In Romania, the standardized mortality rate for colorectal cancer was superior to the European Union and the hospital discharge rate for these patients in our country was above the European average in 2016. In terms of population aged 50-74 years participants in screening programs for this type of cancer, Romania ranks last, with less than 10% of the population, who has ever done this test. As far as the statistics on malignancies are concerned, they are missing or incomplete in our country, so the situation of these patients is unclear.

In this context, our study attempts to provide some additional information on the situation in Romania at the level of the last 5 years in terms of cases diagnosed as malignant tumor with digestive localization or tumor with unpredictable evolution or unknown behavior, hospitalized in public hospitals under contract with the National Health Insurance House.

Findings in our study represent valid evidence and they should be complemented by evidence of the determinants of these pathologies and the level of resource consumption in order to support the decision-making process in the health sector in Romania.

Keywords: cancer, digestive cancer, hospitalization, Romania

OBJECTIV
To identify the geographic distribution of hospitalization episodes due to the main two classes / categories of neoplasms affecting adults in Romania at the national, regional and local (county) levels during 2013-2017.
METHODOLOGY

In 2018, the National School of Public Health, Management and Profesional Development in Bucharest conducted a retrospective, descriptive study on the current situation in Romania regarding admission episodes due to malignancies in adults as well as in children. Data from the National DRG Data Base, data reported under continuous hospitalization by Romanian hospitals in contractual relationship with the National Health Insurance House, were used. The data are reported monthly, according to the law to the National School of Public Health, Management and Profesional Development also. In this study, data were reported for the period 2013-2017. The data on tumor hospitalization episodes in Romania in the above-mentioned hospitals were analyzed, data being selected using the ICD-10-AM classification, extracting and analyzing those related to class Diagnostic Tumors, depending on the diagnosis name and diagnosis subclass name, diagnostic codes between C00.0-C96.9 and D00.0-D48.9. Subsequent to data processing, analysis has been deepened by the study of the main types of malignant tumors that caused most adult hospitalization episodes during 2013-2017. The first two categories of cancer disease were identified that together resulted in more than one-third of cancer hospitalization episodes for the entire period, these being: according to DRG classification Primary malignant tumors located in digestive organs (C15-C26) and Tumors with unpredictable evolution or behavior unknown (D37-D48).

The episodes of hospitalization for patients over 18 years of age have been studied. The data were processed using the SQL Server Management Studio Express 2005 software, further processing and analysis was performed using SPSS and MO Excel. Data analysis was performed according to a range of demographic and socio-economic variables such as patient gender, age, rural/urban residence, length of stay etc. included in the minimum data set reported in the DRG system by hospitals. Interpretation and presentation was done in the form of tables and graphs.

RESULTS

The results of the analysis were interpreted in relation to a series of demographic variables and socio-economic characteristics (sex, age, residence environment, duration of hospitalization, discharge status) following the geographic distribution and temporal evolution of the two main types of diagnosed / hospitalized tumors in the country during 2013-2017.

1. The most common diagnoses in adult malignant tumor conditions that required hospitalization during 2013-2017

The most common hospitalized malignancies in adult for the period 2013-2017 were primary tumors located in the digestive organs (C15-C26) - 51.7% and tumors with unpredictable evolution or unknown behavior (D37-D48) - 48% of the total number of 635,166 hospital episodes. Among the tumors located in the digestive organs in the first places as frequency of hospitalization episodes determined by them were colorectal tumors (located in the rectum, sigmoid, rectosigmoid junction), gastric tumors or neoplasia of the pancreas head.

In tumors with unpredictable evolution or unknown behavior category, genital tumors with uterine or ovarian localization were most frequently hospitalized and prostate tumors in men.

2. Evolution of the frequency of continuous hospitalization episodes due to the main categories of tumors affecting adults, in 2013-2017, at national level

The number of inpatient episodes due to the first two categories of adult malignancies in 2013-2017 was 635,166 episodes, representing a third (32.7%) of the total 1944247 continuous hospitalization episodes of patients with diagnosis primary tumor and 3% of the total 21075085 episodes of hospitalization recorded during this period. From graph1 we can see that during the last 5 years the evolution of hospitalization episodes due to digestive tumor diseases and tumors with unpredictable evolution or unknown behavior increased steadily, in 2017 there were 3% more episodes compared to 2013.

