

TOTAL KNEE ARTHROPLASTY - HOSPITALIZATION EPISODES, IN THE LAST DECADE, IN ROMANIA

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INTRODUCTION

Osteoarthritis is one of the top 10 disabling diseases in developed countries, being the main cause leading to the need for prosthesis in the large joints, hip or knee. Globally, WHO estimates based on data available in 2020 that approximately 528 million people have osteoarthritis symptoms, which represents an increase of 113% compared to 1990. [1] The disease occurs mainly in women, age along with other factors such as obesity, sedentary lifestyle, physical trauma, tobacco use, alcohol being the strongest predictors of the evolution of the disease [1], total prosthesis representing the solution for maintaining mobility, personal autonomy and increased quality of life. In general, surgery is necessary especially after the age of 60, practiced especially in the case of large joints, but can also be performed at younger ages. The highest rates of knee replacement in 2021 were recorded in countries such as Switzerland, Germany, Finland or Austria, with the average in OECD countries being 119 interventions/100,000 inhabitants for knee replacement. The lowest rates were recorded in Mexico, Costa Rica or Chile. Major differences exist not only between countries but even between different regions of countries, with differences persisting even after age standardization, examples being Australia, Canada, Germany, France and Italy, where differences greater than double between certain regions are observed [1].

With the increase in the incidence and prevalence of osteoarthritis caused by both the aging of the population and the increase in the obesity rate, the number of prosthetics has also increased steadily, with substantial increases in Poland, Costa Rica or Chile where the observed rates were more than double in the case of knee prostheses. This phenomenon was observed until 2019, during the pandemic years the number was reduced by limiting non-urgent interventions. And EUROSTAT indicates that in Europe alone the number of knee prosthetic interventions in 2019 was 754622, the number increasing variably over time, some countries registering very large increases (in England an increase of 100% since 1991, in Sweden 165% compared to 1995, etc.) [2]. Compared to the current period, the number of this type of surgical procedure is forecast to increase in the future, due to the increasing degenerative joint pathology, so that an increase of 85% is expected by 2030 (1.26 million procedures) [3]. In Romania, the level of this type of intervention is low compared to other countries, the value in 2021 being for knee surgery 18 interven-

The aging of the population, as well as the unhealthy lifestyle, lead to the increasingly frequent occurrence of degenerative diseases, osteoarthritis being one of the top 10 disabling diseases in developed countries, with an increasingly high frequency of occurrence in recent decades. The solution to this problem, considering the need to maintain mobility, personal autonomy and increase the quality of life, is the total prosthesis of the affected joint, this type of surgical intervention being practiced more frequently all over the world. Globally, it is estimated that the number of this type of intervention will almost double by 2030, and in Romania, it is estimated that the number of this type of intervention will double compare to 2001 by 2027.

Keywords: Knee arthroplasty, hospitalization, Romania

tions/100,000 inhabitants, but the same upward trend can be observed in our country [1].

During the period 2001-2021, 51,035 knee replacements were performed in our country, the growth rate being +19.55%, with an estimate of doubling the number by 2027 [4].

Given the current statistical data indicating a constant increasing trend all over the world, we propose through the present study to analyze the evolution of hospitalization episodes coded with, the procedure code for knee arthroplasty, in the last ten years, the results being presented below.

OBJECTIV

Identification at national, regional and local level of the geographical distribution of hospitalization episodes in patients with unilateral or bilateral arthroplasty, as well as the temporal evolution of their number, during the period 2015-2024.

