

STUDY REGARDING THE SITUATION OF HOSPITALIZATION EPISODES DUE TO CONGENITAL MALFORMATIONS IN ROMANIA, IN THE LAST DECADE

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Birth defects are the leading cause of death in newborns and children up to 5 years of age, as well as a major cause of long-term disability, burdening the individual, family, society, and health systems. Although a large part of the causes of congenital malformations remain unknown, a number of factors, from maternal health surveillance, the mother's lifestyle, medical care throughout pregnancy can be influenced so that the risk of such accidents is diminished. The health system, public health is an important part of this process, the real knowledge of the phenomenon representing the starting point in establishing future interventions and strategies.

Keywords: Birth defects, hospitalization episodes, Romania

INTRODUCTION

Every year, approximately 8 million children with congenital malformations are born in the world, representing 3-6% of newborns, birth defects being the leading cause of death in newborns and children up to 5 years of age [1], as well as a major long-term disability cause, burdening individuals, families, health systems and society. It is estimated that around 240,000 newborns die in the first 28 days after birth, every year, worldwide, due to malformations, and in children between one month and 5 years, 170,000 deaths are recorded annually. [2] Nine out of ten children with such pathology come from underdeveloped countries with low and middle income/capita, 94% of malformations are observed in these regions. The most common birth defects recorded are heart defects, neural tube defects and Down syndrome. [2]

The causes of its occurrence can be multiple from genetic factors (approximately 10%) [3], to socioeconomic factors (poor maternal nutrition, infectious or toxic risk or limited access to health care and screening), environmental factors 10% (infections, pollution including radiation, certain drugs, nutritional deficiencies in certain areas-iodine for example), 20-30% multiple factors, up to unknown causes. [2] Almost half of the causes of malformations remain unknown, but some of the determinants can be controlled. [4] Thus, improvements in nutrition, medical supervision of pregnant women, health education, reducing the impact of pollution can represent interventions aimed at reducing the frequency of congenital malformations. [4]

According to EuroCat in Europe 2.5% of all births have this result. [5]

In Romania between 2005-2020, between 1506 (in 2005) and 5839 (in 2015) births of newborns with congenital malformations were recorded, in recent years a decrease has been observed (2923 in 2019 and 2677 in 2020). [6]

According to the European Health for All database, the registered number of deaths in Romania was 310 in 2019, continuously decreasing in recent years, the crude mortality rate for children under 1 year being in 2018 136.85/100,000, also decreasing (for example in 2005 a value of 364.57/100000 inhabitants was recorded). Comparatively, at EU level in 2018 a value of 90.47/100,000

inhabitants were recorded. [7] The age standardized mortality rate due to congenital malformations 0-64 years was in Romania in 2018 2.91 deaths/100,000 inhabitants, compared to 3.41/100,000 inhabitants in the European region and 3.31 deaths/100,000 inhabitants in the EU. [7]

This study presents the situation of hospitalizations episodes determined by the presence of congenital malformations in the period 2012-2021 at the national level, depending on their location, according to DRG coding.

OBJECTIV

Identification at national, regional, and local level of the geographical distribution of hospitalization episodes in the case of patients with congenital malformations, as well as the temporal evolution of their number, in the period 2012-2021.

METHODOLOGY

The descriptive, retrospective study used data from the National DRG Database, data reported in continuous hospitalization regime by Romanian hospitals in a contractual relationship with the National Health Insurance House. In accordance with the provisions of the Order. no. 1782/576/2006 regarding the registration and statistical reporting of patients who receive medical services under continuous hospitalization and day hospitalization, with subsequent additions and changes, the National Institute for Management of Health Services collects and processes the minimum set of data at the patient level for cases treated in continuous and day hospitalization.

The study used data reported between 2012-2021, regarding hospitalization episodes for patients with congenital malformations in Romania, in the aforementioned hospitals (admissions under continuous hospitalization regime). The data were selected using the ICD-10-AM classification, records were extracted and analyzed from the observation sheets that most frequently had one of the codes as the main diagnosis: Q00-Q07 Congenital malformations of the nervous system, Q10-Q18 Congenital malformations of the eye, ear, face and neck, Q20-Q28

Congenital malformations of the circulatory system, Q30-Q34 Congenital malformations of the respiratory system, Q35-Q37 Cleft lip and palate, Q38-Q45 Other congenital malformations of the digestive system, Q50-Q56 congenital malformations of the genital organs, Q60-Q64 Congenital malformations of the urinary system, Q65-Q79 Malformations and deformations of the osteo-articular system and muscles, Q80-Q89 Other congenital malformations, Q90-Q99 Chromosomal abnormalities not elsewhere classified.