The temporal evolution of hospitalization episodes due to the two categories of tumoral disease studied was an increasing trend for unpredictable tumors or unknown behavior, with 20% more hospitalizations in 2017 than in 2013. In the case of hospitalization episodes due to digestive tumors, their number has decreased slowly from 2013 until 2016, so that in 2017 there will be an increase, their number being higher than at the beginning of the study period by almost 3% (graph 2).

At regional level, most hospitalizations due to these types of tumors were recorded in the South Region (16.9% of the total) and Bucharest Iflov (16.2% of the total). The western, central and south-western regions recorded the slightest episodes of hospitalization (around 10%) - graph 3. From the evolution point of view during the studied 5 years, the number of hospitalization episodes due to the two types of tumors was higher in Bucharest-Ilfov, South and North-East regions in the first two years, and then the place of the latter was taken by the South East region. The regions with the lowest number of hospitalization episodes were the West, Center and Southwest (Table 1).

Most hospitalized type of tumor that it is noted in the southern parts of the country (regions like Bucharest-Ilfov, South and South-East) were tumors with unpredictable evolution or unknown behavior, while in all other regions digestive tumors are first placed. The greatest differences between episodes occur in digestive tumors in the Northeast and Northwest regions, representing more than 60% of the total of the two types in the region, and in the case of unpredictable tumors or unknown behavior, the largest difference is recorded for Bucharest-Ilfov region (61.6% of total on this region) - graph 4. At local/county level, most of the hospitalization episodes in these cancers were recorded between 2013-2017 in Bucharest (14% of the national total), Prahova (approximately 3.9%), Timis (3.7%) and Cluj (3.3%), with Covasna, Bistrița-Năsăud and Sălaj counties being the opposite, with the fewest episodes of hospitalization (graph 5). The trend in the counties with the highest values was increasing during the study period.
Regarding tumors with unpredictable evolution or unknown behavior at local level, the most frequent episodes of hospitalization during the study period were recorded in the counties of Bucharest (17.8% of the national total of this type), Timis, Prahova and Constanța, and the fewest were observed in Bistrița-Năsăud, Covasna, Sălaj and Vaslui - graph 6.

The most frequent episodes due to primary malignant tumors located in digestive organs were recorded between 2013-2017 in Bucharest (10.5% of the national total for this type), as well as in Cluj and Prahova counties, but with much lower values, approx. 2.6 times lower. The counties with the lowest number of hospitalizations in this type of malignancy were Covasna and Braila - graph 7.

From the point of view of the type of cancer, the predominance of tumors with unpredictable evolution or unknown behavior (61% of the total) was observed in men, but in women digestive tumors (64.5%).

As a trend, the number of admissions during the study period, with respect to tumors with unpredictable progression or unknown behavior, increased significantly in both sexes, more in women than in males (36% more in women and 27% in male in 2017 compared to 2013).

In the case of admissions due to primary malignant tumors located in the digestive organs (C15-C26) the observed increases were only in the order of several percentages (about 4% in males and 2% in females) - table no.2.
Graph 4 Distribution of the number of hospitalization episodes due to the first two types of tumors in adults, at regional level in Romania, during 2013-2017

Graph 5 Distribution of the number of hospitalization episodes due to the first two types of tumors in adults at local / county level in Romania, during 2013-2017
Table 1 Distribution of the number of hospitalization episodes due to the first two types of tumors in adults, at regional level in Romania, during 2013-2017

<table>
<thead>
<tr>
<th>Regions</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bucharest Ilfov Region</td>
<td>20510</td>
<td>20821</td>
<td>19988</td>
<td>19814</td>
<td>21647</td>
<td>102780</td>
</tr>
<tr>
<td>South Region</td>
<td>19918</td>
<td>20818</td>
<td>21683</td>
<td>22122</td>
<td>23081</td>
<td>107622</td>
</tr>
<tr>
<td>North-East Region</td>
<td>15702</td>
<td>16143</td>
<td>15155</td>
<td>15868</td>
<td>16903</td>
<td>79771</td>
</tr>
<tr>
<td>South-East Region</td>
<td>14874</td>
<td>15431</td>
<td>16064</td>
<td>16782</td>
<td>18099</td>
<td>81250</td>
</tr>
<tr>
<td>North-West Region</td>
<td>14405</td>
<td>14923</td>
<td>14810</td>
<td>16230</td>
<td>17114</td>
<td>77482</td>
</tr>
<tr>
<td>South-West Region</td>
<td>11803</td>
<td>11855</td>
<td>12695</td>
<td>13270</td>
<td>13441</td>
<td>63064</td>
</tr>
<tr>
<td>Center Region</td>
<td>11776</td>
<td>12165</td>
<td>12156</td>
<td>12405</td>
<td>13971</td>
<td>62473</td>
</tr>
<tr>
<td>West Region</td>
<td>10510</td>
<td>11557</td>
<td>12156</td>
<td>13016</td>
<td>13485</td>
<td>60724</td>
</tr>
<tr>
<td>Total</td>
<td>119498</td>
<td>123713</td>
<td>124707</td>
<td>129507</td>
<td>137741</td>
<td>635166</td>
</tr>
</tbody>
</table>