METHODOLOGY

A descriptive, retrospective study was conducted, with data from the National DRG Database, data reported in continuous hospitalization by hospitals in Romania in contractual relationship with the National Health Insurance House. In accordance with the provisions of 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 amendments, National Institute of Health Services Management (NIHSM) collects and processes the minimum set of data at patient level for cases treated in continuous and day hospitalization. The study used data that were reported in the period 2015-2024, aiming to analyze data on hospitalization episodes in the case of patients with total knee arthroplasty, unilateral or bilateral, in Romania, in the hospitals (continuous hospitalization). The data were selected using the ICD-10-AM classification, records from the observation sheets were extracted and analyzed, which most frequently had as the main diagnosis one of the codes: O14902 – Unilateral total knee

arthroplasty and O14903 – Bilateral total knee arthroplasty. In accordance with the provisions of Law 190/2018 and Art. 13 of EU Regulation no. 679/2016, personal data are deleted upon transmission to NIHSM, and the identification of persons for the purpose of analysis is based on encrypted numeric 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 were processed using the SQL Server Management Studio Express 2005 software program, the subsequent processing and analysis was performed using SPSS and Excel programs. The analysis was performed according to a series of demographic and socioeconomic variables, such as age, length of hospitalization, discharge status, etc., information included in the minimum data set reported in the DRG system by hospitals. The interpretation and presentation are performed as tables and graphs.

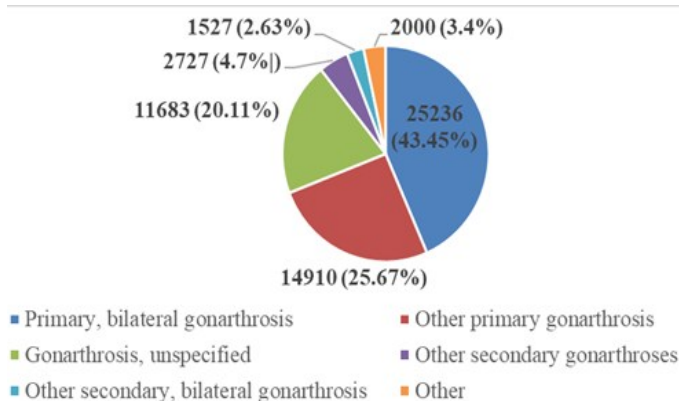
RESULTS

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, area of residence, length of hospitalization, in-hospital mortality rate, discharge status) tracking the geographical distribution and temporal evolution of hospitalization episodes of patients with total knee arthroplasty, from hospitals in our country, during the period 2015-2024.

1. Hospitalization episodes in patients with knee arthroplasty, in Romania, 2015-2024

In Romania, during the period 2015-2024 total number of episodes of continuous hospitalization for patients with knee arthroplasty was 58,083 episodes, of which most had as main diagnosis at discharge primary, bilateral gonarthrosis (43.4%), other primary gonarthrosis (25.7%) or gonarthrosis, unspecified (20.1%) graph no. 1. 99.6% of all operations were unilateral.

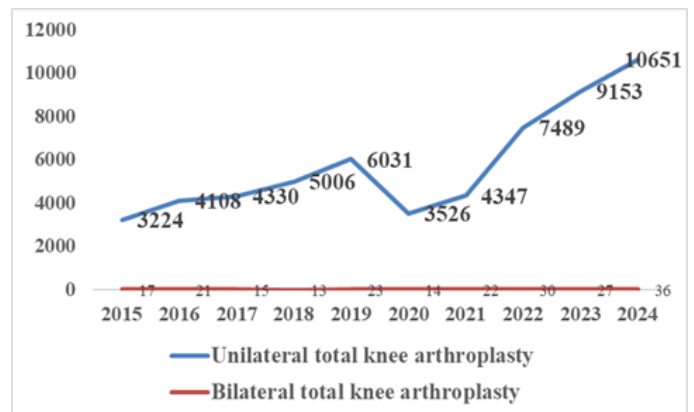
Graph no. 1. Hospitalization episodes according to the type of main diagnosis at discharge, in patients with knee arthroplasty, 2015-2024, at national level (first 5



2. Temporal evolution of hospitalization episodes in patients with knee arthroplasty, in Romania, 2015-2024

The temporal evolution of hospitalization episodes in patients with unilateral total knee arthroplasty during this period can be seen in graph no. 2. It is noted that the hospitalization situation is an ascending one, only during the coronavirus pandemic, reaching the lowest level in 2020, when the number recorded was close to the initial year. In subsequent years, hospitalizations began to increase again, so that in 2024 the increase observed compared to 2014 was 3.3 times. In patients with bilateral arthroplasty, the number of cases doubled in 2024 compared to 2015.