In accordance with the provisions of Law 190/2018 and Art. 13 of EU Regulation no. 679/2016, personal data are deleted at the time of transmission to National Institute for Management of Health Services, and the identification of persons for the purpose of analysis is based on the encrypted personal code. The age of the patients was calculated in completed years, as the difference between the date of admission and the date of birth. The data was processed using the software program SQL Server Management Studio Express 2005, the subsequent processing and analysis was carried out using the SPSS and Excel programs. The analysis was performed according to a series of demographic and socio-economic variables, such as age, length of hospitalization, status at discharge, etc., information included in the minimum data set reported in the DRG system by hospitals. The interpretation and presentation was made in the form of tables and graphs.

RESULTS

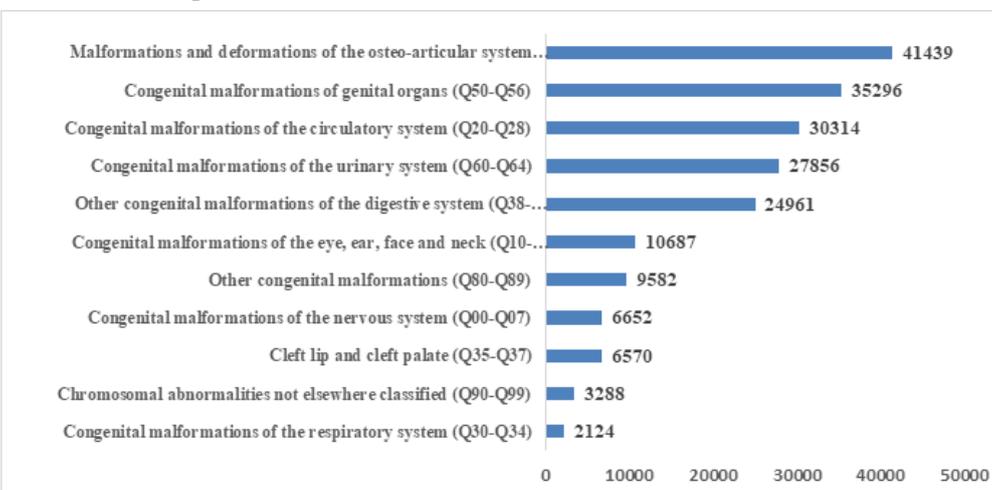
The data extracted from the national DRG database were processed, analyzed and interpreted in relation to a series of demographic variables and socioeconomic characteristics (sex, age, place of residence, duration of hospitalization, in-hospital mortality rate, status at discharge) following the geographical distribution and temporal evolution of hospitalization episodes for patients with congenital malformations, from hospitals in our country, in the period 2012-2021.

1. Total number of hospitalization episodes for patients with congenital malformations, registered in Romania, in the period 2012-2021

The total number of continuous hospitalization episodes for patients with congenital malformations recorded in Romania, in the period 2012-2021, was 198,769 episodes, most of which concerned the osteo-articular and muscular system (21%), the genital organs (18 %) or the circulatory system (15%) - graph no. 1. And the digestive and urinary systems recorded important percentages (13 and 14%, respectively).

Depending on the diagnostic code, the most frequent cases of osteoarticular malformations were Equinovarus crooked leg and Other congenital valgus deformities

Graph no. 1. Total number of reported episodes of continuous hospitalization and the type of main diagnosis at discharge, in patients with congenital malformations, recorded in the period 2012-2021, at the national level



