

International Journal of Health Science

ISSN 2764-0159

vol. 6, n. 5, 2026

●●● ARTICLE 5

Acceptance date: 23/04/2026

EPIDEMIOLOGICAL PROFILE OF HIP FRACTURES IN THE ELDERLY AT A TERTIARY CARE HOSPITAL IN PARANÁ

Maria Cecília Furlan Dalmolim

Campo Real University Center, Guarapuava, Paraná

Igor Fiorese Vieira

Gladis Cristina Furlan



All content published in this journal is licensed under the Creative Commons Attribution 4.0 International License (CC BY 4.0).



ABSTRACT: Objective: To analyze the epidemiological profile of older adults with hip fractures treated at a tertiary hospital in the state of Paraná. **Methods:** This is a quantitative, observational, retrospective, and descriptive study conducted through the analysis of medical records of 76 elderly patients diagnosed with hip fractures treated at Hospital Santa Tereza from January 2024 to December 2025. Sociodemographic and clinical data were collected, including sex, age, type of fracture, and type of implant, and analyzed using descriptive and inferential statistics with the chi-square test ($p < 0.05$). **Results:** A higher incidence of hip fractures was observed in female patients aged 80 years or older. Trochanteric fractures were the most frequent (34.2%), followed by proximal and femoral neck fractures (32.9%). The most commonly used implant was the intramedullary nail (38.2%), followed by prostheses (26.3%) and plates with screws (11.8%). There was a significant association between the type of femoral neck fracture and the use of a prosthesis in 100% of cases. **Conclusion:** It is concluded that trochanteric fractures predominate in long-lived elderly women, and that a prosthesis was the procedure used in all cases of femoral neck hip fractures.

Keywords: Hip fracture, Elderly, Epidemiology.

INTRODUCTION

Population aging is one of the main demographic phenomena of the 21st century, characterized by a progressive increase in the proportion of older adults in the global population (ALVES, 2019). In Brazil, this process is occurring at an accelerated pace, driven by declining fertility rates, in-

creased life expectancy, and improved health and care conditions, resulting in significant growth in the population aged 60 and older (IBGE, 2023).

This scenario is part of the demographic and epidemiological transition, characterized by a decline in infectious diseases and an increase in the prevalence of chronic noncommunicable diseases, such as systemic hypertension, diabetes mellitus, cardiovascular diseases, and osteoporosis (WORLD HEALTH ORGANIZATION, 2021). In this context, aging is associated with physiological changes, such as reduced muscle mass, decreased bone mineral density, and changes in balance, which increase vulnerability to falls and, consequently, to the development of fractures (INTERNATIONAL OSTEOPOROSIS FOUNDATION, 2021).

Among these injuries, hip fractures stand out, generally related to fractures of the proximal femur, including the femoral neck, intertrochanteric, and subtrochanteric regions (BRASIL, 2022). This is a serious clinical event, often resulting from falls from standing height in individuals with bone fragility, and is associated with high rates of hospitalization, the need for surgical intervention, and significant functional impact (BRAZILIAN SOCIETY OF ORTHOPEDICS AND TRAUMATOLOGY, 2021).

Femur fractures are highly relevant in clinical practice and can affect different anatomical segments, with distinct implications for prognosis and therapeutic management. In the elderly, the prevalence of proximal femur fractures is notable, comprising injuries located between the femoral head and approximately 5 cm below the lesser trochanter, including cervical, basocervical, transtrochanteric, and subtrochanteric

fractures (BARROS FILHO TEP; LECH O; CRISTANTE AF, 2017). Proper classification of these fractures is essential for determining the therapeutic approach and estimating the functional prognosis.

From a clinical perspective, hip fractures are associated with high morbidity and mortality rates, with mortality in the first year following the event ranging from 15% to 30%, depending on the patient's clinical condition and the quality of care provided (BRAZILIAN SOCIETY OF ORTHOPEDICS AND TRAUMATOLOGY, 2021). Furthermore, many patients do not regain their previous functional level, leading to loss of independence, the need for institutionalization, and family burden, constituting a significant public health problem (WORLD HEALTH ORGANIZATION, 2021).

