Management in health
XXIII/1/2019; pp.17-25

THE MOST FREQUENT HOSPITALIZATION EPISODES IN CHILDREN WITH TUMORS, IN ROMANIA, IN THE LAST 5 YEARS

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In the world, childhood and adolescent cancer is the main cause of non-accidental mortality in developed countries, while in average and low income / per capita countries, only 10-20% of children diagnosed with this condition can be cured. Similar to international statistics, in Romania the most common types of tumors in children are blood cancers - leukemias or lymphomas, cerebral cancers and embryonic tumors. The complexity and severity of neoplastic disease determines the need for frequent hospitalizations of these patients not only for the purpose of diagnosis but also for the establishment and follow-up of the therapeutic behavior, so that for the best possible management and planning of resources of all kinds, it is necessary to periodically analyze the situation to allow for a more accurate knowledge of the temporo-spatial distribution of the episodes of admission caused by this condition.

Keywords: cancer, hospitalizations, Romania

BACKGROUND

Every year, around 300,000 children aged 0-19 years are diagnosed with cancer in the world, this disease being the main cause of non-accidental death in children and adolescents in developed countries and in an increasing number of developing countries [1], [2]. If in countries with high income/per capita 80% of treated children can be cured, in countries with average or small income/per capita, with insufficient medical and financial resources and limited access to health services this percentage is reduced to 20 % [1] or even 10% [2], although the largest number of children (8 out of 10) diagnosed with cancer is found in these countries [3]. The annual incidence rate varies between 50 and 200/million in children under 15 and between 90 and 300/million in children over 15, but data are unavailable in many underdeveloped countries, with statistics only for about a fifth of the global population. [4].

A recent (2016) report by the International Agency for Cancer Research (IARC) estimates about 80000 deaths/ annually determined by this condition globally [2].

The most common neoplasms in children are blood cancers - leukemias or lymphomas (almost half), cerebral cancers and embryonic tumors (retino, nephro, or neuroblastoma) [1] [2] [4]. Central nervous system tumors are placed on second place with 20% of cases, lymphomas are about 12%, and in children up to 5 years embryonic tumors represent one-third of the total at this age [5]. Among adolescents (15-19 years), the annual incidence rate was between 2001-2010 of approx. 185/million adolescents, the most common being lymphomas (23%) and carcinomas or melanoma (21%) [5].

In Romania, according to the analysis of the National Cancer Registry, the incidence of the disease at these ages remained relatively constant from year to year, between 2010-2015, the mean value was 9.86/100.000 people aged between 0 and 19, annually 400 children are diagnosed with cancer, and one third of the total were under 4 years of age. In our country as well as in all over the world predominates leukemias (31%) and lymphomas (15%), followed by tumors of the central or peripheral nervous system (20%) and tumors of the bones and soft parts 1 of 6) [6].

The complexity and severity of neoplastic disease determines the need for frequent hospitalizations of these patients not only for the purpose of diagnosis but also for the establishment and follow-up of the therapeutic course so that an analysis of the situation in terms of admission frequency research is required.

With the National DRG database, the National School of Public Health, Management and Professional Development has conducted an analysis of the situation of continuous hospitalization of children who have been diagnosed with this condition and treated in public hospitals in Romania in the last 5 years, the results being presented below.

OBJECTIVE

Identification at national, regional and local level of the geographical distribution of hospitalization episodes due to the main three classes / categories of tumors that most frequently caused hospitalization in children (0-18 years) and the evolution of their number during 2013-2017.

METODOLOGY

The data analisys from the National DRG Database was descriptive, retrospective using, data reported under continuous hospitalization by the Romanian hospitals, which are in contractual relation with the National Health Insurance House. According to the law, the data are also reported monthly to the National School of Public Health, Management and Professional Development Bucharest.

The analysis of the data regarding hospitalization episodes in children in Romania, in the mentioned hospitals (episodes of hospitalization in continuous hospitalization) targeted the period 2013-2017. The data were selected using the ICD-10-AM classification, the records for the *Tumors* diagnostic class were extracted and analyzed, based on the diagnosis name and the diagnostic subclass name. The diagnostic subclass included the following most frequent tumors that required hospitalization (established by a previous study): malignant tumors of the lymphoid, hematopoietic and related tissues (C81-

C96), malignant tumors of the eye, brain and other parts of the nervous system central (C69-C72) and tumors with unpredictable evolution or unknown behavior (D37-D48). Episodes of hospitalization for patients aged 18 years and below were studied.

The data was processed using the SQL Server Management Studio Express 2005 software, further processing and analysis was performed using SPSS and Excel programms. The analysis was based on a series of demographic and socio-economic variables such as the patient's gender, age, residence, length of hospitalization, etc., information included in the minimum data set reported in DRG by hospitals. Interpretation and presentation was done in the form of tables and graphs.

RESULTS

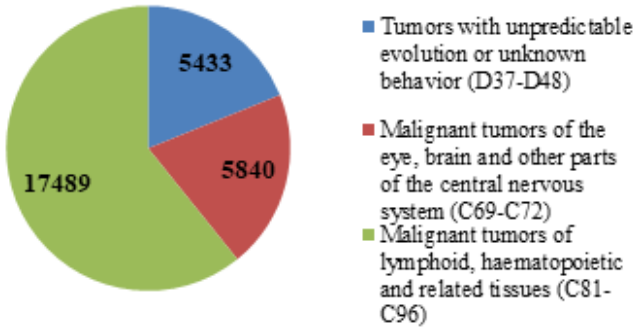
Interpretation of the results was performed in relation to the demographic and socio-economic variables available through the minimum set of data from the National DRG database (gender, age, residence environment, length of hospitalization, in-hospital mortality rate, discharge status, discharge type) following geographical distribution and temporal evolution of hospitalizations due to the main types of tumors diagnosed in children in hospitals in Romania during 2013-2017.

