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RESEARCH

ANALYSIS OF OSTEOPOROSIS DETERMINED HOSPITALIZATION EPISODES IN ROMANIA, IN THE PERIOD 2008-2020

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WHO considers osteoporosis second health problem in the world, folowing cardiovascular diseases. Every 3th woman/5th man over 50 is threatened by the risk of an osteoporotic fracture, associated with functional impotence, impaired quality of life, increased hospitalizations and mortality and specialists believe should be considered a public health issue. In Romania number of fractures estimated to increase by 17% 2010-2025, by 13% in men and 20% in women. A large proportion of these patients end up in hospital, with costs rising from € 468 million in 2010 to € 537 million in 2025. Effective management would require in-depth analysis regarding pattern of patients and health services used. Methods retrospective study (last decade) using DRG database, to identify profile of osteoporosis patient suffering hospitalization and hospital services used. Dynamic analysis of parameters allows identification of evolutionary trend of hospitalizations and geographical distribution, in order to identify problems and represent scientific evidence that can be used for better service planning and development of preventive/curative programs. Results Were analyzed types of involved wards, hospitalization episodes number, length of stay, type of primary/secondary diagnosis, patient's discharge status and deaths/hospitalization episodes number. Conclusions osteoporosis hospitalized patient profile is female, adult or over 65 years, from urban areas, areas less economically developed, hospitalized for osteoporotic fractures, hospitalization episodes due to osteoporosis decreasing in frequency lately, but increasing episodes ending with patient's death. This type of analysis, are useful tools for decision makers tailoring health policies.

Keywords: osteoporosis, hospitalization, Romania

INTRODUCTION

Increasing the share of the elderly population, especially in economically developed countries, coupled with other causes such as unhealthy lifestyle (fast food, nutritional deficiencies, sedentary lifestyle, lack of exercise in the open air and insufficient exposure to sunlight), sharp increase in pollution, especially in urban areas with large population agglomerations and an increased share of the elderly lead to a high prevalence of osteoporosis. Despite the progress made in the last 50 years in the field of disease management, including the availability of various effective pharmacological therapies, and the fact that it is no longer considered an inevitable consequence of aging, the economic burden of osteoporosis is significant, for example according to Hernlund et al, Archives of Osteoporosis, 2013, costs in the European Union in terms of fractures associated with the disease were 37 billion euros in 2010, with 26,300 years of life lost and 1.16 million QALY lost annually, while in the US the cost was $ 17.9 billion, and in the UK it was £ 4 billion a year. These costs are expected to increase by 25% by 2025 [1], [2]. WHO considers osteoporosis the second health problem in the world, after cardiovascular diseases. In 2010, there were an estimated 22 million women and 5.5 million men with osteoporosis and 3.5 million fractures at European level, including 620,000 hip fractures, 5,000,000 vertebral fractures, 560,000 forearm fractures and 1,800,000 other fractures [2]. In the Western world, every third woman and every fifth man over the age of 50 is at risk of osteoporotic fracture, associated with functional impotence, impaired quality of life, increased hospitalization and mortality, however, experts believe that the necessary attention is not paid and should be considered a public health issue [3]. Globally, osteoporosis causes over 9 million fractures annually, ie one fracture every 3 seconds, those who have already suffered a fracture are at risk for others [3], and by 2050, the incidence of hip fracture in men is increasing. It is estimated to triple, and in women it will increase 2.5 times compared to 1990 [4]. There are 150,000 deaths annually from complications of osteoporotic fractures in the EU [4].

In Romania, the number of statistics is low. At the level of 2009, the prevalence of osteoporosis in women over 50 was 20%, in men it was 6% [4], and the total number of fractures is estimated to increase by 17% from 2010 to 2025, by 13% in men and 20% in women [4]. The cost of osteoporosis in 2010 was estimated at 129 million euros, combined with lost QALYs reaching 468 million euros in 2010. In 2025 an increase in the number of fractures is expected from 94,000 in 2010 to 110,000, an increase of 17% in total and 13% in men and 20% in women. The costs of osteoporosis will increase from 129 million euros in 2010 to 151 million in 2025, an increase of 17%. Including QALYs, the increase is estimated at 468 million in 2010 to 537 million in 2025, an increase of 12% for men and 17% for women [4]. Given the high prevalence of this condition, especially among certain population groups, such as the elderly, and given the subsequent serious implications for morbidity and mortality, we believe that a better understanding of the prevalence of the disease is needed, first, by conducting population studies and monitoring susceptible age groups. This offers the possibility of taking preventive measures, establishing treatments for those eligible and preventing the onset of other derived comorbidities, which require further treatment, with high costs from an individual point of view, but also economically and socially. This study describes the hospitalization case for health problems related to osteoporosis and its consequences, fractures, and was conducted by the National School of Public Health, Management and Development in Health, Bucharest (NSPHMDHB) for the period 2008-2020.