The etiology of these fractures is multifactorial, involving factors such as advanced age, female gender, osteoporosis, history of falls, sarcopenia, and the use of multiple medications. Osteoporosis plays a central role in this process, characterized by reduced bone mass and deterioration of bone tissue microarchitecture, resulting in increased fragility and fracture risk (INTERNATIONAL OSTEOPOROSIS FOUNDATION, 2021). Additionally, common comorbidities in the elderly, such as hypertension, diabetes mellitus, and cardiovascular diseases, negatively influence prognosis and increase the risk of complications (BRAZILIAN SOCIETY OF ORTHOPEDICS AND TRAUMATOLOGY, 2021).

Despite the availability of national and international data, there is heterogeneity in the distribution of these fractures across different regions, influenced by socioeconomic and demographic factors as well as access

to healthcare services. In this regard, regional epidemiological studies are essential for identifying specific characteristics of the served population, informing strategies for prevention and the organization of healthcare services (BRAZILIAN SOCIETY OF ORTHOPEDICS AND TRAUMATOLOGY, 2021).

Because this is a condition of high clinical relevance and growing impact in the context of an aging population, it is necessary to understand the epidemiological profile of affected patients, enabling a better understanding of occurrence patterns and contributing to the planning of health interventions. In this regard, the present study aims to analyze the epidemiological profile of elderly patients with hip fractures treated at a tertiary hospital in the state of Paraná.

METHODS

This is a quantitative, basic-level study with an observational, retrospective, and descriptive design. The research was conducted through the analysis of medical records available in the files of elderly patients who suffered hip fractures at Santa Tereza Hospital between January 1, 2024, and December 1, 2025.

The study population consisted of medical records of 76 elderly individuals diagnosed with hip fractures, of both sexes, including 22 men and 54 women, aged between 61 and 95 years (mean = 77.38; standard deviation = 8.46). Regarding age distribution, 48.7% of the individuals were 80 years or older, 27.6% were between 70 and 79 years old, and 23.7% were between 60 and 69 years old.

Sampling was non-probabilistic and based on convenience, including medical records of patients who met the established inclusion criteria: age 60 years or older and a confirmed diagnosis of hip fracture. Medical records with incomplete information or lacking essential data for analysis were excluded.

Sociodemographic and clinical data were collected using a structured form developed by the authors themselves, containing variables such as sex, age, type of fracture, and type of treatment. The data collection instrument was developed specifically for this study and will be made available in a supplementary file at the time of submission, as required.

As a security and data protection measure, patient information was anonymized, with names replaced by alphanumeric codes. The database, titled “Epidemiological Profile of Hip Fractures,” was stored in a spreadsheet with restricted access to the researchers and will be retained for a period of five years after the conclusion of the study, after which it will be deleted, in accordance with the General Data Protection Law.

Data analysis was performed using the Statistical Package for the Social Sciences (SPSS) software, version 30.0, employing descriptive and inferential statistics. For categorical variables, absolute and relative frequencies were calculated. For numerical variables, the mean and standard deviation were used as measures of central tendency and dispersion. Pearson’s chi-square test (χ^2) was used to verify associations between variables, with a significance level of $p < 0.05$.

The study was approved by the Research Ethics Committee of the Campo Real University Center, in accordance with

Opinion No. 8.014.481 and the Certificate of Submission for Ethical Review (CAAE) No. 92334525.6.0000.8947. The entire project was funded by the researchers’ own resources.

RESULTS

Seventy-six elderly individuals with hip fractures treated at a tertiary hospital in Paraná participated in the study, of both sexes (22 men and 54 women), aged between 61 and 95 years ($M = 77.38$; $SD = 8.46$). Regarding the age group of the elderly participants, 48.7% were 80 years or older, 27.6% were between 70 and 79 years old, and 23.7% were between 60 and 69 years old.

According to the data in Figure 1, the distribution of fracture types among elderly patients with hip fractures showed a predominance of trochanteric fractures, which accounted for 34.2% of cases. Next were proximal and femoral neck fractures, each representing 32.9%.

