

Challenges in Utilization of Osteoporosis Healthcare Services during COVID-19 Pandemic in Romania – a Nationwide Population Study

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ABSTRACT

Objectives: This study compares the utilization of osteoporosis and osteoporosis complication healthcare services before and during the COVID-19 pandemic in Romania.

Methods: The descriptive nationwide population study has used secondary data collected from the national health information system. We have calculated and compared the procedures performed for osteoporosis diagnosis and screening, standardized incidence and hospitalization rate for osteoporosis and osteoporosis fractures before and during the COVID-19 pandemic.

Results: A 37.84% reduction in the number of DXA scans performed in 2020 have been observed, decreasing from 30,698 in 2019 to 12,064 in 2020. The standardized incidence for osteoporosis was 212.97 cases/100.000 person-years in 2018, 234 cases/100,000 person-years in 2019, and 185.97 cases/100,000 person-years in 2020. The hospitalization rates for osteoporosis have decreased by 68% compared with 2019 and the continuous hospitalization rate for osteoporotic fracture by 48% compared with 2019.

Conclusions: The COVID-19 pandemic affected the utilization of healthcare services for osteoporosis management, posing a threat due to a magnified effect on osteoporotic fracture burden. More efforts are further needed to progress and re-engage with osteoporotic fracture prevention in our country and to develop and shape an optimal implementation of prevention and management strategies for all level of health care in Romania.

Keywords: osteoporosis, COVID-19, health services, osteoporosis incidence, osteoporosis hospitalization, osteoporotic fracture.

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INTRODUCTION

Osteoporosis is an asymptomatic subclinical disease until complicated by a fracture. It is characterized “by low bone mass and structural deterioration of bone tissue, leading to an increased risk to fractures, especially of the hip, spine, and wrist” (1). Osteoporosis is one of the musculoskeletal conditions rising a public health concern due to the susceptibility to fractures. Osteoporosis subsequent fractures cause pain, disability, exacerbate the morbidity and may lead to death, causing excess mortality and healthcare resource utilization with higher financial and social cost than prevention (2-6).

In Romania, the estimated prevalence of osteoporosis is 4.8%, with 103,000 new fragility fractures in 2019 (7). Research that has proposed a scorecard to summarize key indicators of the burden of osteoporosis in EU highlighted that in Romania, the direct cost of incident fractures in 2019 was € 91.0 million, accounting for approximately 2.5% of health care spending (7).

As lack of physical exercise and increasing age are well-known risk factors for osteoporosis (8), it is expected that there will be an increasing incidence of both osteoporosis and osteoporotic fractures in Romania as the two risk factors co-exist and their incidence continues to rise in our country’s population.

The estimated prevalence of sufficient physical activity among Romanian adults was 30% in 2020 (9, 10), with physical activity levels being negatively affected by lockdowns and limited access to public spaces and infrastructure for physical activities during the pandemic (11).

Also, the proportion of aged population is continuously increasing, starting with 1990, and is accelerating in the last years. The percentage of the Romanian population aged over 65 is estimated to rise from 20.6% in 2020 to 29.5% by 2050, leading to a higher prevalence of chronic conditions, including osteoporosis and osteoporotic fractures (12).

The COVID-19 pandemic has widened the prevalence of risk factors for osteoporosis and its complications because the opportunity to perform physical activity has decreased and the probability to adopt non-healthy behaviors such as smoking and alcohol consumption has risen.

During the pandemic, there were official restrictions regarding both outdoors physical activity/training movement outside home and access to ambulatory and hospital care for chronic conditions. Additionally, the fear of infection affects how people seek medical advice and may have a limiting effect on the addressability to medical services (13).

Barriers to care, such as limitations in coverage of screening and diagnostic tests and treatment services for osteoporosis during the COVID-19 pandemic, could inhibit/delay early detection and treatment, creating a substantial strain on the healthcare system as the population ages. In Romania, the state of emergency, which was established on the 15th of March 2020 and extended monthly until the end of the year, has brought changes in all circumstances of life, including those related to the care and management of other pathologies than COVID-19.

In this study we aim to investigate the incidence of osteoporosis before and during the COVID-19 pandemic as well as the utilization of diagnosis services and treatment care for osteoporosis and osteoporotic fractures in Romania in 2020, a year of confrontation with the COVID-19 pandemic, comparing with the previous two years, 2018 and 2019.