Graph no. 2. Evolution of hospitalization episodes in patients with total knee arthroplasty, 2015-2024, at national level



3. Distribution of hospitalization episodes in patients with total knee arthroplasty, depending on the discharge department

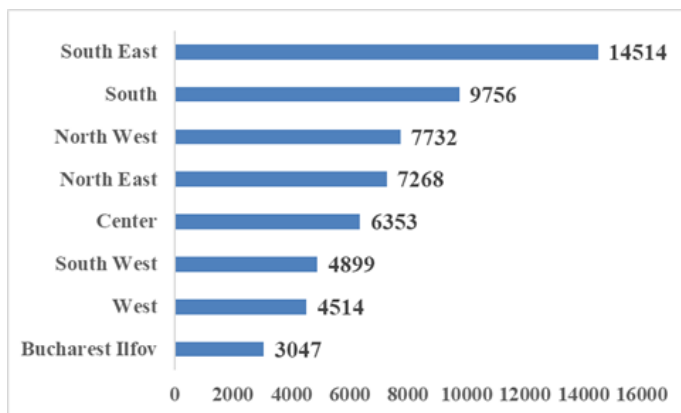
The most hospitalization episodes in patients with total knee arthroplasty were recorded in the Orthopedics and Traumatology departments (96.2% of the total), Medical Rehabilitation - Orthopedics and Traumatology (2.45%) and General Surgery (1.2%).

4. Distribution of hospitalization episodes in patients with total knee arthroplasty, at regional and local level, during 2015-2024

In terms of residential area where patients with this diagnosis come from, it is found that most hospitalization episodes were recorded in patients from urban areas (59.5%). At regional level, most hospitalization episodes for patients with total knee arthroplasty were recorded during the study period in the South East (25% of the national total), South (16.8%), North West and North East (12-13%). The West and Bucharest Ilfov regions with approximately 7.7% and 5.2% respectively had the fewest hospitalizations - graph no. 3.

Compared to the number of inhabitants (average population over the last 10 years in each region), the descending order of regions that recorded hospitalization episodes in patients with total knee arthroplasty was: South East region (60.56 episodes/10,000 people), South region (33.42 episodes/10,000 people), North West (30.31 episodes/10,000 people), Center (27.5 episodes/10,000 people), West region (25.87 episodes/10,000 people), South West region (25.54 episodes/10,000 people), North

Graph no. 3. Distribution of hospitalization episodes in patients with total knee arthroplasty, at regional level in Romania, during 2015-2024



East (22.56 episodes/10,000 people) and Bucharest Ilfov region (13.24 episodes/10,000 people) - graph no. 4.

Graph no. 4. Distribution of hospitalization episodes in patients with total knee arthroplasty, by population (10-year average) at regional level, in Romania, between 2015-2024