1. The most common malignant tumor diagnostics in children aged 0-18 years, requiring hospitalization between 2013 and 2017, at national level

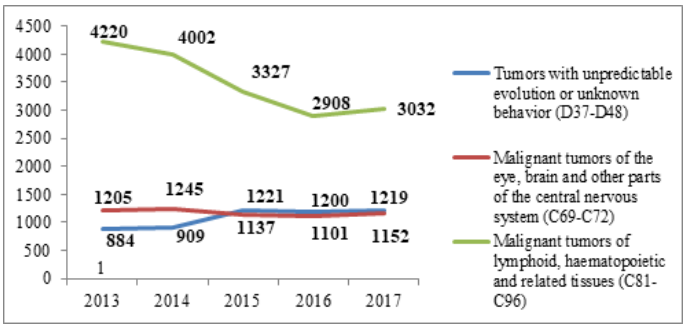
In the analyzed period, were registered a total of 28,762 hospitalization episodes due to the most common types of malignant tumors (malignant tumors of the lymphoid, hematopoietic and related tissues (C81-C96), malignant tumor of the eye, brain and other parts of the central nervous system (C69-C72), and tumors with unpredictable evolution or unknown behavior (D37-D48). Most frequently, in the period 2013-2017, were hospitalized children with malignant tumors of lymphoid, hematopoietic and related cases - 17,489 episodes (60.8% of the most common malignancies in children), but also children with malignant tumors of the eye, brain and other parts of the central nervous system - 5840 episodes (20.3%) or those with unpredictable tumors or unknown behavior - 5433 episodes (18.9%) - graph no.1.

From year-to-year distribution, there is a steady decrease in each year of the study period up to 2016, with about 20% of all hospitalization episodes annually occurring through these types of tumors. A somewhat higher figure was seen in 2013 and 2014, after which there was a reduction in the number in 2015 and 2016, so that in 2017 a new growth took place - graph 2. A similar evolution can be seen in malignant tumors of lymphoid, haematopoietic and related tissue, and partly in the case of malignant tumors of the eye, brain and other parts of the central nervous system, but in the case of unpredictable tumors or unknown behavior, the number of hospitalization episodes has increased over the last years of the study period as compared to 2013.

Graph no. 1. The most common malignant tumor diagnostics in children aged 0-18 years, requiring hospitalization during the period 2013-2017 at national



Graph no. 2. Distribution of the number of hospitalization episodes due to the first three categories of malignant tumors in children 0-18 years, during 2013 -2017



2. Types of tumors that caused hospitalization of children 0-18 years, during 2013-2017

The most common type of tumor that caused hospitalization, as can be seen in graph no. 3, was acute lymphoblastic leukemia in remission, 20% of the total period, or lymphoblastic leukemia with absence of remission specification - 17% - graph no.3. This type is followed by malignant tumor of cerebellum and Hodgkin's disease. The graph below highlights the types of malignancies that most commonly occurred in the children's admission in hospital during the study period. Thus, besides hematopoietic and lymphoid system malignancies (lymphoblastic leukemias, myeloids, Hodgkin's lymphomas and non-Hodgkin's lymphomas, connective tissue tumors) also occured cerebral tumors (cerebellum, brainstem, supra or infratentoral, ventricular tumors), retinal malignancies or other tumors with unpredictable or unknown development.

Over the study period, a reduction in the number of hospitalizations for a series of tumors (eg, lymphoblastic leukemia, Hodgkin's disease, cerebellar tumors or brainstem, Burkitt tumor, etc.) was observed, so that the number of admissions episodes in 2017 was lower than in 2013, with the largest reduction seen for Burkitt's non-Hodgkin's diffuse lymphoma or acute lymphoblastic leukemia, without mentioning remission. Other types of tumors determined a higher number of hospitalization episodes in 2017 compared to 2013, eg ovarian tumor with unpredictable and

Graph no. 3. Main types of tumors that caused hospitalization episodes in children aged 0-18 in Romania during 2013-2017