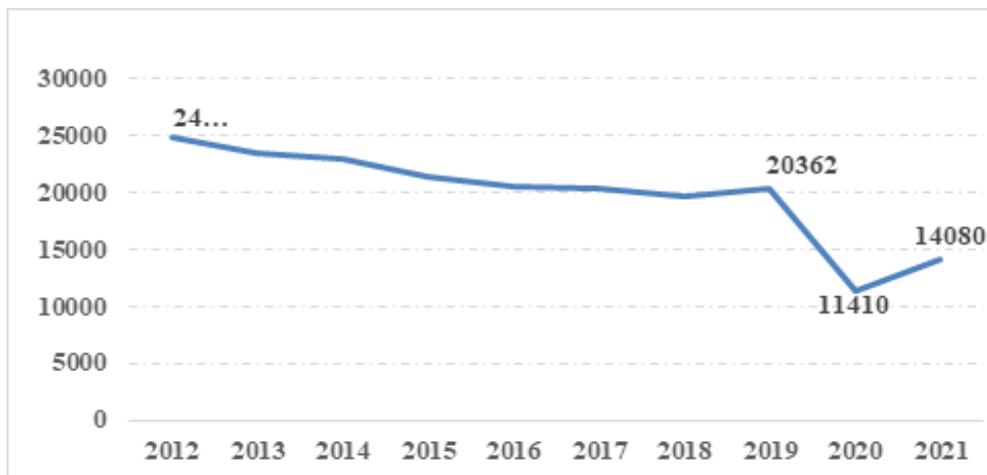
of the leg (17% and 9% respectively of the total of this type of malformation), in the case of malformations in the genital sphere Undescended testicle, unilateral or bilateral in boys and developing ovarian cyst, single in girls. In the cardiovascular sphere, the most frequent registered malformations concerned the atrial (30%) and ventricular (16%) septal defect and the arterio-venous malformation of the cerebral vessels (16%), and in the urinary sphere, congenital hydronephrosis (23%). In the case of the digestive system, the most common abnormalities were Other congenital malformations of the gallbladder (21%), Ankyloglossia (19%) or Cystic liver disease (11%). The most frequent malformations of the eye were represented by Congenital Cataract (19%) or Congenital Stenosis or sclerosing of the lacrimal canal (16%), of the nervous system Congenital hydrocephalus, unspecified (14%), Other congenital hydrocephalus (9%) or Syndrome Arnold-Chiari (8%). In the cleft lip and palate category, the most frequent cases were cases of Cleft vault and soft palate with unilateral cleft lip (17%) or Unilateral cleft lip (14%), and in the case of the respiratory system Laryngo-malacia congenital (30 %) or choanal atresia (13%). As chromosomal malformations, Down's syndrome, unspecified (42%), Trisomy 21, meiotic non-disjunction (14%) or Turner's syndrome, unspecified (11%) were recorded most frequently.

2. Temporal evolution in terms of hospitalization episodes for patients with congenital malformations, in Romania, in the period 2012-2021

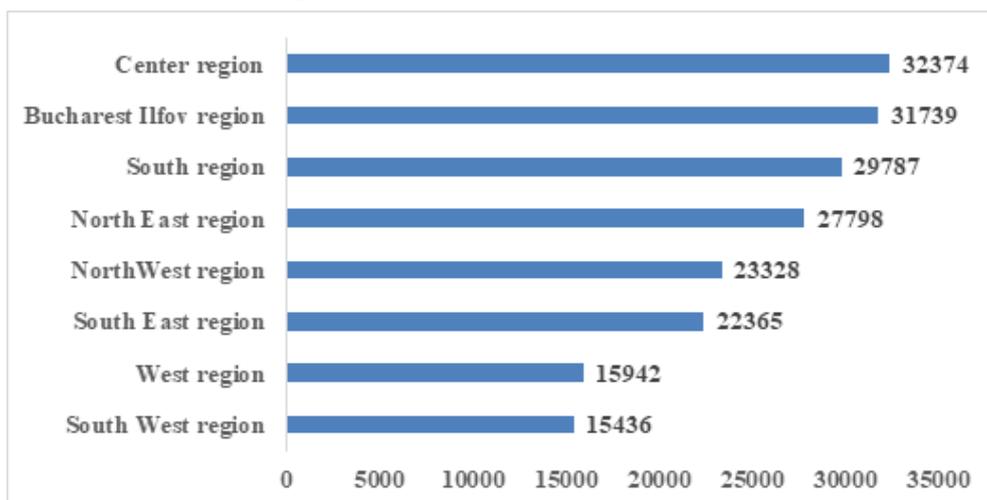
The temporal evolution of hospitalization episodes of patients with congenital malformations during this period can be seen in graph no.2. It is noted that the situation of hospitalizations is relatively constant, slightly decreasing, with certain not very large variations from one year to another, the maximum number being recorded in 2012, while the minimum was observed in 2020.

