not consistent with the existing literature where a higher prevalence is noted in childhood and the elderly. It is pertinent to note that Chile has a long hospital stay when compared with other countries in the region.*

Key words: *Epilepsy, hospitalization, patient discharge.*

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INTRODUCTION

The epidemiological transition that Chile experienced for more than three decades has become of interest due to the increase in non-communicable diseases, changes in mortality and morbidity patterns, and longer life expectancy, which has led to a growing demand for public and private health services[1]. Hospital discharge rates are an indicator that enables the prioritization of economic costs and a response to user needs[2].

Epilepsy is the second most frequent neurological disease worldwide with 72.5% of primary care consultations[3]. It requires transdisciplinary care because it causes many cerebral sequelae and has physical, mental, and emotional repercussions on user quality of life[4]. Worldwide, 45.9 million people with active epilepsy have been reported, and the age-standardized prevalence is 621.5 per 100,000 inhabitants[5].

Among the sociodemographic characteristics, age is related to an unfavorable evolution of the epileptic condition; it is a predictive factor, including for mortality[6], From a social perspective, there is evidence of bidirectional association between epilepsy and poverty; it has also been identified that race and economic status are interrelated[5].

Clinical variables mainly include the type of epilepsy, age of onset, number of crises, and associated comorbidities[7]. A study of subjects with epilepsy conducted in Colombia reported that 40% showed cognitive impairment and 18% psychiatric comorbidities. In addition, 37% exhibited resistance to drugs, while 14% had undergone epilepsy surgery[8].

Clinical research has focused its efforts on understanding crises in the prehospital setting. However, the need arises to identify characteristics of hospital stays because epilepsy is an increasingly recurrent emergency with significant health care costs[9].

Therefore, the objective of the present study was to describe sociodemographic and clinical characteristics of hospital discharges of users diagnosed with epilepsy in Chile between 2015 and 2019.

METHODOLOGY

The descriptive cross-sectional study design was used. The source of information was the Informe Estadístico de Egresos Hospitalarios del Departamento de Estadísticas del Ministerio de Salud de Chile (Hospital Discharge Statistics Report of the Department of Statistics of the Chilean Ministry of Health,). An exclusive secondary database was constructed by recording all hospital discharges with an epilepsy diagnosis between 2015 and 2019. The records with an epilepsy diagnosis (G.40) and the variables of analysis were selected for a census sample of 14,436 discharges.

To eliminate distortion and minimize bias, hospital stays longer than 5 years (2 records) were excluded. The study was based on the ethical principles of the Declaration of Helsinki and was approved by the Bioethics and Biosecurity Committee of the Universidad del Bío-Bío.

Data were analyzed by descriptive statistics with the Excel program and SPSS v. 19 software. Measures of central tendency, position and/or dispersion were used for the quantitative variables. Meanwhile, measures of frequency and percentages were used for the qualitative variables.

RESULTS

In the 2015-2019 period, 14,436 discharges with an epilepsy diagnosis were recorded in Chile. Data analysis based on age group showed that the highest proportion of discharges was between 45 and 59 years of age with 25.5% (n = 3,681). The average age of hospitalization was 48 ± 23.5 years. The sex variable showed 57.82% (n = 8,347) men and 42.18% (n = 6,089) women.

The country was divided into three macrozones to analyze data for the region of residence variable. The macrozones were: northern (Arica and Parinacota, Tarapacá, Antofagasta, Atacama, and Coquimbo), central (Valparaíso, Metropolitan, Libertador General Bernardo O'Higgins, Maule, Ñuble, Biobío), and southern (Araucanía, Los Ríos, Los Lagos, Aysén del General Carlos Ibáñez del Campo, Magallanes and Chilean Antarctic, and Chileans Abroad) **(Tables 1, 2, and 3)**. It should be noted that the northern and southern macrozones recorded lower nationwide discharge percentages, specifically in the Atacama and Aysén Regions with a value ≤ 1.4%. In contrast, in the central macrozone, the Metropolitan Region had the highest percentage with 26.4% (n = 3,808), followed by the Biobío Region with 13.8% (n = 1,997).