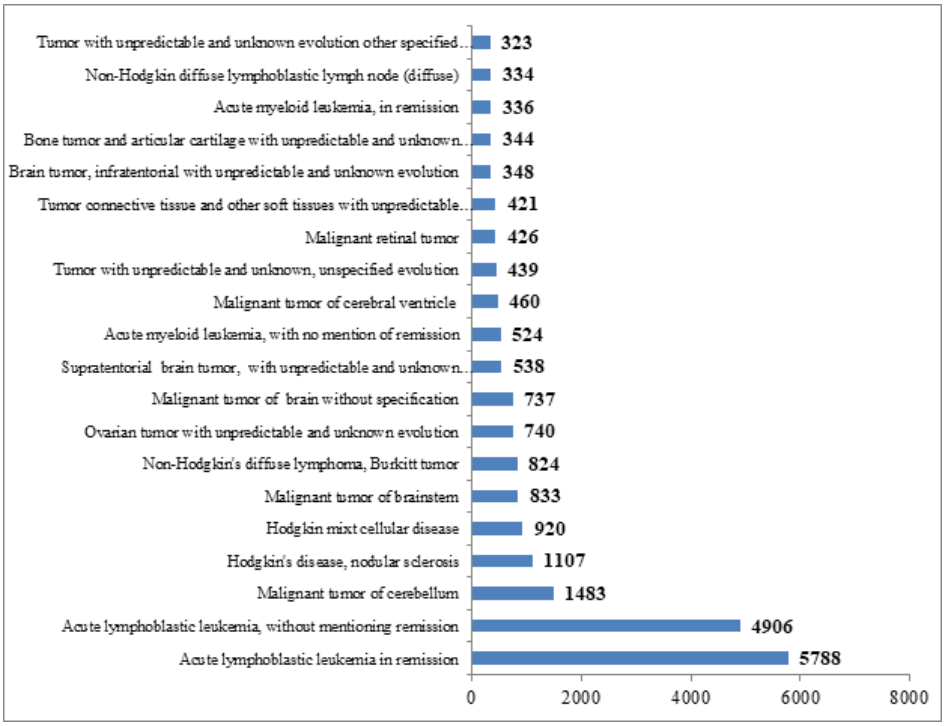


Table no. 1. Evolution of hospitalization episodes by tumors in children, 2013-2017

Anul	2013	2014	2015	2016	2017	Total
Year	1270	1360	1025	905	885	5445
Acute lymphoblastic leukemia, in remission	1277	1091	876	665	759	4668
Acute lymphoblastic leukemia, without mentioning remission	297	354	260	246	254	1411
Malignant tumor of cerebellum	260	184	235	171	197	1047
Hodgkin's disease nodular sclerosis	233	246	145	109	140	873
Mixed cellular Hodkin's disease	206	174	115	125	158	778
Malignant tumor of brainstem	224	152	151	131	97	755
Diffuse non-Hodgkin's lymphoma Burkitt tumor	129	188	161	150	127	755
Malignant tumor of the brain, without specification	74	73	124	112	100	483
Ovarian tumor with unpredictable and unknown evolution	53	78	112	123	113	479
Brain tumor, supratentorial with unpredictable and unknown evolution	123	101	63	81	106	474
Acute myeloid leukemia, without mentioning remission	50	87	76	110	77	400
Malignant retinal tumor	63	72	77	85	102	399
Malignant tumor of cerebral ventricle	54	77	75	69	77	352
Tumor connective tissue and other soft tissues with unpredictable and unknown evolution	48	41	57	90	114	350
Tumor with unpredictable and unknown, unspecified evolution	49	50	62	79	92	332
Brain tumor, infratentorial with unpredictable and unknown evolution	38	63	94	71	46	312
Lymphoblastic (diffuse) non-Hodgkin diffuse						

unknown evolution, brain tumors, supra or infratentorial with unpredictable and unknown evolution (with doubling of the number of cases in 2017), retinal tumor, malignant brain cerebral ventricle, connective tissue tumor, and other soft tissues with unpredictable and unknown evolution - table no1.

3. Distribution of hospitalization episodes due to tumors in children, at regional and local level, during 2013-2017

According to the data analysis, with the exception of the South Region where the highest number of hospitalizations (16% of the total national) and West Region were observed with almost half of the number of episodes registered in the South, the rest of the development regions recorded close proximity around 12-13% of the national total - graph no.4.

The overall trend in development regions was downward, with a decrease of about 15%, from 6309 episodes registered in 2013 to 5403 admissions in 2017. Except for two regions, West a 22% increase) and the Center, for all the rest, this downward trend is preserved, even though there have been some variations in the sense of increases over the years - table no. 2. The most significant decrease was observed for North West (about 35%) and South (about 25%).

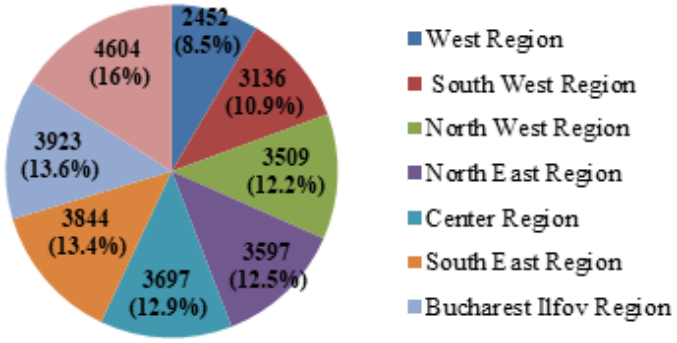
In five of the eight development regions, the Center, North-East, North-west, South-East and South-West regions predominated malignant tumors of lymphoid, haematopoietic and related tissue, and malignant tumors of the eye, brain, and other parts of the system central nervous system, but in the Bucharest-Ilfov, West and South regions outside the malignant tumors of lymphoid, hematopoietic and related tissues, more frequent were tumors with unpredictable evolution or unknown behavior.

Among the classes mentioned, tumors that required the most frequent hospitalization were acute lymphoblastic leukemias in remission or without remission, followed by malignant brain tumors or ventricular tumors (in the North, South, South-East and South-West regions), Hodgkin's nodular

Table no. 2.

Year	2013	2014	2015	2016	2017	Total	%
West Region	433	467	490	531	531	2452	8.5
South West Region	625	694	663	582	572	3136	10.9
North West Region	885	812	674	565	573	3509	12.2
North East Region	823	805	736	611	622	3597	12.5
Center Region	786	716	674	731	790	3697	12.9
South East Region	775	813	745	813	698	3844	13.4
Bucharest Ilfov Region	840	817	796	719	751	3923	13.6
South Region	1142	1032	907	657	866	4604	16.0
Total	**6309**	**6156**	**5685**	**5209**	**5403**	**28762**	**100.0**

Graph no. 4. Structure of the cases according to the number of hospitalization episodes in children, registered by development regions, during 2013-2017



sclerosis disease in the West region and mixed cellular Hodgkin's disease in Bucharest Ilfov, or malignant brain tumor in Center and North West Regions.