3. Distribution of hospitalization episodes for patients with congenital malformations, depending on the discharge department

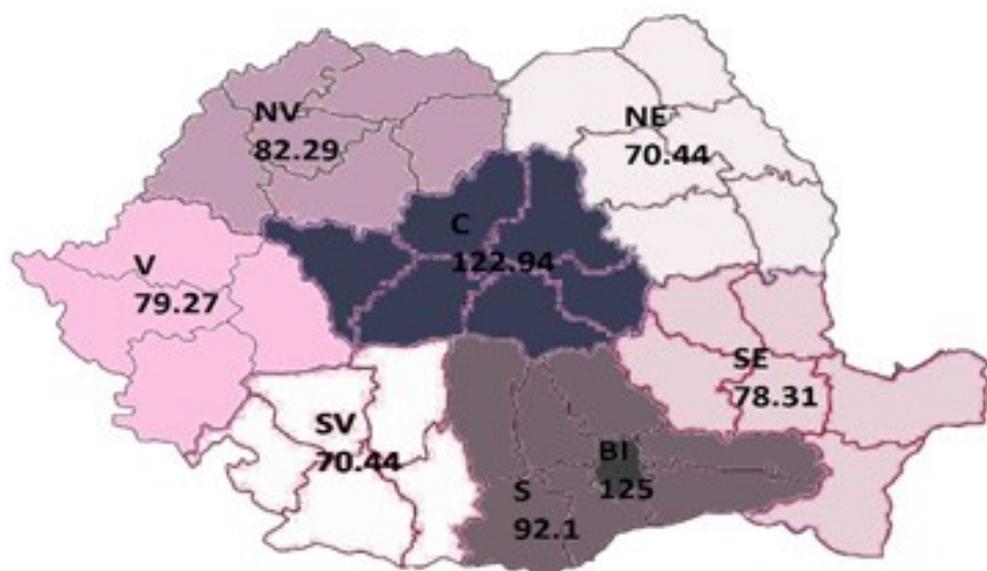
Graph no. 2. The evolution of total number of episodes, in patients with congenital malformations, recorded in the period 2012-2021, at the national level



Graph no. 3. Distribution of hospitalization episodes for patients with congenital malformations, at the regional level in Romania, in the period 2012-2021



Graph no. 4. Distribution of hospitalization episodes for patients with congenital malformations, depending on the population, at regional level, in Romania, between 2012-2021



The most episodes of hospitalization for patients with congenital malformations were recorded in the wards of pediatric surgery (16% of the total), neonatology (15%) and pediatric surgery and orthopedics (9%). Lower percentages were recorded in the departments of internal medicine, diabetes, nutrition and metabolic diseases or cardiology.

4. Distribution of hospitalization episodes for patients with congenital malformations, at regional and local level, in the period 2012-2021

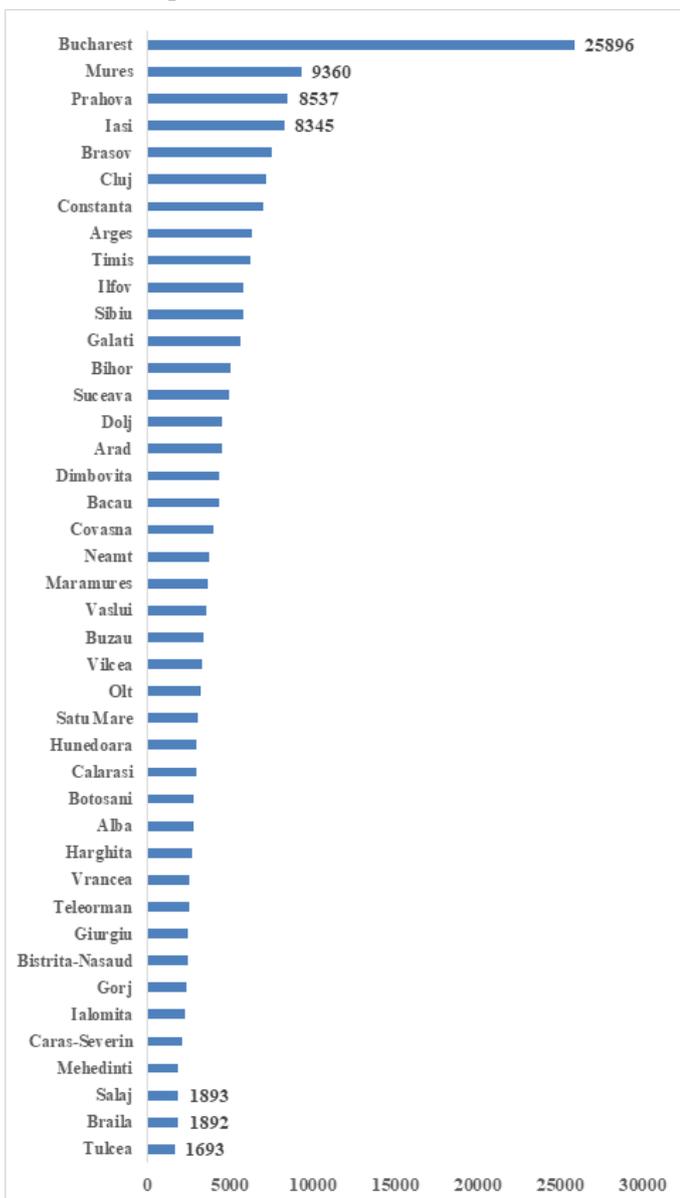
From the point of view of the residential environment where the patients with this diagnosis come from, it is noted that the most episodes of hospitalization were recorded in the case of patients from the urban areas (57.5%). At regional level, the most episodes of hospitalization for patients with congenital malformations were recorded during the study period in the Center region (16.3% of the national total), Bucharest-Ilfov (16% of the national total) and South region (15 %). The West and South-West regions with approximately 8% had the fewest hospitalizations - graph no. 3.