Table 1. Frequency distribution of hospital discharges of users diagnosed with epilepsy between 2015 and 2019 in the northern macrozone.

	FIVE-YEAR PERIOD											
	2015		2016		2017		2018		2019		Total	
Region of residence	n	%	n	%	n	%	n	%	n	%	**n**	**%**
Arica and Parinacota	36	1.5	39	1.6	58	2.2	56	2.1	136	3.2	**325**	**2.3**
Tarapacá	49	2.0	48	1.9	70	2.7	51	1.9	93	2.2	**311**	**2.2**
Antofagasta	27	1.1	42	1.7	39	1.5	47	1.8	223	5.3	**378**	**2.6**
Atacama	21	0.8	32	1.3	30	1.1	27	1.0	71	1.7	**181**	**1.3**
Coquimbo	64	2.6	63	2.5	45	1.7	39	1.5	119	2.8	**330**	**2.3**

Table 2. Frequency distribution of hospital discharges of users diagnosed with epilepsy between 2015 and 2019 in the central macrozone.

	FIVE-YEAR PERIOD											
	2015		2016		2017		2018		2019		Total	
Region of residence	n	%	n	%	n	%	n	%	n	%	**n**	**%**
Valparaíso	370	14.9	296	11.9	285	10.8	260	9.9	556	13.2	**1.767**	**12.2**
Metropolitan	708	28.6	737	29.5	763	29.0	904	34.4	696	16.6	**3.808**	**26.4**
Libertador General Bernardo O'Higgins	93	3.8	71	2.8	106	4	98	3.7	12	0.3	**380**	**2.6**
Maule	113	4.6	151	6.1	163	6.2	108	4.1	161	3.8	**696**	**4.8**
Ñuble	92	3.7	104	4.2	125	4.7	123	4.7	208	5.0	**652**	**4.5**
Biobío	296	11.9	319	12.8	341	13	351	13.3	690	16.4	**1.997**	**13.8**

Table 3. Frequency distribution of hospital discharges of users diagnosed with epilepsy between 2015 and 2019 in the southern macrozone.

	FIVE-YEAR PERIOD											
	2015		2016		2017		2018		2019		**Total**	
Region of residence	n	%	n	%	n	%	n	%	n	%	**N**	**%**
La Araucanía	261	10.5	242	9.7	251	9.5	220	8.4	473	11.3	**1.447**	**10.0**
Los Ríos	110	4.4	125	5.0	94	3.6	100	3.8	190	4.5	**619**	**4.3**
Los Lagos	159	6.4	146	5.9	165	6.3	137	5.2	363	8.6	**970**	**6.7**
Aysén del General Carlos Ibáñez del Campo	34	1.4	36	1.4	31	1.2	33	1.3	68	1.6	**202**	**1.4**
Magallanes and Chilean Antarctic	33	1.3	41	1.6	51	1.9	49	1.9	123	2.9	**297**	**2.1**
Chileans Abroad	13	0.5	3,0	0.1	15	0.6	26	1.0	19	0.5	**76**	**0.5**

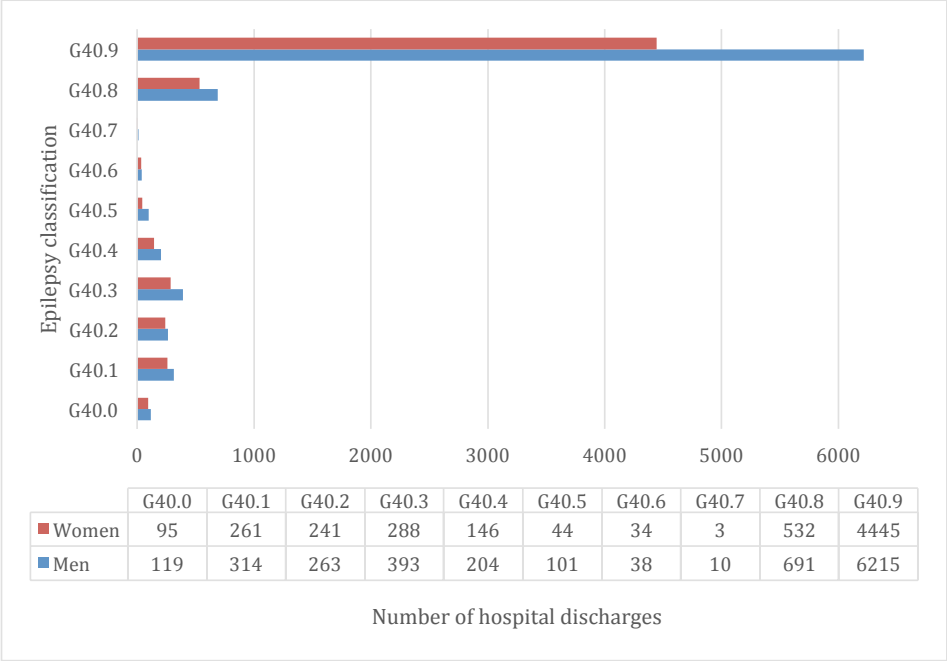
Table 4. Frequency distribution of hospital discharges of users diagnosed with epilepsy between 2015 and 2019 according to type of health insurance.