The analysis of the distribution of episodes of hospitalization due to tumors in children at the local level indicates, on the first positions as frequencies, counties such as Bucharest, Prahova, Mureş, Bihor, Constanţa and Dolj, while at the opposite pole there are counties such as Satu Mare, Vrancea, Covasna and Botosani - graph no.5.

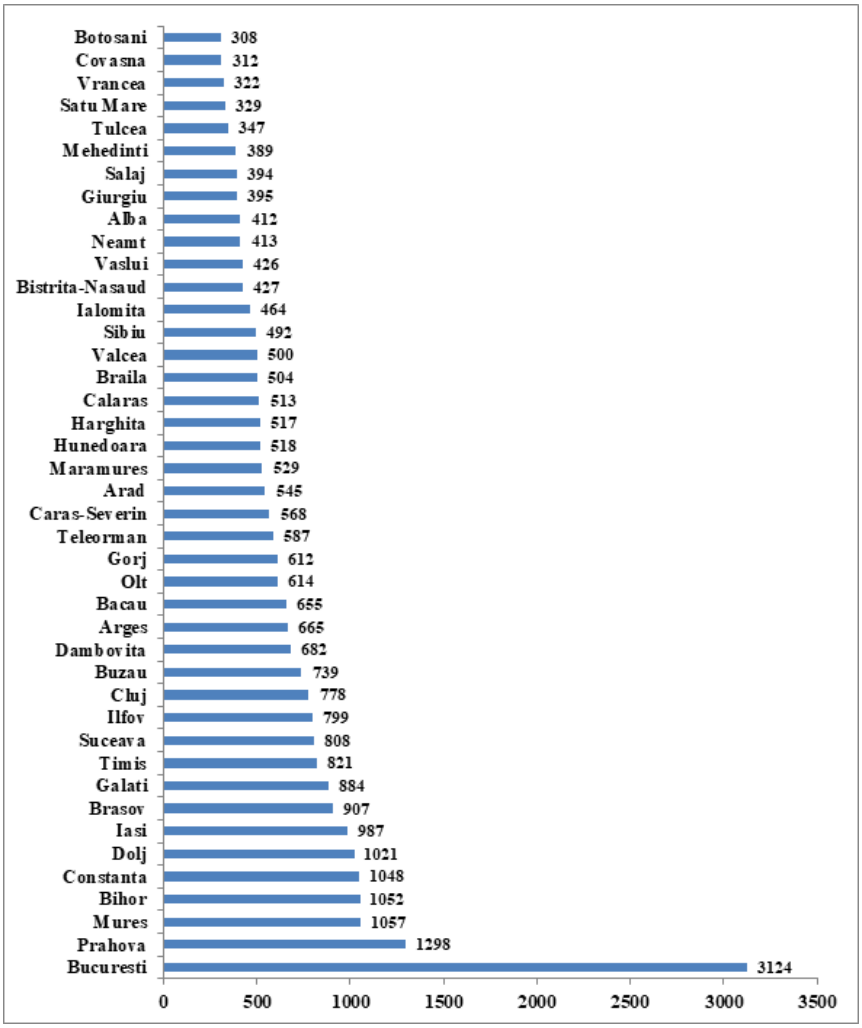
Graph no.5 Distribution of hospitalisation episodes according to the patient's county of residence

In the counties with the highest number of hospitalization episodes, the most frequent types of tumors that caused hospitalization were recorded: in Bucharest - 43% of the total hospitalization episodes on the city were lymphoblastic leukemias, less than 10% Hodgkin's disease or malignant brainstem tumors. In Prahova County hospitalization episodes were most often due to acute lymphoblastic leukemia - 41% of the county total, but also to malignant brainstem tumors. In the Mureş and Bihor counties, lymphoblastic leukemia (41% and 34%) is on the first place.

Table no. 3. Evolution of hospitalization episodes due to tumors in children during the study period, according to the patient's county of residence

County of residence	2013	2014	2015	2016	2017	Total
Alba	107	104	70	37	94	412
Arad	119	141	88	87	110	545
Argeș	149	155	147	96	118	665
Bacău	172	199	111	82	91	655
Bihor	316	195	136	161	244	1052
Bistrița-Năsăud	116	131	66	62	52	427
Botoșani	45	87	88	51	37	308
Brăila	102	112	112	92	86	504
Brașov	265	212	153	146	131	907
București	638	641	638	592	615	3124
Buzău	185	161	108	159	126	739
Călărași	125	137	103	53	95	513
Caraș-Severin	83	81	117	164	123	568
Cluj	199	178	174	123	104	778
Constanța	217	281	181	188	181	1048
Covasna	55	32	53	92	80	312
Dâmbovița	169	110	98	97	208	682
Dolj	213	283	230	137	158	1021
Galați	164	126	212	205	177	884
Giurgiu	109	86	66	59	75	395
Gorj	119	164	156	96	77	612
Harghita	70	97	102	127	121	517
Hunedoara	87	89	90	120	132	518
Ialomița	95	66	121	82	100	464
Iași	219	185	200	177	206	987
Ilfov	202	176	158	127	136	799
Maramureș	88	129	125	99	88	529
Mehedinți	50	61	78	102	98	389
Mureș	199	183	192	226	257	1057
Neamț	91	87	104	62	69	413
Olt	100	106	126	163	119	614
Prahova	349	316	242	196	195	1298
Sălaj	99	118	84	61	32	394
Satu Mare	67	61	89	59	53	329
Sibiu	90	88	104	103	107	492
Suceava	168	169	150	171	150	808
Teleorman	146	162	130	74	75	587
Timiș	144	156	195	160	166	821
Tulcea	58	73	85	75	56	347
Vaslui	128	78	83	68	69	426
Vâlcea	143	80	73	84	120	500
Vrancea	49	60	47	94	72	322
Total	**6309**	**6156**	**5685**	**5209**	**5403**	**28762**