The study is an opportunity to highlight and discuss the effects of the pandemic on the management of chronic diseases, including osteoporosis. The analysis of national patterns of ambulatory and hospital care services for not only osteoporosis, but also the main causes of morbidity involved in hospitalized morbidity is important for understanding the impact of the pandemic and to shape the development of future health care services. □

METHODS

This is a nationwide population-based observational study, in which secondary data regarding the number of procedures was used to identify and diagnose osteoporosis (Dual energy X ray absorptiometry and Quantitative computed tomography) total cases/investigations per area (urban/rural) and per gender. The study also has used secondary data on admissions for hospital care due to osteoporosis and osteoporosis fracture, with all cases and all ages having an In-

ternational Classification of Disease-10 (ICD-10) coded diagnosis.

For this study, the following ICD-10 codes were used to identify patients with osteoporosis diagnoses (M80-M82), osteoporosis without fracture (M80), osteoporotic fracture (M81), circulatory diseases (I00-I99), respiratory disease (J00-J99), digestive systems (K00-K93), or neoplasms (C00-D48). In Romania, the reporting system for new cases is used for the diagnosis of osteoporosis by general practitioners, without differentiation between osteoporosis with fracture (ICD-10 code:M81) and osteoporosis without fracture (ICD-10 code M80).

The following codes from the International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification (ICD-10-AM Xth revision) were used to identify the procedures performed for osteoporosis: 12306-00 for dual energy X ray absorptiometry (DXA) and 12309-00 for quantitative computed tomography (CT).

To place the analysis in the pandemic context, we used data regarding the number of hospital admission at the national level for circulatory, respiratory and digestive system diseases as well as neoplasms at all ages. Data regarding the diagnosis of osteoporosis and all other disorders discussed here were collected for day admission and continuum hospitalization.

Data on hospitalization by ICD 10 codes and procedures by ICD-10-AM Xth revision were retrieved from a national database of patients admitted to tertiary care services between January–December 2018, January–December 2019, and January–December 2020, which were provided by the National Institute of Public Health (NIPH).

We used data regarding the number of new osteoporosis cases registered by general practitioners, which were reported by the County Public Health Directorate and centralized in a database by the NIPH.

We calculated osteoporosis standardized incidence rate, hospitalization rate for osteoporosis (total, continuous and day admission by gender and area) and osteoporosis with pathological fracture (continuous and day admission) two years before and during the first year of the COVID-19 pandemic. The standardized incidence rate was calculated for three years, 2018, 2019 and 2020, using Romanian population's

structure by age in 2020 as standard population. The hospitalization rate for osteoporosis was calculated as number of hospital admission due to osteoporosis divided by the number of individuals in the population.

We analyzed the trend, absolute number changes and percentage changes of the osteoporosis services in 2018, 2019 and 2020.

We tested for significant differences between the 2019 (non-pandemic) and 2020 (pandemic) periods. The χ^2 test was used to compare categorical variables. A two-sided α -level of 0.05 was considered statistically significant. Data were analyzed using the statistical software Open Epi (Open-Source Epidemiologic Statistics for Public Health).

Data regarding the Romanian population by age group, sex and total population for the years 2018, 2019 and 2020, which were reported by the National Institute of Statistics (available online), have been used to measure inpatient admission rates for continuous and day hospitalization at the national level, total and by sex (14). □

RESULTS

Osteoporosis DXA scans performed during 2020 have decreased by more than a third compared to 2019

Dual energy X ray absorptiometry (DXA) is "an extremely accurate and precise method for quantifying bone mineral density", but DXA cannot measure the bone depth; instead, quantitative computed tomography (QCT) for measuring the volumetric bone density (15) is a useful tool for the early detection of osteoporotic changes in the population (16). In Romania, both methods are used for opportunistic screening and diagnosis purposes. A total number of 12.064 DXA and 382 QCT procedures were performed during the pandemic year 2020 (January to December). There were 18.364 DXA scan less than in the similar period in 2019, representing a 37.84% and 63.5% decrease for DXA and QCT procedures, respectively.

A reduction in bone densitometry testing was reported in settings from different countries – for example, an orthopedic hospital in Italy reported that the number of DXA scans decreased by 50% in winter and spring 2020 compared to the corresponding period in 2019 (17).