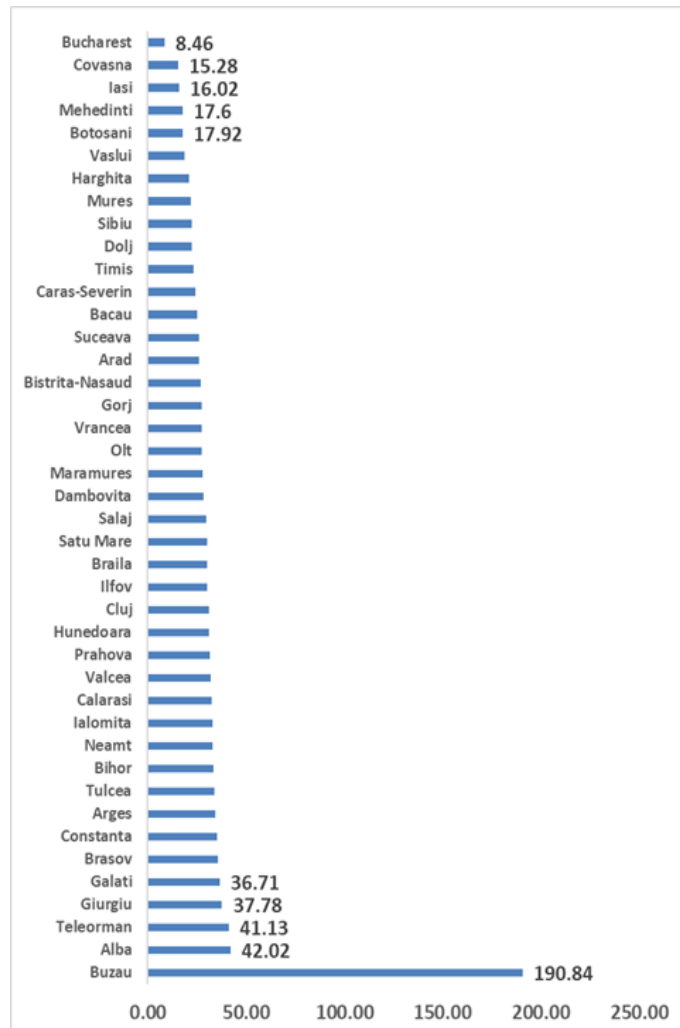
At the local level, the most hospitalization episodes were recorded between 2015-2024 in Buzău county, which has approximately three times more episodes than the next leading counties Constanța, Prahova and Cluj - graph no. 5.

Compared to the population of each county (calculated as the average of the 10 years), a change in the ranking is observed in graph no. 6, with the counties of Buzău (190.84 episodes/10,000 people), Alba (42.02 episodes/10,000 people), Teleorman (41.13 episodes/10,000 people) and Giurgiu (37.78 episodes/10,000 people) in the first places, and Iași, Covasna and Bucharest in the last places.

5. Distribution of hospitalization episodes in patients with total knee arthroplasty, depending on the patient's gender

Of the total number of hospitalization episodes for total knee arthroplasty, recorded during the study period, most

Graph no. 5. Distribution of hospitalization episodes in patients with total knee arthroplasty, at local/county level, in Romania, during 2015-2024



belonged to women, 3.1 times more than in the case of men if the arthroplasty was unilateral and 4 times more if the arthroplasty was bilateral - graph no. 7.

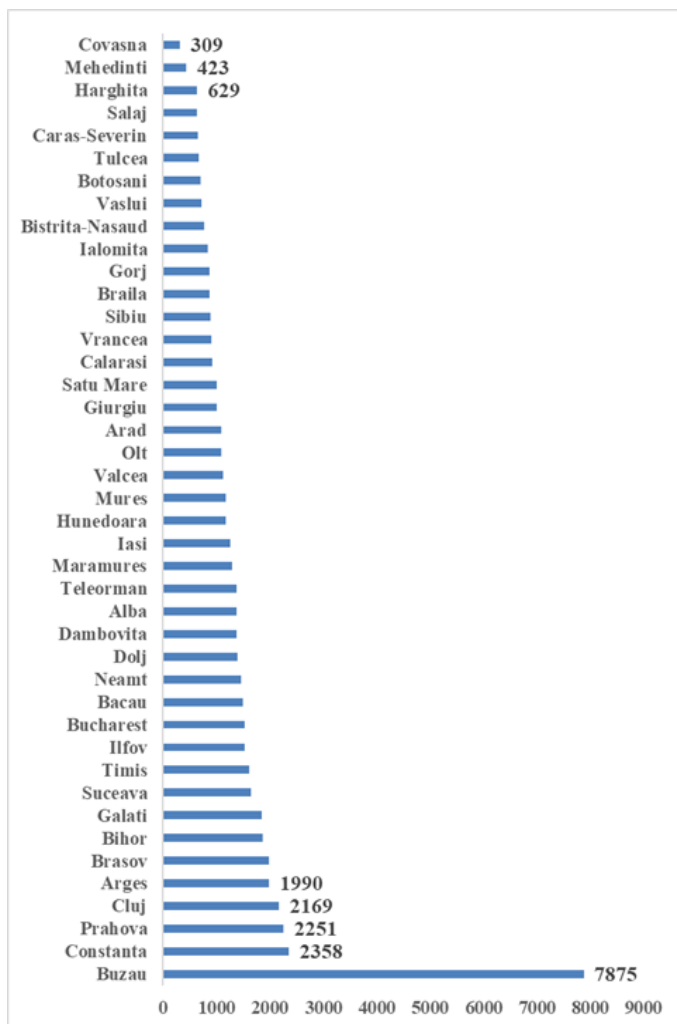
6. Distribution of hospitalization episodes in patients with total knee arthroplasty, depending on the patient's age