	FIVE-YEAR PERIOD											
	2015		2016		2017		2018		2019		**Total**	
Health insurance	n	%	n	%	n	%	n	%	n	%	**n**	**%**
FONASA	2.090	84.3	2.075	83.2	2.217	84.2	2.135	81.2	3.723	88.6	12.240	**84.8**
ISAPRE	229	9.2	244	9.8	241	9.2	318	12.1	296	7.0	1.328	**9.2**
CAPREDENA	21	0.8	19	0.8	23	0.9	46	1.7	48	1.1	157	**1.1**
DIPRECA	27	1.1	38	1.5	27	1.0	25	1.0	27	0.6	144	**1.0**
SISA	0	0.0	0	0.0	0	0.0	24	0.9	13	0.3	37	**0.3**
None	49	2.0	43	1.7	53	2.0	63	2.4	60	1.4	268	**1.8**
Unknown	63	2.5	76	3.0	71	2.7	18	0.7	34	0.8	262	**1.8**

FONASA: National Health Fund (public) ISAPRE: Health Insurance Institutions (private)
CAPREDENA: National Defense Welfare Fund DIPRECA: Carabineros de Chile Social Security Administration (Police)
SISA: Armed Forces Health System

Table 4 shows that the trend for the five-year period is similar for the distribution of discharges by type of health insurance; the highest value was recorded for FONASA (National Health Fund) with 84.8% (n = 12,240). Accordingly, by type of facility, 83% (n = 12,041) of the subjects received care in public health facilities.

The epilepsy pathology in the Chilean Ministry of Health (MINSAL) database has been classified



	G40.0	G40.1	G40.2	G40.3	G40.4	G40.5	G40.6	G40.7	G40.8	G40.9
Women	95	261	241	288	146	44	34	3	532	4445
Men	119	314	263	393	204	101	38	10	691	6215

G40.0: Localization-related (focal) (partial) idiopathic epilepsy and epileptic syndromes with seizures of localized onset
G40.1: Localization-related (focal) (partial) symptomatic epilepsy and epileptic syndromes with simple partial seizures
G40.2: Localization-related (focal) (partial) symptomatic epilepsy and epileptic syndromes with complex partial seizures
G40.3: Generalized idiopathic epilepsy and epileptic syndromes
G40.4: Other generalized epilepsy and epileptic syndromes
G40.5: Special epileptic syndromes
G40.6: Grand mal seizures, unspecified (with or without petit mal)
G40.7: Petit mal, unspecified, without grand mal seizures
G40.8: Other epilepsy
G40.9: Epilepsy, unspecified

Figure 1. Frequency distribution of hospital discharges of users diagnosed with epilepsy between 2015 and 2019 according to sex.

according to the International Classification of Diseases (ICD-10). This variable was analyzed in the present study according to sex **(Figure 1)**, which revealed a higher proportion of men in all classifications, especially in the unspecified type with 43% (n = 6,215). For both sexes, 73.8% (n = 10,660) exhibited the same classification of unspecified epilepsy (G40.9). In contrast, the classifications with the lowest prevalence were unspecified grand mal (G40.6) with 0.5% (n = 72) and unspecified petit mal (G40.7) 0.1% (n = 13).