Graph no. 5. Distribution of hospitalisation episodes according to the patient's county of residence



In the case of the majority of counties (28), the number of these hospitalization episodes was reduced, the most significant decrease being recorded in Sălaj, Bistriţa-Năsăud and Braşov counties. The rest of the counties recorded increases, the highest in Mehedinţi county (almost double the value in 2013), Harghita with almost 75% and Hunedoara with about 50% - table no.3.

4. The distribution of hospitalization episodes due to tumors in children, depending on the patient's gender.

In terms of the patient's gender, close numbers of episodes of hospitalization due to tumors during the study period are recorded, with a slight predominance of boys (56% of total hospitalization episodes).

As a time evolution, there is a constant decrease in the number of hospitalization episodes in both sexes in 2017 compared to 2013, the observed decrease being about 15% - graph no.6.

For boys, the most frequent hospitalizations were due to malignant tumors of lymphoid, hematopoietic and related tissues, and malignant tumors of the eye, brain, and other parts of the central nervous system (85% of the total), while the tumors prevailed for the girls were of the lymphoid, haematopoietic and related tissues, and tumors with unpredictable evolution or unknown behavior (80.5% of the total).

As types of tumors, for girls, the most common types that caused hospitalization episodes during the study period were acute lymphoblastic leukemia accounting for about 37% of the total for female sex but also ovarian tumor with unpredictable and unknown evolution, Hodgkin's nodular sclerosis, malignant tumor of the cerebellum or brainstem, all with less than 10% of the total.

For male sex, the most common episodes of hospitalization were also due to acute lymphoblastic leukemia accounting for 37% of the total for this genus, but also malignant tumor affecting cerebellum and non-Hodgkin's Burkitt diffuse lymphoma in much smaller weight - tabel no. 4.

5. Distribution of hospitalization episodes due to tumors in children, depending on the age of the patient

Analyzing the structure of hospitalization episodes according to the age groups of the patients it is noted that the highest values are observed in the 5-10 years age group, approximately one third of the total hospitalization episodes due to these types of tumors during this period, but also in the groups 10-15 years and 1-5 years, one quarter each of the total - graph no.7.

Table 5 shows that the number of hospitalization episodes in most age categories was decreasing, the most significant decrease in 2017 as compared to 2013, being in the group of 1-5 years, about 25%. The age groups that registered an increase in the number of admissions were the extreme groups, the 0-1 group having the highest increase - 34%. The most significant reduction is seen in children of 5 years, almost half of the number in 2013, and the highest increase in children up to one year, more than half.

Graph no. 6. Evolution of hospitalization episodes due to tumors in children, in the period 2013-2017, depending on the patient gender

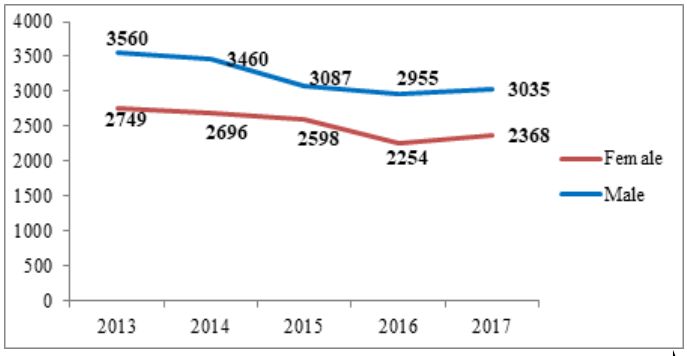
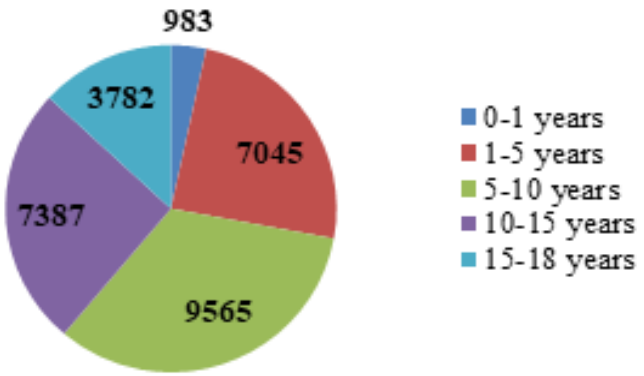


Table no. 4. Types of tumors that caused most hospitalization episodes during the study period, depending on the patient gender