Table 2 Distribution of the number of hospitalization episodes due to the first two types of tumors in adults, depending on the patient gender, during 2013-2017

<table>
<thead>
<tr>
<th>Gender</th>
<th>Male</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>Tumori maligne primare localizate la organele digestive (C15-C26)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>36730</td>
<td>38619</td>
<td>41370</td>
<td>45155</td>
<td>25389</td>
<td>26589</td>
<td>25136</td>
</tr>
<tr>
<td>Total</td>
<td>20219</td>
<td>21697</td>
<td>23194</td>
<td>25627</td>
<td>39845</td>
<td>40175</td>
<td>39255</td>
</tr>
<tr>
<td>Total</td>
<td>54264</td>
<td>56949</td>
<td>60316</td>
<td>64564</td>
<td>70782</td>
<td>65234</td>
<td>64391</td>
</tr>
</tbody>
</table>

Graph 6 Distribution of the number of hospitalization episodes due to tumors with unpredictable or unknown evolution at local / county level in Romania, during 2013-2017
Graph 7 Distribution of hospitalization episodes due to primary malignant tumors located at digestive organs at local / county level in Romania, during 2013-2017

Graph 8 Evolution of hospitalization episodes due to the first two types of tumors in adults, by gender, 2013-2017

Graph 9 Distribution of hospitalization episodes by first two types of tumors in adults according to patient age

Table 3 Distribution of hospitalization episodes due to the first two types of tumors in adults, according to the patient age, 2013-2017

<table>
<thead>
<tr>
<th>Age group</th>
<th>Tumors with unpredictable evolution or unknown behavior (D37-D48)</th>
<th>Primary malignant tumors located in digestive organs (C15-C26)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-39 years</td>
<td>2830</td>
<td>2922</td>
<td>2641</td>
</tr>
<tr>
<td>40-49 years</td>
<td>5894</td>
<td>5907</td>
<td>5866</td>
</tr>
<tr>
<td>50-59 years</td>
<td>12397</td>
<td>13047</td>
<td>14659</td>
</tr>
<tr>
<td>60-69 years</td>
<td>10301</td>
<td>10126</td>
<td>11571</td>
</tr>
<tr>
<td>70-79 years</td>
<td>10301</td>
<td>10126</td>
<td>11571</td>
</tr>
<tr>
<td>+80 years</td>
<td>9586</td>
<td>10346</td>
<td>11155</td>
</tr>
<tr>
<td>peste 80 ani</td>
<td>3518</td>
<td>3885</td>
<td>4315</td>
</tr>
<tr>
<td>Total</td>
<td>54264</td>
<td>56949</td>
<td>60316</td>
</tr>
</tbody>
</table>

Graph 10 Distribution of the hospitalization episodes number, depending on the patient age the and type of tumor
5. Distribution of hospitalization episodes number due to the first two types of tumors in adults, according to the patient age

The average age of patients hospitalized during this period due to the two types of tumors was 61.17 years, the median age being 63 years and the mean age 65 years. Data analysis by age group indicates that at the national level, for the entire study period, most episodes of hospitalization were registered in the 60-69 age group (29.6% of the total), 70-79 years (22.4%) and 50-59 years (18.3%). A percentage of up to 22% is reported for young people under the age of 50 and about 8% for people over 80 years old – graph 9. The majority of those affected fall into groups under the age of 65, ie persons active in terms of working capacity (58.2%).

Overall, the evolution over the period of study of the incidence of hospitalization episodes registered an increasing trend, with the highest increases in 2017 compared to 2013 being observed for the age group over 80 years (30.5 %), 60-69 years (26%) and 40-49 years (22%). Very small decreases in values in the last year of study compared to 2013 are found only in the age groups 19-29 years and 50-59 years (table no.3). Age correlates strongly with the number of hospitalization episodes due to tumors, so for each of the 5 years of study, values of the Pearson correlation coefficient are high, ranging from 0.978 to 0.980, the correlation being direct, positive, statistically significant at a threshold of 0.001.