OBJECTIV

Identification at national, regional and local level of geographical distribution of hospitalization

episodes for patients diagnosed with osteoporosis, as well as the temporal evolution of their number, between 2008-2020.

METHODOLOGY

The descriptive, retrospective study that looked at the period 2008-2020 used data from the National DRG Database, data reported in a 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 on the registration and statistical reporting of patients receiving medical services in continuous hospitalization and day hospitalization, with subsequent additions and modifications, NSPHMDHB collects and processes the minimum set of patient-level data for cases treated in continuous and day hospitalization. The study followed the analysis of data on hospitalization episodes for patients with osteoporosis in Romania, in the aforementioned hospitals (hospitalizations in continuous hospitalization). The data were selected using the ICD-10-AM classification, the records were extracted and analyzed from the observation sheets that most frequently had one of the codes as the main diagnosis: M80-Osteoporosis with pathological fracture, excluding NOS fissured vertebrae (M48. 5), pathological fracture NOS (M84.4), compaction of an NOS vertebra (M48.5) and including compaction and vertebral osteoporotic fissure, M81-Osteoporosis without pathological fracture, excluding osteoporosis with pathological fracture, M82-Osteoporosis in diseases classified elsewhere (osteoporosis in multiple myelomatosis M82.1, in endocrine diseases M82.1, in other diseases classified elsewhere M82.8), M83-Adult osteomalacia, excludes infantile and juvenile osteomalacia -E55.0, resistance to vitamin D-E83.3, renal osteodystrophy-N25.0, rickets (evolutionary) NOS -E55.0, sequelae -E64.3, resistant to vitamin D-E 83.3, M84-Bone continuity disorders. 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 NSPHMDHB, and the identification of persons for the purpose of analysis is based on encrypted personal code. The age of the patients was calculated in years of age, as the difference between the date of hospitalization and the date of birth. The data were processed using SQL Server Management Studio Express 2005 software, and further processing and analysis was performed using SPSS and Excel. The analysis was performed according to a number of demographic and socioeconomic variables, such as age, hospital length of stay, discharge status, etc., information included in the minimum set of data reported in the DRG system by hospitals. The interpretation and presentation were done in the form of tables and graphs.

RESULTS

The analysis and interpretation of data from the national DRG was performed in relation to a number of demographic variables and socioeconomic characteristics (sex, age, area of residence, length of hospital stay, in-hospital mortality rate, discharge status) following geographical distribution and temporal evolution of episodes for hospitalization of patients with the main diagnosis of osteoporosis, in the period 2008-2020.

1. Total number of hospitalization episodes for patients diagnosed with osteoporosis, according to the diagnostic code registered in Romania, in the period 2008-2020

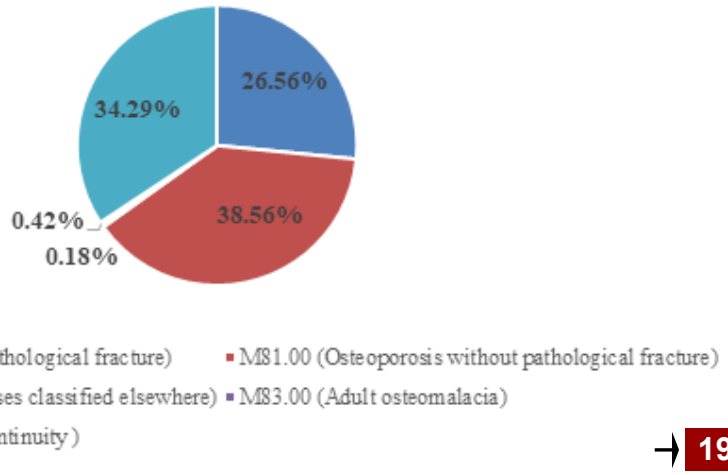
The total number of continuous hospitalization episodes for osteoporosis patients registered in Romania in the period 2008-2020 was 61950 episodes, of which about a third were represented by osteoporosis without pathological fracture (39%) and diseases of bone continuity (34%), and approx. a quarter (27%) of osteoporosis with pathological fracture - graph no. 1.

On each type of diagnostic, it is found that it predominates: among osteoporosis with pathological fracture, postmenopausal (54% of the total in this category), and among osteoporosis without pathological fracture, the most common are also postmenopausal osteoporosis (69%).