Relative to the number of inhabitants, the descending order of regions that recorded episodes of hospitalization for patients with malformations was: Bucharest Ilfov region (125 episodes/10,000 inhabitants), Center region (123 episodes/10,000 inhabitants), South (92 episodes/10,000 inhabitants), North West (82.3 episodes/10,000 inhabitants), West region (79.3 episodes/10,000 inhabitants), South East region (78.3 episodes/10,000 inhabitants), South West and North East (70.4 episodes /10,000 inhabitants) - graph no. 4.

At local level, the most episodes of hospitalization were recorded between 2012-2021 in Bucharest, almost three times more episodes than the next leading counties Mureș, Prahova, Iași - graph no. 5.

Compared to population of each county, graph no. 6 shows →

Graph no. 5. Distribution of hospitalization episodes for patients with malformations, at local/county level, in Romania, in the period 2012-2021

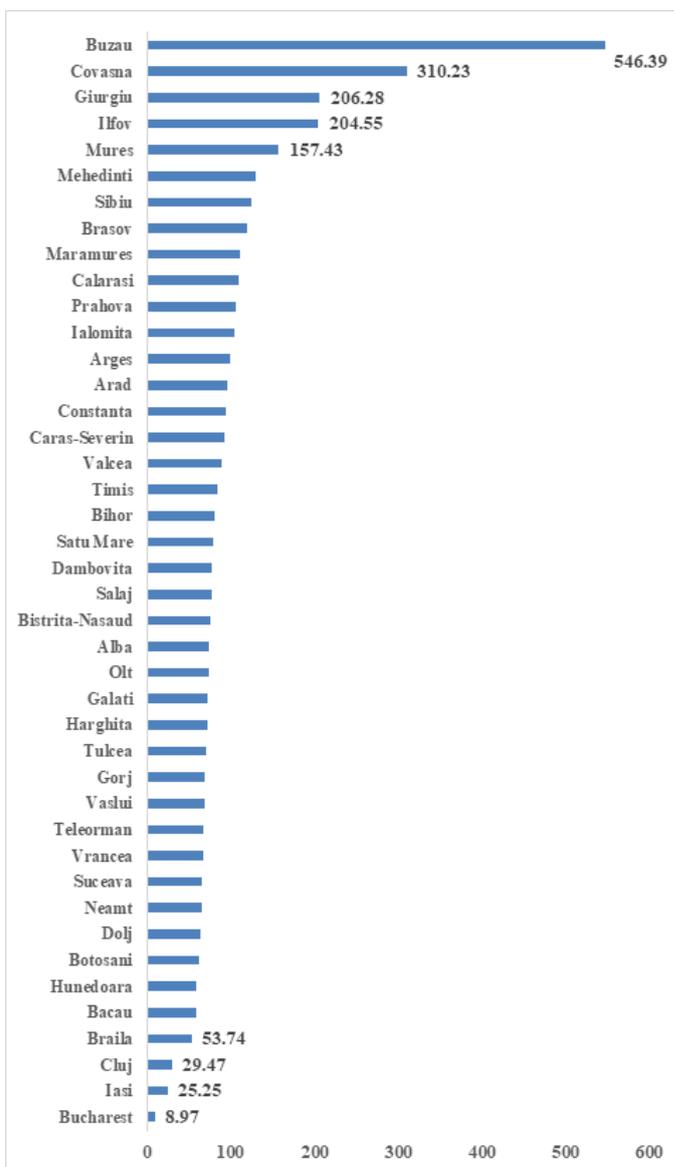


a change in the ranking, with the counties of Buzău (546.39 episodes/10,000 people), Covasna (310.23 episodes/10,000 people) as well as Giurgiu and Ilfov, on the first places. and on the last Bucharest, Iași, Cluj and Brăila.