Referring to the type of tumor classification by age group, the most common type of malignancy encountered in younger age groups, under 50 was the Tumor with unpredictable evolution or unknown behavior (D37-D48). Thus, 93% of the total of the two types of tumors in the 19-29 age group were included in the above category, 85% in the 30-39 age group and 74.6% in the 40-49 age group. Over 50 years of age prevail digestive tumors. 53.7% of the total in 50-59 years age group were primary tumors located in digestive organs, around 63% between 60-79 years and 56% in patients over 80 years - graph 10.

From the point of view of evolution during the study period, in case of tumors with unpredictable evolution or unknown behavior there is an increase in the number of hospitalization episodes in each age group. Compared to the number of episodes observed in 2013, there are the highest increases in 2017 for the age groups of 60-69 years and +80 years (increase by more than 50%), and for groups 70-79 and 40- 49 increases by more than one third.

In terms of primary malignant tumors located in the digestive organs, four of the seven age groups recorded decreases in the number of admission episodes compared to the starting year of the study period, the most notable reductions being observed in the 19-29 age group (-18%) and 50-59 years (-16%). The highest increases in 2017 compared to 2013 are observed in age groups +80 years (approx. 16%) and 60-69 years (13%) - table no.3.

6. Distribution of the number of hospitalization episodes due to the first two types of tumors in adults, depending on the patient residence area

Analyzing the data according to the patient’s residence area, it was found that most of the hospitalization episodes due to the main types of tumors in adults were registered by urban patients (61%), the tendency for both residential over the five years of study being an increasing one. The increase in 2017 compared to the number observed in 2013 is 20% higher for rural patients, compared with a 12% increase in the patients in urban areas - graph 11.

In both residential settings the number of hospitalizations due to one type or another of tumors was quite close, with a slightly more pronounced predominance being recorded for digestive tumors in rural patients (graph 12).

Episodes of hospitalization for both types of tumoral diseases and for patients in both residential settings have increased almost yearly. The highest increases were seen in tumors with unpredictable development or unknown behavior (D37-D48), especially for rural patients (+39%), but also patients living in the city had an increase more than one quarter of the number of hospitalization episodes in 2013 - table no.4. In the case of digestive tumors, growth was reduced, only in the case of rural patients.

7. Distribution of hospitalization episodes number due to the first two types of tumors in adults, depending on the length of stay

From a total of 157427638 days of continuous hospitalization at national level in 2013-2017, the number of hospitalization days for patients with the two types of tumors studied was 4186573 representing 2.65% of the national total and 33.8% of the national total of 12396301 days of hospitalization for patients with cancer.

From the point of view of the no. of hospitalization days due to the main types of tumors in adults, it increased steadily, reaching 867,070 days in 2017 from 814,699 days in 2013. The median national level in the study period was 6.59 days for patients with these two types of malignancies, with a median of 4 days and a modal value of 2 days.

Depending on the type of malignancy, a median length of stay of 5.59 days for tumors with unpredictable evolution or unknown behavior (D37-D48) was found to be lower than that of patients with primary malignant tumors located in the digestive organs C15-C26), in which case the average length of stay was 7.52 days. The evolution of this indicator during the study period can be seen in table no.5.

As length of stay, between 2013 and 2017, an average of 6.37 days of inpatient hospitalization was recorded for patients with tumors, a value exceeded in patients with digestive malignancies (7.52 days).

At the level of each study year, the average length of stay was higher for rural and urban patients in both types of tumors. Differences however exist by gender, depending on the type of tumor. Thus, for tumors with unpredictable evolution or unknown behavior (D37-D48), the average duration of hospitalization was higher for women than for men in each of the 5 years of study, and for digestive tumors, men were hospitalized more time than women.
Most deaths occurred in patients with digestive malignancies, 89% of the total number of deaths throughout the study period, and also most cases discharged as aggravated are seen in the same patient (84% of the total number of aggravated cases).