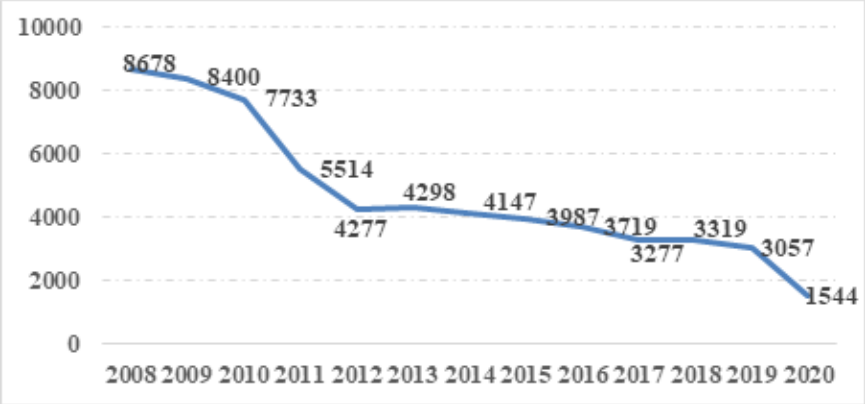
2. Evolution of hospitalization episodes for osteoporosis patients, in Romania, between 2008-2020

The temporal evolution of hospitalization episodes for osteoporosis patients during this period can be observed in graph no.2. There is a reduction in the number of hospitalization episodes over the period, approximately 3 times in 2019, compared to 2008 and 5.6 times in 2020.

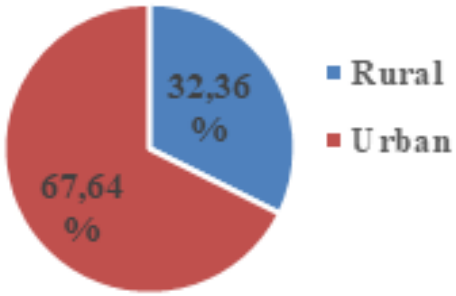
Graph no. 1. Total number of hospitalization episodes reported in continuous hospitalization in osteoporosis patients, according to the diagnostic code, registered in the period 2008-2020, at national level



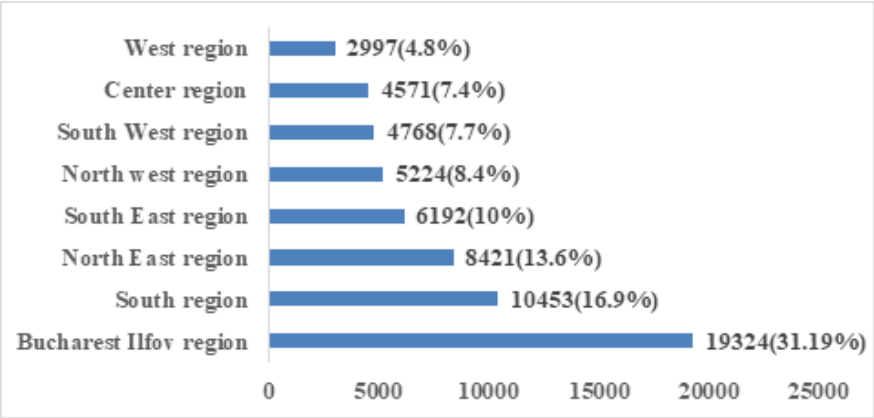
Graph no. 2. Evolution of the total number of episodes reported in continuous hospitalization, in patients with osteoporosis, registered in the period 2008-2020, at national level



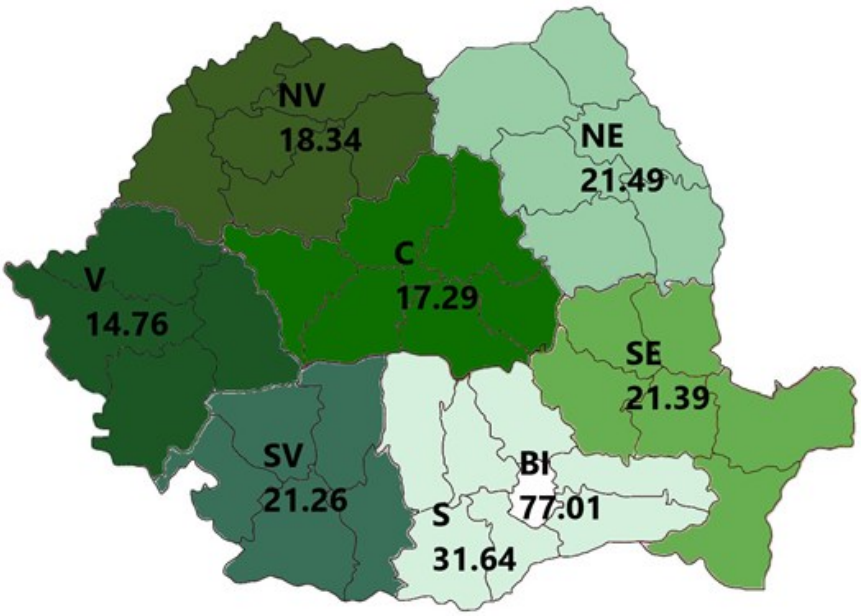
Graph no. 3. Distribution of hospitalization episodes for patients with osteoporosis, depending on the patient's place of residence, in Romania, 2008-2020



Graph no. 4. Distribution of hospitalization episodes for patients with osteoporosis, at regional level in Romania, in the period 2008-2020



Graph no. 5. Distribution of hospitalization episodes for osteoporosis patients, by population, 10,000 inhabitants, at regional level, in Romania, 2008-2020



3. Distribution of hospitalization episodes for patients with osteoporosis, by discharge ward

Most episodes of hospitalization for patients with osteoporosis were recorded in the departments of endocrinology (45% of the total) and orthopedic traumatology (33%). In the departments of internal medicine, rheumatology or general surgery, the percentage of hospitalization episodes was below 10%.