5. Distribution of hospitalization episodes for patients with congenital malformations, depending on the patient's gender

Most episodes of hospitalization with this main diagnosis at discharge belonged to men, approximately 56%, and the evolution of hospitalizations over time indicates a reduction in the number of cases for both sexes, somewhat more intense in the case of women (of 1.9 times fewer hospitalizations in 2021 compared to 2012). The most important reduction in the number of hospitalizations occurred in 2020 and 2021 - graph no. 7.

Graph no. 6. Distribution of hospitalization episodes for patients with congenital malformations, at local/county level, depending on the population of each county, in the period 2012-2021

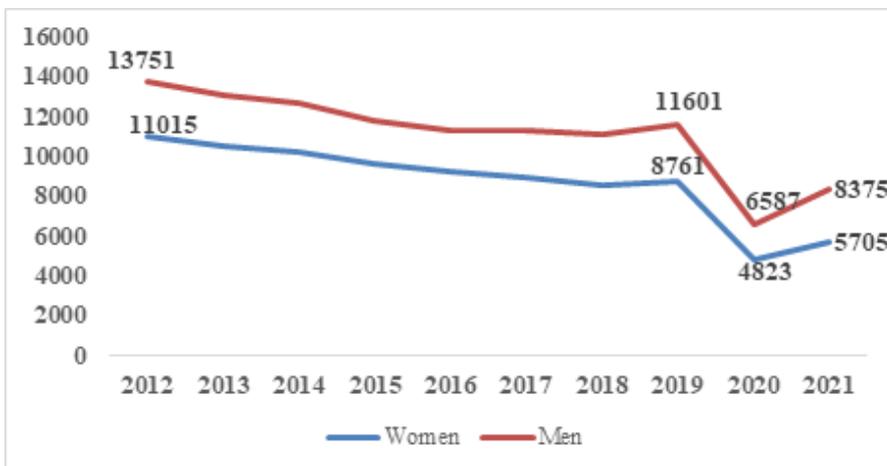


6. Distribution of hospitalization episodes for patients with congenital malformations, depending on the age of the patient

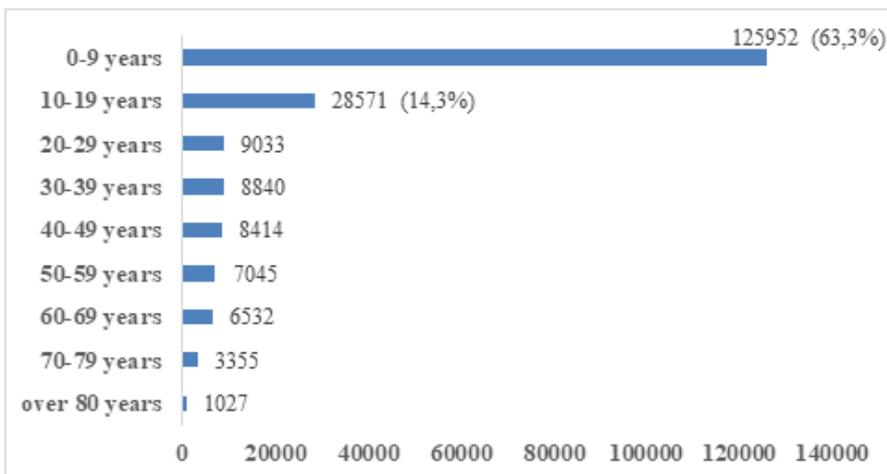
By age group, the data analysis shows that for the entire study period, the most episodes of hospitalization were registered in children between 0-9 years old (63%), the next affected age group being that of young people, between 10- 19 years (14%) – graph no. 8.