CONCLUSIONS

In Romania, during the period 2013-2017, nearly one-tenth of hospitalization episodes, at national level, were hospitalization due to tumors. From the category of adult malignancies requiring hospitalization between 2013 -2017, the most common were primary malignant tumors located in digestive organs (C15-C26) and tumors with unpredictable evolution or unknown behavior (D37-D48), in close proportions, together accounting for a third of all admissions with a primary diagnosis of malignancy. The evolution of the number of hospitalizations due to them has been continuously increasing, with this increase being more pronounced, especially in the case of unpredictable tumors or unknown behavior (D37-D48).
In regional and local level, there are areas such as the South, South-East and Bucharest-IIfov regions, where the most hospitalization episodes were registered, and at the local / county level, the city of Bucharest, as well as counties like Prahova, Timis and Cluj. The reverse situation is recorded in the West, Center and Southwest regions, with the fewest hospitalization episodes in the study period, and in the county, the least cases were observed in Covasna, Bistrita-Nasaud and Salaj.

Studying the distribution of hospitalization episodes according to the determinant type of tumor, we can say that predominantly unpredictable tumors or unknown behavior prevail in regions such as Bucharest-IIfov, South and South-East and digestive tumors prevail in all other regions.

Counties situation indicates the higher prevalence of hospitalization episodes due to tumors with unpredictable evolution or unknown behavior in certain areas such as Bucharest, Timis, Prahova and Constanta, while in other counties such as Cluj and Prahova there are prevalent episodes of admission caused by digestive tumors.

Men required several hospitalization episodes due to these types of tumors, and the trend observed throughout the study period was a steadily rising one for this type of tumor. Also, males were predominantly hospitalized for tumors with unpredictable development or unknown behavior, while in women hospitalization was more often due to digestive tumors. The increasing trend has been observed in both cases, more pronounced lately for women, for tumors with unpredictable development or unknown behavior.

The average age of patients hospitalized during this period due to the two types of tumors was 61.17 years, the median age being 63 years and the mean age 65 years. Most episodes of hospitalization were registered in the 60-69 age group (almost one third of the total), 70-79 years (over one fifth), and 50-59 years, the age correlated strongly with the number of episodes of hospitalization due to tumors. Under 50, patients presented tumors with unpredictable or unknown behavior, and digestive tumors over 50 years. From the point of view of evolution during the study period, in the case of tumors with unpredictable evolution or unknown behavior there is an increase in the number of hospitalization episodes in each age group, and in the case of digestive tumors the highest increases in the year 2017 as compared to 2013 is observed in the age groups + 80 years and 60-69 years.

Data analysis from the point of view of the patient's residence area, it is noted that most episodes of hospitalization due to the main types of tumors in adults were registered by patients coming from urban areas, the tendency for both residential environments over the five years of study being an increasing one. In both residential settings, the number of hospitalization episodes due to one or other type of tumor was close enough, with a slightly more prominent prediction for digestive tumors in rural patients. Hospitalization due to unpredictable tumors or unknown behavior, especially for rural patients, has increased by more than a third, but also patients living in the city had an increase of over one quarter of hospitalization episodes in 2013. In the case of digestive tumors, the growth was reduced, and observed only in rural patients.

The number of hospitalization days for patients with the two types of tumors studied accounted for almost 3% of the total number of days of hospitalization at national level, namely one third of the total number of hospitalization days for patients with neoplasia, increasing by 6% (in the year 2017 compared to 2013). The median national level during the study period was 6.59 days for patients with these two types of malignancies, with a median of 4 days and a modal value of 2 days. The median length of stay for tumors with unpredictable or unknown behavior was 5.59 days, lower than that of patients with primary malignant tumors located in digestive organs (7.52 days) and lower than the national mean 6.37 days of hospitalization for patients with any type of tumor. The average hospitalization duration was higher for rural than urban patients, for both types of tumors, for hospitalized women for tumors with unpredictable or unknown behavior and for men with digestive tumors. The highest average duration of hospitalization was for older people, over 80 years and 70-79 years (values ranging from 6.06-6.65 days for those with unpredictable tumors or unknown behavior and values between 7.88 and 9.88 days for digestive tumors).

Most patients were discharged improved, stationary or cured and only very small weights were recorded as worsening or death, but although the absolute number of aggravated cases declined from 2013 in 2017, the number of deaths increased by 1.4 times. Most of the deaths and also the most aggravated cases come from patients with digestive malignancies.

These records should be complemented by evidence of the determinants of these pathologies and the level of resource consumption so that they can support the decision-making process in the health sector in Romania.

References
2. https://digestivecancers.eu/