TABLE 1. DXA and QCT scans performed in 2018, 2019 and 2020 in Romania

Dual energy X ray absorptiometry (DXA): % and n			
	2018	2019	2020
Total	100% (19080)	100% (30698)	100% (12064)
Female	92.14% (17581)	93.54% (28714)	92.63% (11172)
Urban	56.17% (10717)	61.05% (18740)	60.21% (7264)
Quantitative computed tomography (QCT): % and n			
	2018	2019	2020
Total	100% (1184)	100% (1121)	100% (382)
Female	92.65% (1097)	94.38% (1058)	75.39% (288)
Urban	67.57% (800)	67.53 (757)	74.08% (283)

TABLE 2. Number of osteoporosis cases according to year

Calendar year	New cases – total (n)	Age-standardized Incidence rate (per 100.000 person-years)	Change compare to 2018 (%)
2018	40906	212,97	-
2019	45198	234,18	9,96
2020	35836	185,97	12,67

The pattern of patients' characteristics examined by DXA scan has been maintained, most of these procedures being performed for women (more than 90%) and urban area patients (Table 1). There were differences regarding the QCT scans in 2020, only 75.3% of them having

been performed among women compared with 94.38% in the previous year (Table 1).

DXA scan has the potential to identify patients who are at risk of osteoporotic fracture (18), rising the opportunity to prevent them in high-risk individuals (19). In Romania, the decreasing number of DXA scan during the pandemic year 2020 could further lead to fewer opportunities for a proper prophylactic treatment to avoid fractures, also increasing the risk of morbidity.

Incidence of osteoporosis in the Romanian population has decreased by 13% in 2020 compared with 2019.

During 2020, a total of 35,836 new osteoporosis cases were registered in Romania, declining from 45,198 in 2019 and 40,906 in 2018. The age-standardized incidence rate shows similar patterns (Table 2).

Disruptions in the delivery of regular hospital services for osteoporosis in 2020

The total number of admissions for osteoporosis, which were registered in 2020, decreased by 68% and 62% compared with 2018 and 2019, respectively ($\chi^2=825.7$, $p < 0.0000001$). In Romania, the rate of admissions for continuous hospitalization due to osteoporosis in 2020 declined by approximately 40% of the 2019 level (a 60% reduction) ($\chi^2=134.6$, $p < 0.0000001$). Admissions for osteoporosis in 2018, 2019 and 2020 in Romania are shown in Table 3.

TABLE 3. Admissions due to osteoporosis in 2018, 2019 and 2020 in Romania

Hospitalisation	2018 Per 100.000 (n)	2019 Per 100.000 (n)	2020 Per 100.00 (n)	2020 to 2019 Change (%)	p value
Total	17,90(3489)	15,27 (2959)	5,78 (1114)	37.86%	<0.0000001
Day	4,29 (835)	2,73 (528)	0,71 (137)	25.95%	<0.0000001
Continuous	13,62 (2654)	12.55 (2431)	5,07 (977)	40.19%	<0.0000001
Women day	8.26 (822)	5.06 (501)	1.33 (131)	26.28%	<0.0000001
Women continuous	25.10 (2498)	23.12 (2287)	9.07 (893)	39.24%	<0.0000001
Urban day	7.51 (788)	4.56 (477)	1.16 (120)	25.35%	<0.0000001
Urban continuous	17.73 (1859)	15.90 (1663)	6.15 (638)	38.66%	<0.0000001