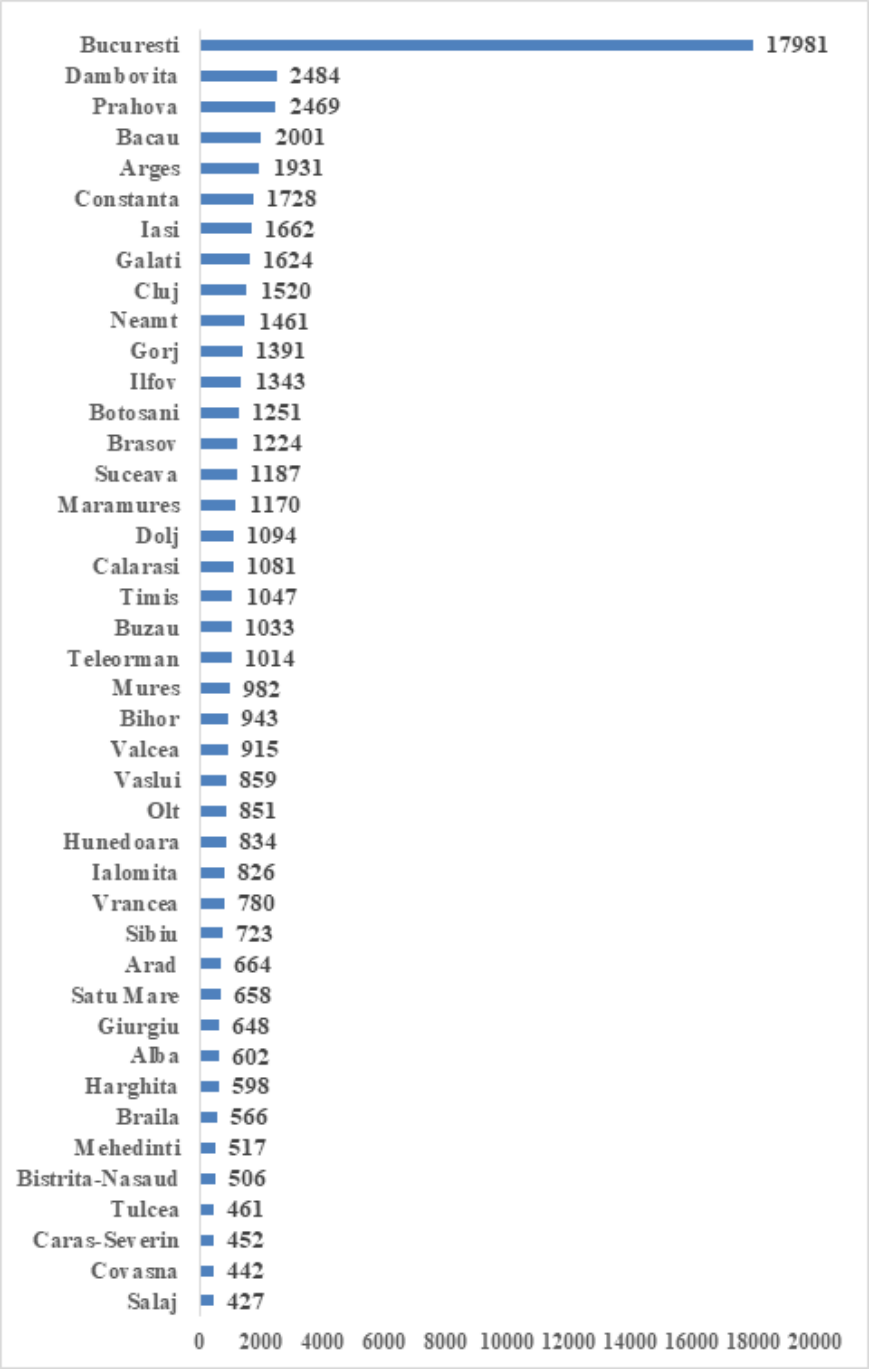
4. Distribution of hospitalization episodes for osteoporosis patients, at regional and local level, between 2008-2020

From the point of view of residence place where patients with this diagnosis come from, the most episodes of hospitalization (double the value) were recorded in the case of patients from urban areas (68%) - graph no 3. For women, Osteoporosis patients came mainly from urban areas (71%), while in the case of men a smaller percentage (58%) came from urban areas.