There were 270 surgical procedures performed on hospitalized users, and there was a higher proportion in 2019 with 31.9% (n = 86). Overall, 24.4% (n = 66) of all surgeries were for epilepsy-specific procedures of which epilepsy and complex symptomatic epileptic syndrome (G40.2) accounted for 37.9% (n = 25).

In-hospital mortality represented 0.6% (n = 91) of users, while medical discharge was 99.4% (n = 14,345). The leading diagnosis resulting in mortality was unspecified epilepsy (G40.9) with 66% (n = 60).

Men had a higher mortality rate with 54.9% (n = 50) and average age of 63.6 years; the age group with the most records was between 75 and 89 years of age with 30.8% (n = 28). The in-hospital mortality rate for epilepsy was 6.3 per 1,000 discharges.

Finally, when analyzing the length of hospital stays, it was established that the average stay was 7.6 days. Likewise, the hospitalization rate for discharges was 15.7 per 100,000 inhabitants.

DISCUSSION

There was no correlation between the average age of hospitalization and age groups and the ages at which the prevalence and incidence of epilepsy were higher, although manifestations were more pronounced in children and the elderly[10]. In the present study, the average age at admission to hospital was 48.4 ± 23.5 years. This is similar to findings reported in Peru for hospitalized patients with a slightly lower average age of 45.8 years[11].

The higher number of hospitalizations in adults could be explained by their being of working age and, together with justifying poor self-care practices, they are less committed to the disease, which leads to more frequent decompensations[12]. In addition, other factors arise during the transition process from pediatric to adult care that could have an impact on higher records such as poorly personalized care, irregular check-ups, professionals with limited experience, and inadequate management of comorbidities[13].

When analyzing discharges in relation to the sex variable, there was a higher proportion of hospitalizations for men; this is similar to a study conducted in Ecuador that reported a slightly lower value of 52% of discharges[14]. It has also been described that men have a higher incidence and susceptibility to convulsions, which could eventually be the cause of a higher record of hospitalizations[15].

The distribution of results by region of residence was consistent with population density. The largest number of records was in the Metropolitan Region, which shows that the high demand was matched by the greater supply of public and private health centers. This circumstance is similar to that of the Biobío and Valparaíso Regions[16].

Likewise, the extreme regions of the country had the lowest number of hospitalization records, which reflects possible geographic and socioeconomic inequalities[17]. This situation has been supported by a study conducted in Brazil, which indicated that individuals with lower incomes were more likely to suffer severe crises due to sociocultural deprivation and comorbidities[18].

The health insurance variable and type of health care facility were consistent with the national reality because 78% of the population had FONASA health insurance in 2017[19]. However, this result does not concur with a study conducted in Colombia in which the insurance benefits for this diagnosis were focused on private institutions with values between 66% and 83% of the demands for hospitalization[20].

As for epilepsy classifications, the largest number of hospitalization records showed unspecified epilepsy (G40.9). This fact could be explained by the existing shortcomings in diagnostic skills and difficulties in distinguishing the disease from other types of crises such as psychogenic seizures, syncope, sleep and movement disorders, and the different types of epilepsy[20].

Furthermore, this is reinforced by the discrepancy between the types of epilepsy established by the International Classification of Diseases (ICD-10) and those proposed by the International League Against Epilepsy[21]. This occurs because the ICD-10 classifications are outdated and use obsolete terminology such as petit and grand mal[21].

Given that convulsions are often unobserved by third parties, are atypical, or have subtle manifestations, the diagnosis is often unspecific[22,23]. It is estimated that 20% of users in Spain with uncontrolled crises are misdiagnosed due to ignored, trivialized, or poorly defined symptoms[24].

It should be mentioned that while the diagnosis of epilepsy and symptomatic epileptic syndromes (G40.2) was not the classification with the highest hospitalization rates, it recorded the highest number

of surgeries. This is explained by the fact that it is a type of epilepsy related to focal localizations and complex partial seizures, which makes surgery more effective and safer and provides a greater possibility of recovery and seizure control[25].