In the years prior to the pandemic, the evolutionary trend of the number of hospitalizations was a decreasing one, the decrease being more pronounced in children up to 9 years old (2018 and 2019), with a slight increase observed in young people (5%) - graph no. 9. In pandemic years, a more important decrease (by 2 times) in the number of admissions for all categories is observed.

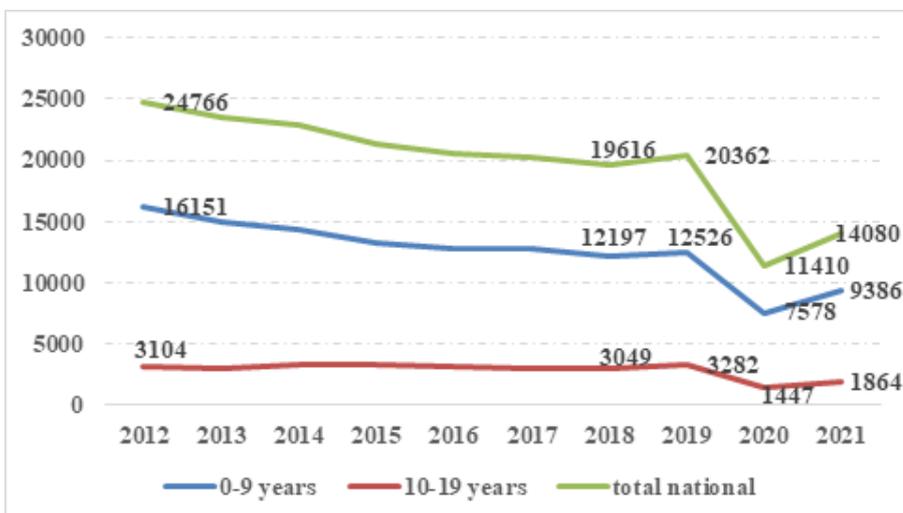
Graph no. 7. Total number of reported episodes of continuous hospitalization, in patients with congenital malformations, depending on the patient's sex, in the period 2012-2021, at national level



Graph no. 8. Number of reported episodes of continuous hospitalization, in patients with congenital malformations, depending on the patient's age, between 2012-2021, at national level



Graph no. 9. Evolution of total number of episodes reported in continuous hospitalization, in patients with congenital malformations, depending on the patient's age, in the period 2012-2021, at national level



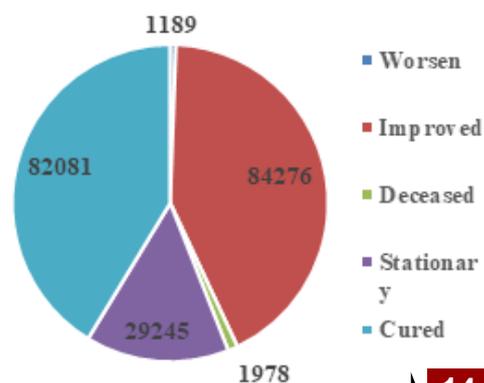
7. Distribution of hospitalization episodes for patients with congenital malformations, according to the average duration of hospitalization

The average duration of hospitalization in the case of episodes of hospitalization for patients with malformations, in the continuous hospitalization regime, was in the period 2012-2021 of 5.5 days, varying throughout the study period, the maximum value being observed in 2012 (5.83 days) gradually decreasing, to the value of 5.08 in 2019 and to 4.95 days in 2021. 81% of patients were hospitalized within a week. The highest average values of the duration of hospitalization were recorded in the case of patients with malformations admitted to acute psychiatric wards (28.6 days), pediatric psychiatry (28 days), renal transplant (22 days), and as a type of pathology, malformations of type Achondrogenesis, type I, diverticulum of the esophagus, intrapulmonary ectopic tissue or cystic disease of the kidney or liver register the highest values of the length of hospitalization, approximately 60 days.