At regional level, most hospitalization episodes for osteoporosis patients were recorded during the study period in the southern regions, more than half of the episodes - Bucharest-Ilfov (31% of the national total), South (17%) and South East (10%), but also in the North East region (14%). The West and Center regions with approximately 5% and 7% had the fewest hospitalizations - graph no.4.

In terms of population, the descending order of the regions that recorded episodes of hospitalization for patients with osteoporosis was: Bucharest Ilfov region (77 episodes/10,000 inhabitants), South region (31.6 episodes/10,000 inhabitants), North East (21.49 episodes/10,000 inhabitants), South East (21.39 episodes/10,000 inhabitants), South West region (21.26 episodes/10,000 inhabitants), North West region (18.34

Graph no. 6. Distribution of hospitalization episodes for patients with osteoporosis, at local / county level, in Romania, in the period 2008-2020



episodes/10,000 inhabitants), Center (17.29 episodes/10,000 inhabitants) and the West region (14.76 episodes/10,000 inhabitants) - graph no.5.

At the local level, most episodes of hospitalization were recorded between 2008-2020 in Bucharest (29% of the total), which has about seven times more episodes than the following leading counties Dâmbovița, Prahova, Bacău and Argeș - graph nr.6. At the opposite pole are counties such as Covasna, Sălaj, Caras Severin, with less than 1% of the national total.

Compared to the population of each county, it can be seen from graph no. 7, the same two counties on the first two places, Bucharest (84.14 episodes/10,000 inhabitants) and Dâmbovița county (46.84 episodes/10,000 inhabitants), followed by Gorj (37.69 episodes/10,000 inhabitants), Ilfov (35.79 episodes/10,000 inhabitants) and Călărași (33.85 episodes/10,000 inhabitants), and on the last places Caraș Severin and Arad counties, with 6 times fewer episodes compared to the leading counties.

5. Distribution of hospitalization episodes in patients with osteoporosis by gender

Of the total number of hospitalizations with the main diagnosis of osteoporosis recorded during the study period, most belonged to women, approximately 76%, three times more compared to those recorded by males - graph no.8.

As an evolution over time, there is a decrease in the number of hospitalization episodes throughout the study period, for both sexes. Women experienced a sharp decline until 2012, then a slight but steady decline until 2019. The reduction in hospitalizations for osteoporosis in women was about 3 times compared to the initial year. In men, too, there is a slow decrease in hospitalizations with this diagnosis, but the evolution of hospitalizations has seen smaller variations than in the case of women, the decrease being only 2 times compared to the first year of the period studied - graph no.9.