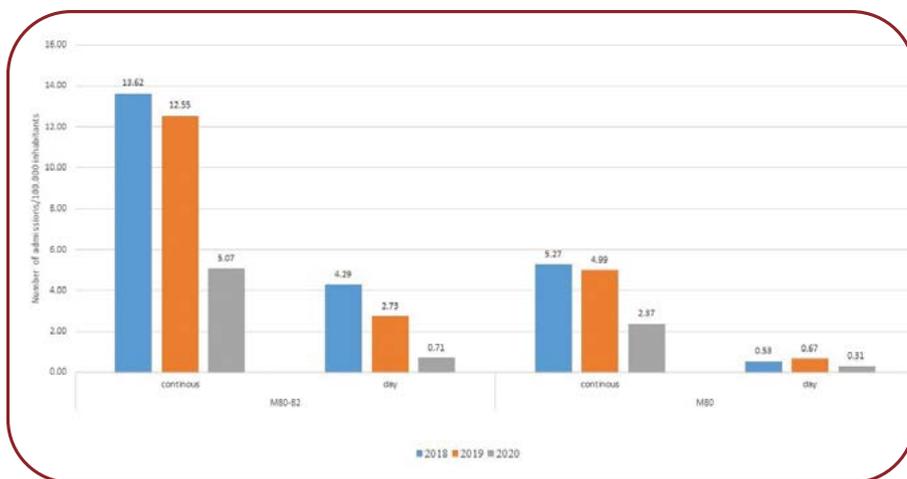


FIGURE 1. Day and continuous admission rates due to osteoporosis

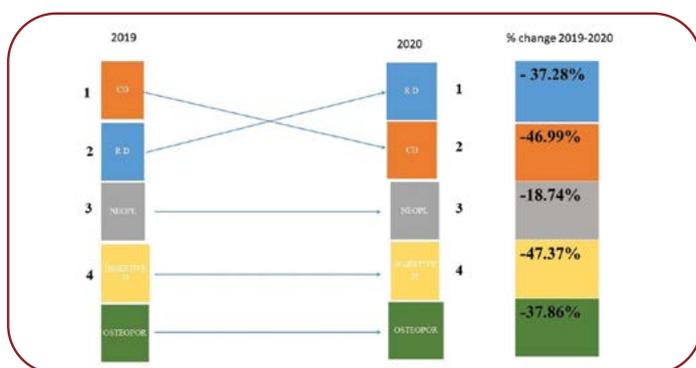


FIGURE 2. Dynamics of admission for continuous hospitalization rates

In Romania, the rate of admissions for day hospitalization due to osteoporosis in 2020 decreased by approximately 17% and 26% of the 2018 and 2019 levels, respectively. The decline in admissions for continuous hospitalization for osteoporotic fractures followed a similar decreasing pattern, with a reduction by 48% in 2020 compared to 2019 (Figure 1).

These decreases of hospitalized morbidity rates for osteoporosis and osteoporotic fractures should be related to a generalized disruption in healthcare services for other pathologies due to the need for a rapid reorientation and adaptation to respond to the pandemic situation.

Disruption in delivery of regular hospital service for the main causes of hospitalised morbidity not only for osteoporosis care throughout the health care system during the COVID-19 pandemic year.

Given that prioritization of urgent healthcare services delayed elective care and due to other consequences of COVID-19 pandemic, admission rates for the first four major groups of di-

seases involved in hospitalized morbidity have registered important decreases in Romania.

The highest reduction in the rate of continuous hospitalization in 2020 versus 2019 was observed for digestive diseases (47.37%), followed by cardiovascular diseases (46.99%), respiratory diseases (37.28%) and neoplasms (the smallest decline). The decline in the continuous hospitalization rate due to osteoporosis follows the same trend, the percentage change for the hospitalization rate due to continuous hospitalization being 45.22%. The variation of admission rates between 2020 and 2019 are shown in Figure 2. Similar models of utilization of health care services for chronic diseases have been observed and reported in other countries (20). □

CONCLUSIONS

The present study has identified a disruption in osteoporosis service provisions at all healthcare levels, including primary care, ambulatory care and hospital settings.

Both the use of procedures to assess for osteoporosis and osteoporotic risk and the rate of hospitalizations for osteoporosis and osteoporotic fractures had an important decline in 2020 compared with the previous two years. Lockdown, social distancing, isolation strategies and public health guidelines to prevent SARS-CoV-2 transmission impacted the delivery of osteoporosis health care services at all levels, decreasing the utilization of osteoporosis healthcare services.

For the future period, the Romanian healthcare system could be confronted with consequences of the limited access to the health sys-

tem during the COVID-19 pandemic, and a rising morbidity due to osteoporosis may be expected.

Our study is a signal to intensify the efforts to both improve population access to healthcare of bone and prioritize prevention of osteoporotic fracture. More efforts are further needed to not

only progress and re-engage with osteoporotic fracture prevention in our country but also to develop and shape optimal implementation of prevention and management strategies for all levels of health care in Romania. ◻