8. Distribution of hospitalization episodes for patients with congenital malformations, according to the patient's discharge status and in-hospital mortality rate

Depending on the patient's condition at discharge, the data analysis indicates that of total number of episodes reported in continuous hospitalization for patients with malformations, the majority of patients were discharged in an improved condition (42.4% of the total) or cured (41.3%). Approximately 15% of the patients were discharged as stationary, and small percentages, 0.6%, had an aggravated condition at discharge or died (1%) - graph no. 10.

Graph no. 10. Number of hospitalization episodes for patients with malformations, depending on the discharge status of patients, in Romania, in the period 2012-2021



The calculated in-hospital mortality rate was 1% throughout the study period, its values oscillating between 0.78% in 2019 and almost double-1.44 in 2020. More male patients died (55%), especially children 0-2 years old (95%). Most of the deceased had as discharge diagnosis malformations of the circulatory system Q20-Q28 (45.5%), of the digestive system Q38-Q45 (17.6%) or of the osteo-articular system and muscles Q65-Q79 (16%).

CONCLUSION

The analysis of data from the DRG database 2012-2021, regarding the hospitalization of patients with congenital malformations, leads to the following conclusions:

- the total number of continuous hospitalization episodes for patients with congenital malformations registered in Romania, in the period 2012-2021, was 198,769 episodes
- malformations of the osteo-articular and muscular system (21%), genital organs (18%) or circulatory system (15%) were most frequently registered
- within each diagnostic code, the most frequent hospitalizations concerned patients with equinovarus foot and other congenital valgus deformities of the leg such as osteo-articular malformations, undescended testicle, unilateral or bilateral in the case of boys and developing ovarian cyst, unique in the case of girls as genital malformations, Atrial (30%) and ventricular (16%) septal defect and Arterio-venous malformation of cerebral vessels in the circulatory system, Congenital hydronephrosis in the urinary sphere, Other congenital malformations of the gall bladder, Ankyloglossia or Cystic liver disease in digestive sphere, Congenital Cataract or Stenosis or congenital sclerosing of the lacrimal canal as malformations of the eye, Congenital hydrocephalus, unspecified, Other congenital hydrocephalus or Arnold-Chiari Syndrome as malformations of the nervous system, Congenital Laryngo-malacia or Atresia of the choans in the respiratory sphere, and as chromosomal malformations Syndrome Down, unspecified, Trisomy 21, meiotic nondisjunction, or Turner Syndrome, unspecified
- the situation of hospitalizations is relatively constant, slightly decreasing, with small variations from one year to another, the maximum number recorded in 2012, and the minimum observed in 2020
- the most episodes of hospitalization, if we refer to the absolute number, were suffered by patients from the urban areas, especially from the Center, Bucharest-Ilfov and South regions. Relative to the number of the population in each region, the order is reversed: Bucharest Ilfov, Center and South region. South West and North East are the regions with the fewest admissions (1.8 times less)
- at local level, in absolute numbers, the most episodes of hospitalization were recorded in Bucharest, three times more than in the following leading counties: Mureș, Prahova, Iași. If we refer to the number of populations, the leading counties are Buzău, Covasna,

Giurgiu and Ilfov, while Bucharest, Iași, Cluj and Brăila are on the last places.

- most hospitalizations belonged to men, approximately 56%, and the evolution of hospitalizations over time indicates a reduction in number of cases for both sexes
- by age group, the most affected are children between 0-9 years and young people between 10-19 years, together representing over three quarters of hospitalization episodes - the evolutionary trend was constantly decreasing, especially in the case of children, the most important reduction in hospitalizations occurring in the 2 pandemic years
- the average length of hospitalization for patients with malformations, was 5.5 days throughout the period, with small annual variations, the vast majority of patients being hospitalized for up to a week. The wards with the highest values of the average duration of hospitalization were those of acute psychiatry (28.6 days), pediatric psychiatry (28 days), kidney transplant (22 days), and as type of pathology, malformations of the Achondrogenesis, type I, Esophageal diverticulum, intrapulmonary ectopic tissue, or cystic disease of the kidney or liver have recorded values of approximately 60 days
- the highest percentages of these patients were discharged as improved or cured, while small percentages died or had a worsened condition at discharge
- the calculated in-hospital mortality rate was 1% throughout the study period, its values oscillating between 0.78% in 2019 and almost double-1.44% in 2020. More male patients died, especially children 0-2 years old, most of them diagnosed at discharge with malformations of the circulatory system (Q20-Q28), of the digestive system (Q38-Q45) or of osteo-articular system and muscles (Q65-Q79).

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