6. Distribution of hospitalization episodes in patients with osteoporosis, according to patient age

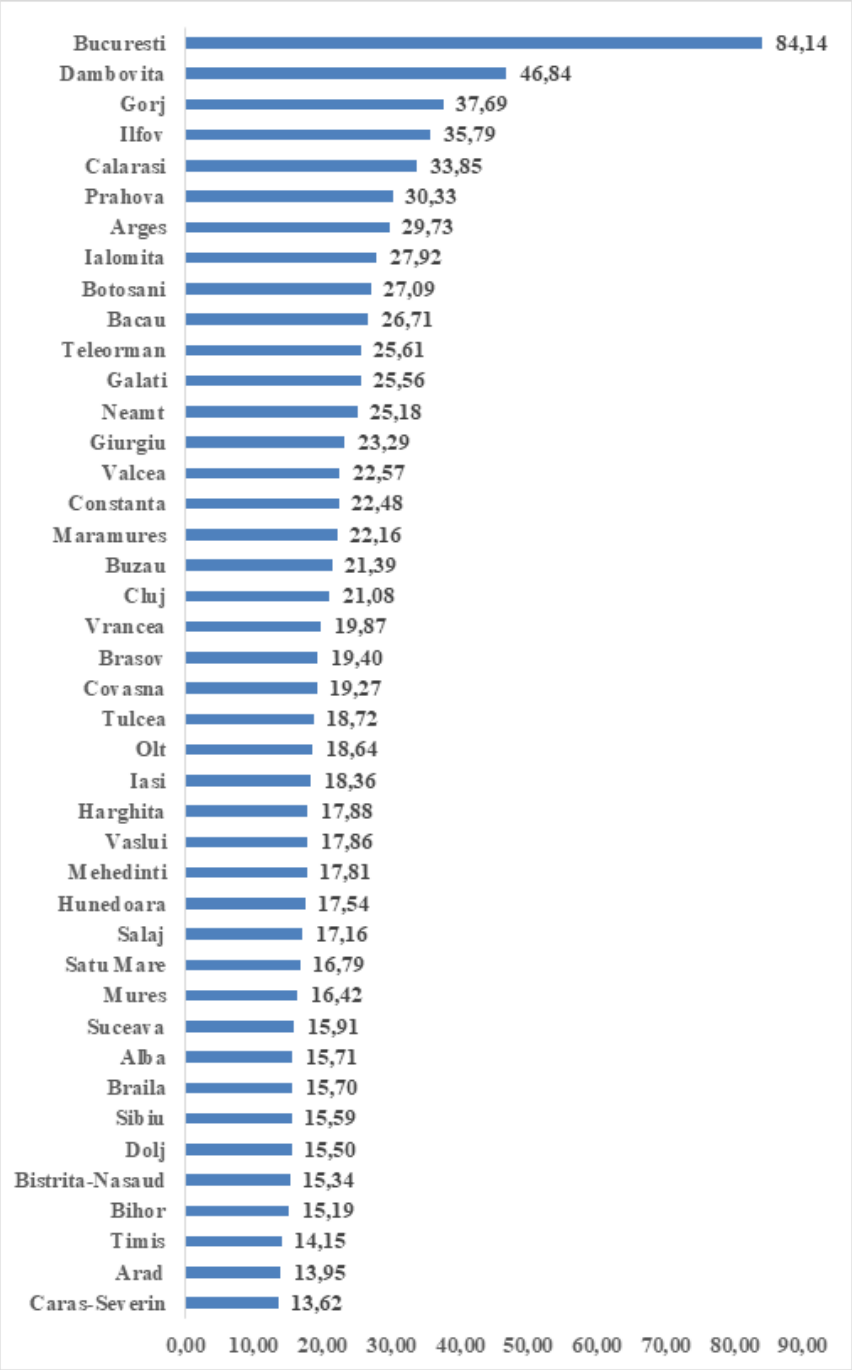
The analysis of the data according to age shows that the most episodes of hospitalization were recorded in people over 65 years (45.5% of the total), the next category being that of adults (44.6%). In young people and children, small percentages were registered, generated by other diseases - graph no.10. The average age of male patients hospitalized with this diagnosis was 47.7 years, compared to women where the average age was higher (65 years).

The number of hospitalizations for all age groups was a decreasing one, in the case of the elderly and adults, a steeper decrease in the case of adults (3.5 times fewer episodes in 2019 compared to the initial year) - graph no. 11.

7. Distribution of hospitalization episodes for osteoporosis patients, based on average hospital length of stay

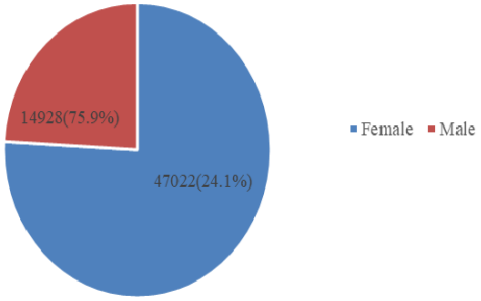
The average of hospitalization for patients with osteoporosis in continuous hospitalization was in the period

Graph no. 7. Distribution of hospitalization episodes for patients with osteoporosis, at local / county level, depending on the population of each county, in the period 2008-2020



2008-2020 of 6.24 days, varying throughout the study period, the highest values, above the average of the period being observed in the initial years 2008-2013 (with the highest value 6.96 days in 2011) it then decreased, in 2020 reaching the lowest value of 5.25 days. The highest average values of hospitalization were recorded in patients admitted to the pediatric pulmonology departments (27 days), osteoarticular TB (25.8 days), or pediatric cardiology (16.5 days). As a type of pathology, Osteoporosis following a post-procedural malabsorption with pathological fracture, unspecified location and Osteomalacia of the adult due to a malabsorption, ankle and foot record

Graph no. 8. Total number of episodes reported in continuous hospitalization, in patients with osteoporosis, depending on the patient's sex, in the period 2008-2020