Tumors type	Female	Male	Total
Acute lymphoblastic leukemia, without mentioning remission			
Leucemia limfoblastică acută, fără menționarea remisiunii	1868	3038	4906
Acute lymphoblastic leukemia, in remission	2866	2922	5788
Malignant tumor of cerebellum	482	1001	1483
Burkitt's non-Hodgkin's diffuse lymphoma	127	697	824
Hodgkin's disease nodular sclerosis	488	619	1107
Mixed cellular Hodkin's disease	302	618	920
Malignant brain tumor, without specification	358	379	737
Tumor malignant brainstem	466	367	833
Malignant tumor cerebral ventricle	122	338	460
Non-Hodgkin's diffuse lymphoblastic lymph node (diffuse)	38	296	334
Acute myeloid leukemia, without mentioning remission	258	266	524
Brain tumor, supratentorial with unpredictable and unknown evolution	279	259	538
Malignant retinal tumor	192	234	426
Brain tumor, infratentorial with unpredictable and unknown evolution	121	227	348
Tumor connective tissue and other soft tissues with unpredictable and unknown evolution	206	215	421
Tumor with unpredictable and unknown, unspecified evolution	228	211	439
Tumor bone and articular cartilage with unpredictable and unknown evolution	146	198	344
Malignant frontal lobe tumors	119	183	302

Graph no. 7. Structure of episodes of hospitalization, by age group in 2013-2017



Leukemias, lymphomas and brain tumors are predominant in all age groups.

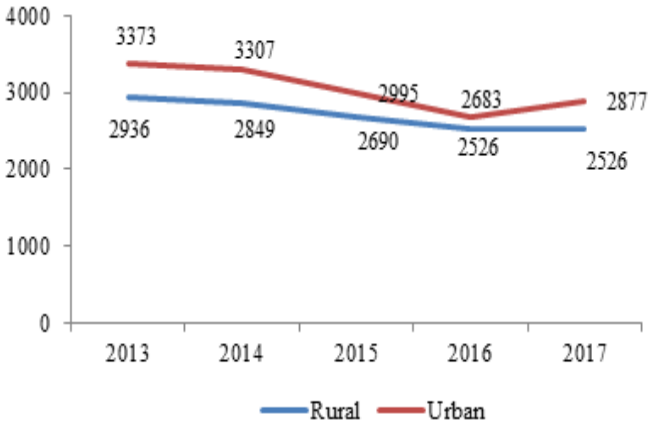
6. Distribution of hospitalization episodes due to tumors in children, depending on the patient's residence

Most of the children with episodes of hospitalization due to tumors in the period 2013-2017 come from urban areas - 15235 episodes (53%), compared with 13527 hospitalizations for rural children (47%). As a diagnostic

Table no. 5.

Age	2013	2014	2015	2016	2017	Total
0	45	46	45	65	70	271
1	97	132	202	160	121	712
2	228	250	222	289	275	1264
3	434	267	263	255	370	1589
4	532	528	332	288	319	1999
5	520	520	478	398	277	2193
6	506	580	429	408	339	2262
7	392	423	437	333	449	2034
8	483	374	357	258	296	1768
9	436	384	321	352	275	1768
10	418	288	374	237	416	1733
11	306	359	216	335	264	1480
12	330	251	308	191	271	1351
13	274	294	273	411	274	1526
14	260	303	289	266	360	1478
15	336	303	354	252	307	1552
16	390	468	369	366	326	1919
17	322	386	416	345	394	1863
Total	**6309**	**6156**	**5685**	**5209**	**5403**	**28762**

Graph no. 8. Evolution of number of hospitalization episodes due to tumors in children, in the period 2013-2017, depending on the patient's residence



class in the urban environment, malignant tumors of lymphoid, haematopoietic and related tumors predominate, and tumors with unpredictable development or unknown behavior (82.5% of the total in this residential environment), compared to the rural one where there are more hospitalizations for malignant tumors of lymphoid, hematopoietic and related tissues, and malignant tumors of the eye, brain, and other parts of the central nervous system.

The evolution of the number of these episodes throughout the study period was generally declining, a slightly

Graph no. 9. Distribution of hospitalization episodes by development regions, depending on the patient's residence

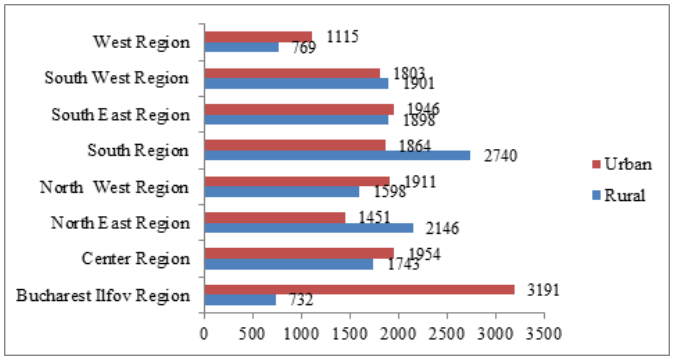


Table no. 6. Distribution of hospitalization episodes due to tumors in children, depending on the length of stay, 2013-217

Length of stay	2013	2014	2015	2016	2017	Total
Number of days	53475	52492	52393	44872	47954	251186
Average length of stay	8,47	8,52	9,21	8,61	8,87	8,7

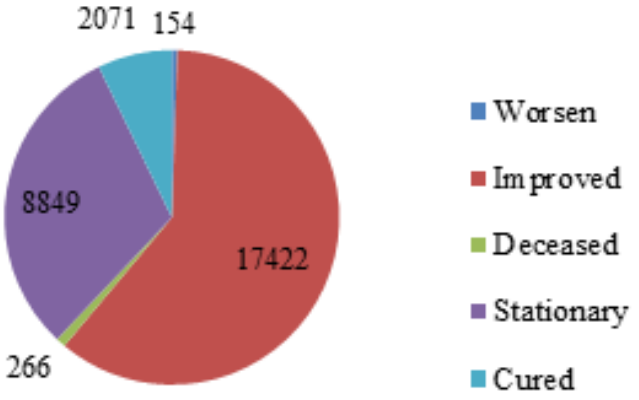
Table no. 7. Evolution of hospitalization episodes due to tumors, in children 2013-2017, depending on the patient's discharge status