The analysis of data by age group shows that for the entire study period, most hospitalization episodes were recorded in adults over 65 years of age (71.5% of the total), and more than a quarter (27%) in the age group 50-64 years – graph no. 8. The average age of those hospitalized during this period was 67.98 years, 67.99 for women, and 66.89 for men.

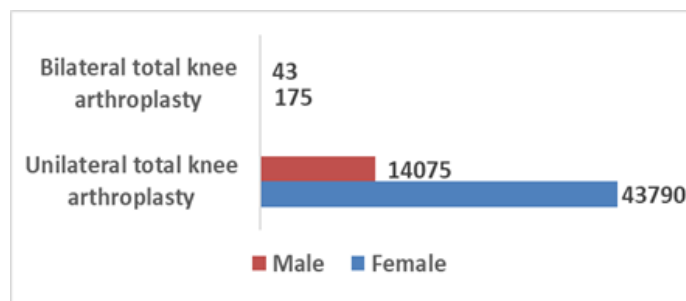
7. Distribution of hospitalization episodes in patients with total knee arthroplasty, depending on the average duration of hospitalization

The average length of hospitalization in patients with total knee arthroplasty was 9.06 days during 2015-2024, varying throughout the study period, with the maximum value observed in 2015 and 2016 (11.49 days and

Graph no. 6. Distribution of hospitalization episodes in patients with total knee arthroplasty, at local/county level, according to the population (10-year average) of each county, 2015-2024



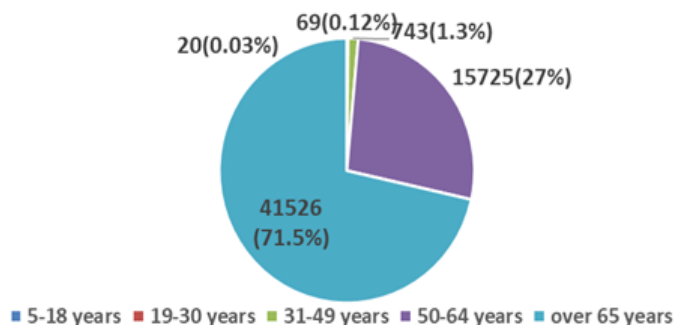
Graph no.7 Total number of hospitalization episodes in patients with total knee arthroplasty, depending on patient gender and type of intervention, 2015-2024, at national level



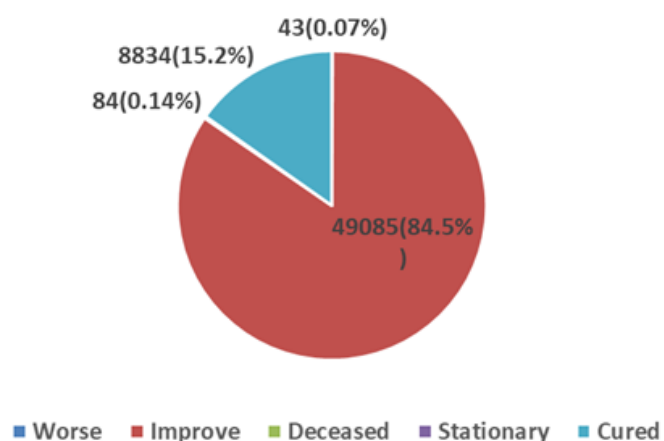
11.72 days, respectively), with the minimum value recorded in 2023 – 7.74 days.