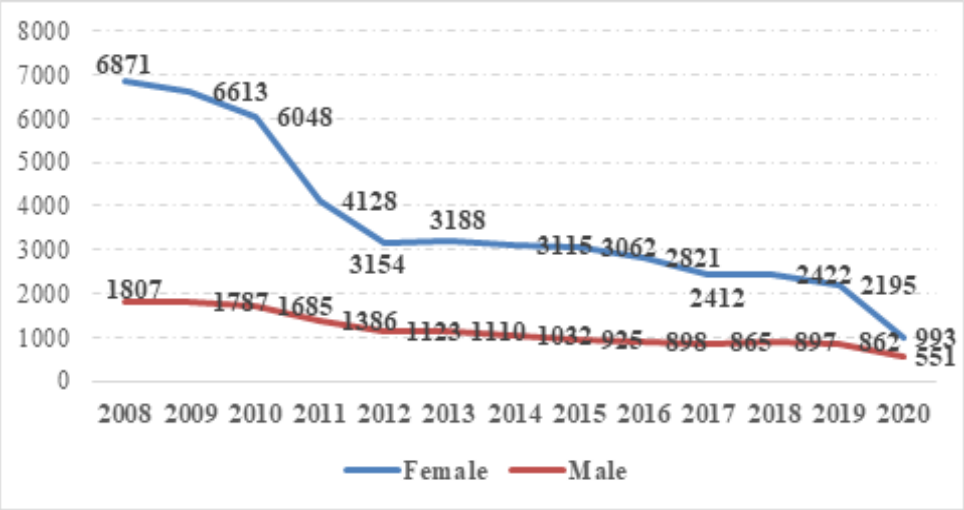
the highest values of hospitalization time (26 days, respectively 22 days). Men had a longer average length of hospital stay, 8.14 days, compared to 5.64 days for women, and the average length of hospital stay was longer in elderly patients (6.43 days).

8. Distribution of hospitalization episodes in patients with osteoporosis, depending on the patient's discharge status and in-hospital mortality rate

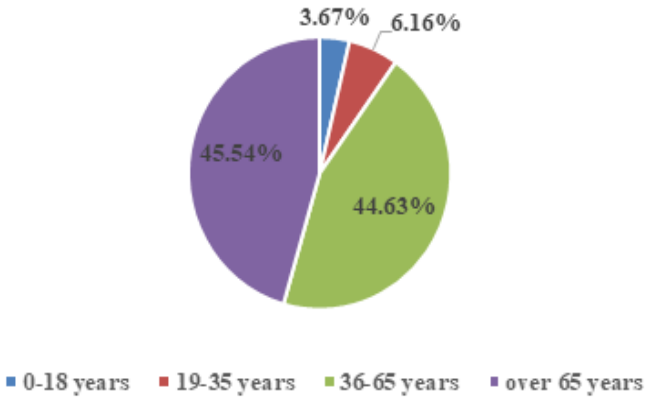
Depending on the patient's discharge status, it is observed that out of the total number of episodes of continuous hospitalization reported in patients with osteoporosis, most patients were discharged in an improved condition (78.2% of the total) or stationary at discharge (16%). Approximately 5% of patients were discharged as cured, and extremely small percentages, 0.14% had an aggravated condition at discharge or died (0.13%) - graph no. 12.

The calculated in-hospital mortality rate was 0.13% for the entire study period, with values ranging from 0.03% in 2008 to 0.36 in 2019. Most of the deceased patients were in the last 2 years of the period, in 2019 (almost 3 times the average of the period) and in 2020. The mortality trend was increasing from 0.03% in 2008 to 0.36% in 2019, 12 times more, slightly increasing until 2013, with 2 peaks in 2011 and 2013, then decreased until 2018, so that in 2019 and 2020 to increase. For women, there was an increase until 2013, then a decrease in 2014 since the growth started, the last 3 years registering the highest values. There were peaks in men in 2011, 2013, 2017 and 2019, but mortality was double that in women (0.2 compared to 0.1%). In women, death most commonly occurred in hospitalized persons for unconsolidated fractures, pathological fractures, or postmenopausal osteoporosis. In the case of men, the deaths occurred in people hospitalized for osteoporosis with pathological fracture or unconsolidated fracture.

Graph no. 9. Evolution of the number of episodes reported in continuous hospitalization, in patients with osteoporosis, depending on the sex of the patient, in the period 2008-2020, at national level



Graph no.10 Number of episodes reported in continuous hospitalization, in patients with osteoporosis, depending on the patient's age, in the period 2008-2020, at national level



CONCLUSIONS

The analysis and interpretation of data on hospitalization in continuous hospitalization of patients with osteoporosis in the period 2008-2020 lead to the following conclusions:

- The number of hospitalization episodes due to osteoporosis has been 61950 episodes in the last decade, with hospitalizations being the result of osteoporosis, generally postmenopausal, without or with pathological fractures or disorders of bone continuity,

- From the point of view of the evolution of the number of hospitalizations due to osteoporosis, the trend over the years has been a downward one, the number of episodes being 3 times lower in 2019 and almost 6 times lower in 2020, compared to the initial year 2008,

- Most episodes of hospitalization, over three quarters were recorded in the endocrinology departments, but also those of orthopedics-traumatology,

- From the point of view of the residence environment of the patients hospitalized with this pathology, most of them come from urban areas, almost three quarters of them, mainly from the southern areas of the country, Bucharest - Ilfov regions, South and South-East regions, but also from the North East region, the leading counties being outside Bucharest, counties such as Dâmbovița, Prahova, Bacău and Argeș. Compared to the number of inhabitants, most hospitalizations were observed in patients from the Bucharest Ilfov regions (2-3 times more), the South and North East regions, especially in Bucharest and the counties of Dâmbovița, Gorj, Ilfov and Călărași,