Patient's discharge status	2013	2014	2015	2016	2017	Total
Worsen	46	33	30	21	24	154
Improved	3959	3963	3231	3085	3184	17422
Deceased	61	59	50	49	47	266
Stationary	1846	1753	1886	1644	1720	8849
Cured	397	348	488	410	428	2071
Total	**6309**	**6156**	**5685**	**5209**	**5403**	**28762**

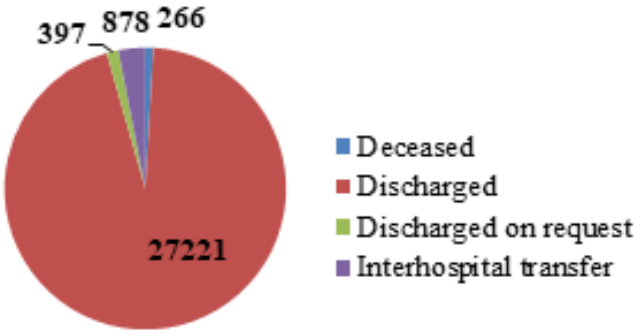
Table no. 8. Evolution of the type of discharge in the case of hospitalization episodes due to tumors in children during 2013-2014

Tipul externării	2013	2014	2015	2016	2017	Total
Decedat	61	59	50	49	47	266
Externat	6019	5908	5364	4894	5036	27221
Externat la cerere	77	79	83	71	87	397
Transfer inter-spitalicesc	152	110	188	195	233	878
Total	**6309**	**6156**	**5685**	**5209**	**5403**	**28762**

Graph no. 10. Patient discharge status following hospitalization episodes due to tumors, 2013-2017



Graph no. 11. Type of discharge of patients with hospitalization episodes due to tumors, during 2013-2017



greater difference between the number of episodes of hospitalization registered in 2013 and that observed in 2017, with the hospitalized children coming from the urban area (15% compared to 2013) - graph no.8.

The most frequent hospitalization episodes in urban patients were determined by acute lymphoblastic leukemia (38% of all hospitalizations in this residential environment), Hodgkin's nodular and mixed cell sclerosis (about 8%), cerebellum malignant tumor, diffuse non-Hodgkin's Burkitt tumor or malignant brainstem tumor. The same diagnosis at admission is most common for children from rural areas. At the level of development regions, hospitalizations of children from urban areas (Bucharest Ilfov, Center, North-West, South-East and West region) predominate, while in the other regions there are more frequent hospitalizations among those living in rural areas (North- East, South and South-East) - graph no.9.

The counties with the most hospitalization episodes of the urban children caused by these three tumor classes were: Bucharest, Prahova, Brasov, Constanta, Bihor and Cluj. In the case of the other residential environment, most episodes were registered for children from Ilfov, Prahova, Dolj, Mureş, Suceava counties.

7. The distribution of hospitalization episodes due to tumors in children, depending on the duration of hospitalization, during 2013-2017.

The total duration of hospitalization for admissions due to tumors in children amounted to 477225 days between 2013 and 2017, of which 251186 days (52.6%) due to the three categories of neoplasms analyzed. The number of hospitalization days has fallen steadily from 2013 to 2016 by about 16%, in 2017 recording a small increase of almost 7% over the previous year.

The average hospitalization duration in children with tumors in the three categories studied was 8.7 days in this period, compared to the average hospitalization duration of children with neoplastic disease that was 6.64 days. Average hospitalization ranged from 8.47-9.21 days, the year with the highest average duration was 2015, and the lowest year 2013 - table no. 6.

By tumor types, the duration of hospitalization was the highest in episodes due to malignant tumors of lymphoid, haematopoietic and related tissue (C81-C96) with an average hospitalization of approximately 10 days followed by tumors of the eye, brain and other parts of the central nervous system (C69-C72) with an average duration of 7.3 days and tumors with unpredictable evolution or unknown behavior (D37-D48) with an average duration of 5.7 days. Acute lymphoblastic leukemia had the highest 13.3 days of hospitalization with no mention of remission and 7.8 days with remission; other types of neoplasia long-term with high mean of hospitalization were non-Hodgkin's diffuse lymphoma Burkitt tumor - 8.4 days, cerebellum malignancy 7 days, Hodgkin's disease nodular sclerosis 6 days. The development regions with the highest average hospitalization duration were North East, West and North West, and the lowest values in the Bucharest Ilfov and the South regions, and among the counties, those with high values were Botosani (16.3 days), Bihor or Constanta (9 day values).

8. Distribution of hospitalization episodes due to tumors in children, depending on the patient's discharge status and the rate of in-hospital mortality

Most hospitalized children due to the three classes of tumors analyzed in 2013-2017 were discharged as relieved (61%), while one third were as stationary and about 7% were healed. Less than 1% of children were discharged in an aggravated state (0.5%) or died (0.9%) - graph no. 10.

As evolution over time, there is a significant reduction over the study period of completed hospitalizations with an aggravated state of health, the number decreasing by half in 2017 as compared to 2013. The same reduction but less important is also observed in case of hospitalization episodes ended with deaths, the number decreasing by 23% compared to 2013-table no 7.