Of all the performed surgical procedures, there was no record of mortality due to surgery for epilepsy; this emphasized the fact that despite the high cost of this type of procedure, it is offset by reduced long-term economic costs. This is reflected in a study conducted in the U.S. population, which showed an annual decrease of costs between US$6,806 and US$13,454(26). A study in the United Kingdom included 284 users who underwent surgery and 47% and 38% remained seizure-free for 5 and 10 years, respectively, after the procedure[27].

Although epilepsy surgery is recognized as a safe and effective procedure, the proportion of users who do not receive surgical management is significantly higher in developing countries (one-fifth of low- and middle-income countries) than in developed countries. This situation is explained by socioeconomic factors and insufficient research on the impact of surgery in these countries[28,29].

The in-hospital mortality rate was similar to the value reported in a study in Ecuador with 6.2 per 1,000 discharges[30]. Another study conducted in the public hospitals of Hong Kong consisted of 7,461 users; it reported that 29% (n = 2,166) died during the five-year study, which resulted in a standardized mortality rate of 5.09[31].

It should be noted that the lowest mortality rate occurred in 2019, and this value was not proportional to the number of hospitalizations because the highest number of discharges was recorded that year. This could be explained by the fact that in a hospital admission with varied symptomatology, all the necessary procedures can be performed to reduce the severity of the condition and thus in-hospital mortality[20].

The average hospital stay was 7.6 ± 25.6 days; this was higher than findings published in a study in the United States that reported an average of 3.83 days[32] and another in Colombia with an average of 4.91 days[33]. Nonetheless, a study conducted in an epilepsy unit in the United States indicated a longer stay of 6.9 days for generalized symptomatic epilepsy[34].

Ecuador has reported an average hospital stay of 7.32 days[35], which is the closest approximation to the value obtained in the present study. This situation could be explained by the lack of specialized centers, shortage of specialists, and limited availability to conduct studies that would enable the health care system to provide optimal treatment[36].

The highest hospitalization rate occurred in 2019; this could be explained by improved record quality, changes in methodology or external variables such as the high cost of drugs and associated insurance benefits, which limit the continuity of care[13]. The rate of 22.0 per 100,000 inhabitants was equivalent to 4,021 discharges, which is similar to 4,782 discharges recorded in Ecuador[35].

A study conducted in London indicated that epilepsy in the elderly is associated with increased hospitalization rates and longer hospital stays, both of which are predictors of a fatal outcome[37]. However, the present study revealed that the elderly, despite a higher mortality rate, did not show higher hospitalization rates.

This study contributes hard data to reveal the nationwide context of an increasingly prevalent pathology. However, it is an obligation and scientific responsibility to recognize a limitation of the study related to the poor quality of the records and insufficient information on discharges. The data did not include clinical variables such as comorbidities, adherence to treatment, severity, and sociodemographic factors such educational attainment, marital status, and employment status. These data would enable a scientific analysis of greater health relevance and significance.

Based on the obtained information, it is feasible

to draw conclusions with practical health benefits, including that epilepsy is the neurological disease with the most frequent records of hospital discharges nationwide. Its incidence is higher in adult age groups; this does not concur with the reviewed literature that reports a higher prevalence in childhood and the elderly. These records reflect the difficulty in controlling the disease and the complexity involved in adapting treatments.

The positive results in reducing mortality rates are grounds for maintaining the resources allocated to treat the disease. However, efforts must be directed at addressing the differences based on sex and regional inequalities. In addition, technological tools and therapeutic measures, such as surgical procedures, must evolve because they are still limited in the country.

Given that the present study is an initial approximation to the investigation of hospital discharges, it is suggested that further research be conducted to study in greater depth the characteristics of users and incorporate other types of variables related to any eventual hospitalization. This would enable continuity in improving the diagnostic approach through research methodologies based on the level of evidence that can support the implementation of new programs and public policies.

The identification of sociodemographic and clinical characteristics in hospital stays is an imperative action, given that epilepsy is an increasingly prevalent disease. It implies significant health costs due to the multiple effects it causes, mainly morbidity.

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