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

Graph no. 8. Hospitalization episodes in patients with total knee arthroplasty, depending on the patient's age, during the period 2015-2024, at national level



Graph no. 9. Number of hospitalization episodes in patients with total knee arthroplasty, depending on the patient's discharge status, in Romania, during 2015-2024



Depending on the patient's condition upon discharge, data analysis indicates that of the total number of episodes reported in continuous hospitalization in patients with total knee arthroplasty, most of them were discharged in an improved condition (84.5% of the total) or cured (15.2%), a very small percentage died (0.06%) - graph no. 9.

The calculated in-hospital mortality rate was 0.06% throughout the study period, with its values oscillating between 0.16% in 2017 and 2018 and 0 in 2019. All the deceased were elderly (the average age of the deceased was 74.18 years) presenting comorbidities, with diagnoses at discharge such as: cerebral infarction, prosthetic-associated infections, duodenal ulcer with bleeding and perforation.

CONCLUSIONS

The conclusions that emerge from the analysis of data from the period 2015-2024, regarding the hospitalization of patients with total knee arthroplasty are the following:

- The total number of hospitalization episodes in patients diagnosed with total knee arthroplasty was 85083 episodes;
- The temporal evolution of the number of hospitalization episodes for patients with unilateral total

knee arthroplasty is an ascending one, only during the coronavirus pandemic it reached the lowest level, close to the initial year, subsequently hospitalizations increased in 2024 by 3.3 times compared to 2014. In the case of bilateral arthroplasty, the number of cases doubled in 2024 compared to 2015;

- Almost all hospitalizations were recorded in the Orthopedics and Traumatology departments, small percentages in Medical Recovery - Orthopedics and Traumatology or General Surgery;
- In terms of the main diagnosis at discharge, almost half of the episodes were recorded for the diagnosis of primary, bilateral gonarthrosis, a quarter other primary gonarthrosis or gonarthrosis, unspecified (one fifth), 99.6% of all operations were unilateral;
- More than half of those hospitalized come from urban areas;
- The analysis of the spatial distribution of hospitalizations by these types of diagnosis indicates a predominance in terms of absolute frequency of cases in the South East, South, North West and North East regions, while in relation to population the leading regions: South East, South and North West;
- Locally, the highest absolute frequencies of hospitalizations were recorded in Buzău County, which has approximately three times more episodes than the next leading counties Constanța, Prahova and Cluj;
- In relation to the population of each county (calculated as the average of the 10 years), the first places are Buzău, Alba, Teleorman and Giurgiu counties;
- The vast majority of hospitalizations belonged to women, 3.1 times more than men if the arthroplasty was unilateral and 4 times more if the arthroplasty was bilateral;
- In terms of the age of the patients, almost three quarters were over 65 years old and more than a quarter belonged to the age group 50-64 years old. The average age by gender was 67.98 years, 67.99 for women and 66.89 for men;

- The average duration of hospitalization was 9.06 days during 2015-2024, varying throughout the study period, with the maximum value observed in 2015 and 2016 (11.49 days, respectively 11.72 days), with the minimum value recorded in 2023 – 7.74 days;
- Most patients were discharged in improved condition or cured, a very small percentage died (0.06%). The calculated in-hospital mortality rate was 0.06% throughout the study period, with values between 0.16% in 2017 and 2018 and 0 in 2019. The deaths were among the elderly (the average age of the deceased being 74.18 years) presenting comorbidities, with diagnoses at discharge such as: cerebral infarction, prosthetic-associated infections, duodenal ulcer with bleeding and perforation.

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