Table no.7 Evolution of hospitalization episodes due to tumors, in children 2013-2017, depending on the patient's discharge status

Most deaths occurred in children with malignant lymphoid, haematopoietic and related tissue tumors (62% of all deaths) and those with malignant tumors of the eye, brain, and other parts of the central nervous system (30%). In terms of diagnosis at admission, most of the deaths were observed in children with acute lymphoblastic leukemia diagnosis, with no mention of remission (17.3% of all deaths), acute myeloid leukemia, without mention of remission (8.6 %), acute lymphoblastic leukemia in remission (5.6%), or malignant tumor of the brainstem (4.9%).

North-East and North-West have the highest deaths (22% and 15% of all deaths nationwide) and the least occurred in West region (6.4%). At the local level, most deaths due to these three types of tumors were found in Bucharest (8.3% of the national total), Iasi (5.6%) and Suceava (4.5%).
95% of the total hospitalization episodes due to tumors in children were completed with normal discharges, while 3% represented in-hospital transfers, and 1.4% discharges on demand - graph no. 11.

Compared to the initial year, over the last year of the study period there was an increase of over 65% in the case of interhospital transfers and also a lower (approximately 13%) increase in the number of inpatient episodes completed by a discharge on-demand - table no.8.

In-hospital mortality rates were 0.92% throughout the entire period, ranging from 0.96% in 2013 to 0.87% in 2017.

CONCLUSIONS

Following the analysis, processing and interpretation of DRG data over the last 5 years, regarding hospitalization due to the main / most common three categories of tumors that affected patients aged 0-18 years, we can conclude that:

- Of the 71824 episodes of hospitalization due to tumors in children 0-18 years during the period 2013-2017, the three tumor categories that most affected the children, causing the highest number of admissions, representing 40% of the total, were in order: malignant tumors of lymphoid, hematopoietic and related tissues, malignant tumors of the eye, brain and other parts of the central nervous system, and tumors with unpredictable evolution or unknown behavior;
- Of the 28762 hospitalizing episodes, malignant tumors of lymphoid, haematopoietic and related tissues caused about more than half of admissions, malignant tumors of the eye, brain and other parts of the central nervous system about one fifth, and tumors with unpredictable development or unknown behavior approx. one fifth. The results obtained in this study confirm the international statistics according to which the first two categories represent the most frequent impairment in children and adolescents;
- The evolution study indicates a general downward trend, which is only valid for malignant tumors of the lymphoid, haematopoietic and related tissue, and partly for malignant tumors of the eye, brain and other parts of the central nervous system. For tumors with unpredictable development or unknown behavior, the number of hospital episodes has increased over the last years of the study period as compared to 2013;
- Of the haematopoietic and lymphoid tumors, the most common was acute or myeloid lymphoblastic

leukemia or lymphoma, in terms of tumors of the nervous system, mainly brain tumors affecting cerebellum or brainstem, and in the category of unpredictable tumors or unknown behaviors are ovarian tumors;

- Evolution throughout the study period was a downward trend in the case of blood or lymphatic system tumors, but with respect to the other categories, a higher number of hospitalizations (even doubles) was observed, especially in the case of unpredictable tumors such as those of the ovary or some brain tumors so classified;
- Case studies at national level, by development region, show a uniform distribution with close values between regions, except for the extremes: the South Region with the highest number of hospitalizations and the lowest number in West;
- The evolution trend was a downward trend for all regions, with two exceptions: the West region with more than one fifth increase in 2017 compared to the initial year and the Center region;
- At the local level, the counties of Bucharest and the counties of Prahova, Mureş, Bihor, Constanţa and Dolj were the leading counties;
- As a local trend in 28 counties, the number of hospitalizations decreased compared to the one recorded in the initial year of the study, while in the rest are observed increases, the highest in counties like Mehedinţi (almost double), Harghita and Hunedoara;
  - The most frequent episodes of hospitalization were recorded by boys (more affected by this disease according to international and national statistics) but the trend was decreasing;
- As tumor classes, both sexes were primarily affected by haematopoietic and lymphatic tumors, but if boys develop more frequently brain tumors, in girls predominate those with unpredictable evolution; Leukemias and lymphomas predominate in both sexes;
  - From the age point of view, 5-10 years predominate as one-third of all episodes; the trend over time has been declining in all other age groups except for extreme groups, with children under 1 year of age accounting for the most significant increase over one third;
- Leukemias, lymphomas and brain tumors predominate in all age groups;

  - From the point of view of the residential environment of the patient, urban hospitalized children predominate, however the differences are small and the trend decreasing for both categories; The most common types of tumor in both environments are blood and lymph tumors, but while urban children are more likely to experience unpredictable tumors, brain tumors were more common in the rural area;
- Inpatient duration analysis indicates a number of days of hospitalization by these three tumor categories, representing more than half of the total days of admissions caused by tumors; however, the number of these days was reduced in 2017 compared to 2013 by about 16%; The average of hospitalization in these categories exceeds hospitalization by tumors, ranging from 8.47-9.21 days;
- Children with hematopoietic tumors (10 days on average) hospitalized for most of the time almost double of those with brain tumors, and leukemia counts most in the premium category as duration of admission;
- From the point of view of the state of admission, very small percentages were discharged as aggravated or deceased (less than 1%), and their number continued to decrease over time;

  - Children with malignant lymphoid, haematopoietic and related (more than half) malignant tumors and those with malignant tumors of the eye, brain, and other parts of the central nervous system (one third of the total) have the highest mortality; Leukemia and brainstem tumors caused the most deaths.
- - As a mortality rate for in-hospital mortality, it was overall 0.92% higher than that determined by tumors in general (0.5%) and varied over the period with values between 0.96% in 2013 and 0.87% in 2017.

In order to make comparisons and formulate effective interventions, the lack of data at both national and international level was the main problem of this study.

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