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REFERENCES

- World Health Organization.** *Assessment of fracture risk and its application to screening for postmenopausal osteoporosis, report of a WHO Study Group.* Geneva: WHO Technical report series: 843, 1994. ISBN 92 4 120843 0, ISSN 0512-3054.
- The North American Menopause Society.** Management of osteoporosis in postmenopausal women: the 2021 position statement of The North American Menopause Society. *Menopause* 2021;28:973-997. doi:10.1097/GME.0000000000001831.
- Nazrun AS, Tzar MN, Mokhtar SA, Mohamed IN.** A systematic review of the outcomes of osteoporotic fracture patients after hospital discharge: morbidity, subsequent fractures, and mortality. *The Clin Risk Manag* 2014;10:937-948. doi:10.2147/TCRM.S72456.
- Sheu A, Bliuc D, Tran T, et al.** Fractures in type 2 diabetes confer excess mortality: The Dubbo osteoporosis epidemiology study. *Bone* 2022;159:116373. doi:10.1016/j.bone.2022.116373.
- Kanis JA, Cooper C, Rizzoli R, et al.** Identification and management of patients at increased risk of osteoporotic fracture: outcome of an ESCEO expert consensus meeting. *Osteoporos Int* 2017;28:2023-2034. doi:10.1007/s00198-017-4009-0.
- Velekraki M, Ioannou P, Tsioutis C, et al.** Age, Comorbidities and Fear of Fall: mortality predictors associated with fall-related fractures. *Maedica (Bucur)* 2020;15:18-23. doi: 10.26574/maedica.2020.15.1.18.
- Willers C, Norton N, Harvey NC et al.** Osteoporosis in Europe: a compendium of country-specific reports. *Arch Osteoporos* 2022;17:23. doi:10.1007/s11657-021-00969-8.
- Aspray TJ, Hill TR.** Osteoporosis and the Ageing Skeleton. *Subcell Biochem* 2019;91:453-476. doi:10.1007/978-981-13-3681-2_16.
- European Commission.** Special Eurobarometer 472- Wave EB88.4-TNS opinion&social, Report Sport and physical activity. *Directorate-general for Education, Youth, Sport and Culture* 2018. doi:10.2766/483047.
- European Commission and World Health Organization Regional Office for Europe.** *Romania Physical activity. Factsheet.* 2021. https://www.euro.who.int/__data/assets/pdf_file/0010/513766/Physical-activity-2021-Romania-eng.pdf.
- WHO Regional Office for Europe.** *2021 Physical Activity Factsheets for the European Union Member States in the WHO European Region.* Copenhagen, 2021. License: CC BY-NC-SA 3.0 IGO. <https://apps.who.int/iris/bitstream/handle/10665/345335/WHO-EURO-2021-3409-43168-60449-eng.pdf>.
- European Commission.** *Ageing Europe — 2021 interactive edition.* Eurostat. 2021. [https://ec.europa.eu/eurostat/cache/digpub/ageing/eing/Europe_\(europa.eu\)](https://ec.europa.eu/eurostat/cache/digpub/ageing/eing/Europe_(europa.eu)).
- WHO Regional Office for Europe.** *Strengthening population health surveillance: a tool for selecting indicators to signal and monitor the wider effects of the COVID-19 pandemic.* Copenhagen. 2021; Licence: CC BY-NC-SA 3.0 IGO.
- National Institute of Statistics - Tempo Online.** *Resident Population.* Bucharest: National Institute of Statistic, 2022. <http://statistici.inse.ro:8077/tempo-online/#/pages/tables/inse-table>.
- International Atomic Energy Agency.** *Dual Energy X Ray Absorptiometry for Bone Mineral Density and Body Composition Assessment.* Vienna: IAEA Human Health Series, 2010. https://www-pub.iaea.org/MTCD/Publications/PDF/Pub1479_web.pdf.
- Zaman M, Shah A, Singal R, et al.** Role of Dual Energy X-ray Absorptiometry (DEXA) Scan in the Diagnosis of Chronic Low Back Pain—a Prospective Randomized Controlled Study in Osteoporotic Patients Hospitalized in a Tertiary Care Institute. *Maedica (Bucur)* 2018;13:120-124. doi:10.26574/maedica.2018.13.2.120.
- Messina C, Buzzoni AC, Gitto S, et al.** Disruption of bone densitometry practice in a Northern Italy Orthopedic Hospital during the COVID-19 pandemic. *Osteoporos Int* 2021;32:199-203. doi: 10.1007/s00198-020-05587-7.
- Marshall D, Johnell O, Wedel H.** Meta-analysis of how well measures of bone mineral density predict occurrence of osteoporotic fractures. *BMJ* 1996;312:1254-1259. doi:10.1136/bmj.312.7041.1254.
- Blake GM, Fogelman I.** The role of DXA bone density scans in the diagnosis and treatment of osteoporosis. *Postgrad Med J* 2007;83:509-517. doi: 10.1136/pgmj.2007.057505.
- Tuczyńska M, Matthews-Kozanecka M, Baum E.** Accessibility to Non-COVID Health Services in the World During the COVID-19 Pandemic: Review. *Frontiers in Public Health* 2021;9:760795. doi:10.3389/fpubh.2021.760795.