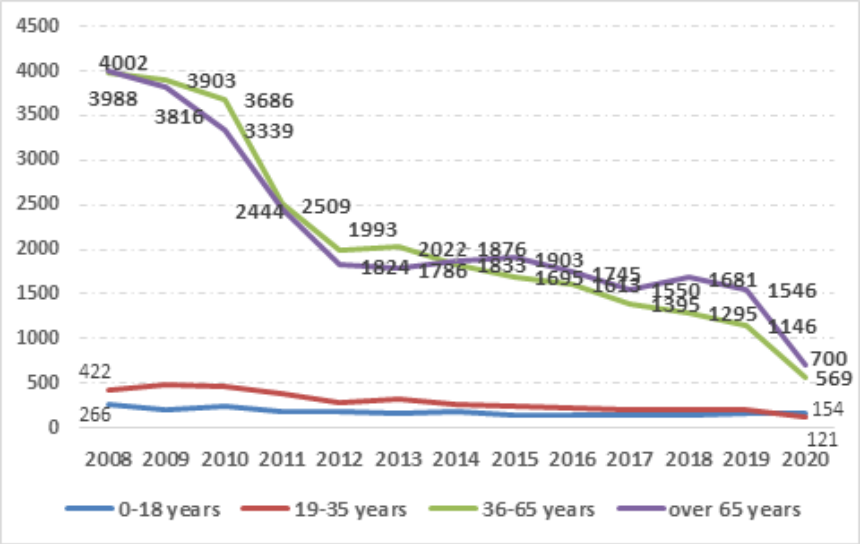
- Of the patients admitted with this diagnosis, three-quarters were women, and the temporal evolution of hospitalizations was a continuous downward trend for both sexes, with the reduction in the number of hospitalization episodes being steeper in women,

- In terms of age, hospitalizations of the over-65s were the most frequent, almost half of the episodes belonging to the elderly, the average age of men with this type of pathology being 47.7 years, compared to 65 years in women. Adults also experienced episodes of osteoporosis hospitalization in a percentage quite close to that of the elderly. The evolution of hospitalizations in both age groups has been downward, with the reduction being more pronounced in the case of adults,

- The average duration of hospitalization for patients with osteoporosis in continuous hospitalization was in the period 2008-2020 of 6.24 days, with a maximum of 6.96 days in 2011 and a minimum of 5.25 days. The highest average values were recorded in the departments of pediatric pneumology, osteoarticular TB, or pediatric cardiology and as a type of pathology, Osteoporosis following a post-procedural malabsorption with pathological fracture, unspecified location and Osteomalacia of the adult due to a malabsorption, ankle and foot record the highest values of hospital stay. Men had a longer average length of hospital stay, 8.14 days, compared to 5.64 days for women, and the average length of hospital stay was longer in elderly patients (6.43 days),

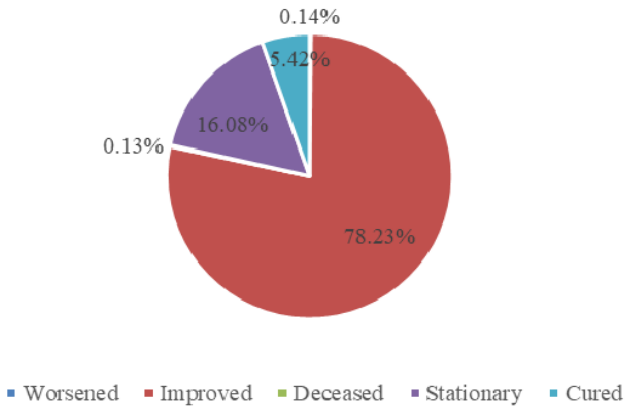
- Over three quarters of patients were discharged in an improved condition, while only 0.14% had a worsening condition or died (0.13%). The in-hospital mortality rate

Graph no. 11. Evolution of the number of episodes reported in continuous hospitalization, in patients with osteoporosis, depending on the patient's age, in the period 2008-2020, at national level



in these patients ranged from 0.03% in 2008 to 0.36 in 2019. Most died in the last 2 years of the period, in 2019 (almost 3 times the average for the period) and in 2020. The mortality trend has been increasing from 0.03% in 2008 to 0.36% in 2019, 12 times more. The highest values were observed in women in the last 3 years, and in men the mortality was double that of women. In women, death most commonly occurred in hospitalized persons for unconsolidated fractures, pathological fractures, or postmenopausal osteoporosis. In the case of men, the deaths occurred in people hospitalized for osteoporosis with pathological fracture or

Graph no. 12. Number of hospitalization episodes for patients with osteoporosis, depending on the state of patient discharge, in Romania, in the period 2008-2020



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