Figure 2 presents the types of implants used in elderly patients with hip fractures treated at a tertiary hospital in Paraná, based on clinical, demographic, and radiological data obtained from medical records and imaging studies. It is noted that 38.2% of the elderly patients underwent stem implant surgery, 26.3% underwent prosthesis implant surgery, and 11.8% underwent screw-and-plate implant surgery. However, data were not available for 23.7% of the elderly patients.

Table 1 presents the proportion of fracture types and implant types among elderly patients with hip fractures treated at a tertiary hospital in Paraná, according to

Figure 1. Types of fractures in older adults with hip fractures treated at a tertiary hospital in Paraná, based on clinical, demographic, and radiological data obtained from medical records and imaging studies.

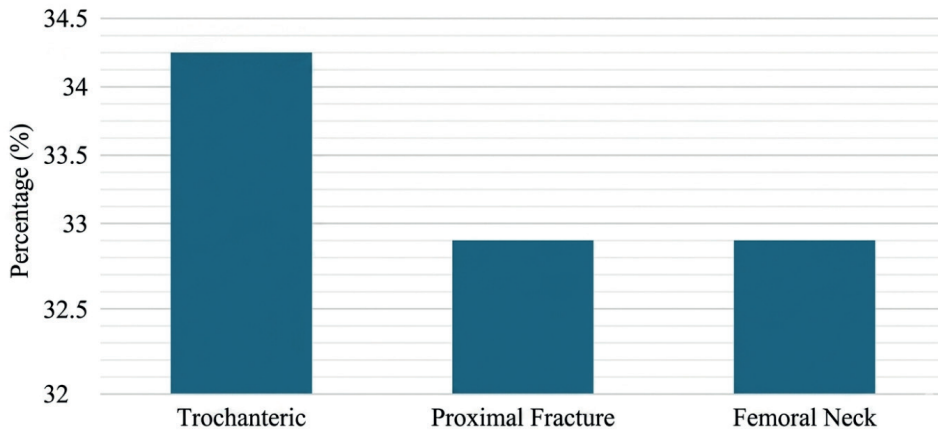
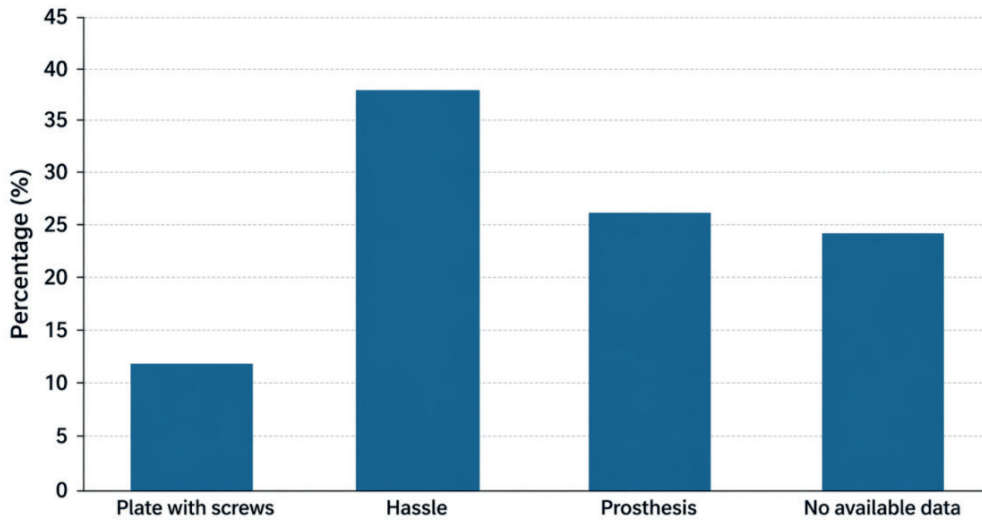


Figure 2. Types of implants in elderly patients with hip fractures treated at a tertiary hospital in Paraná, based on clinical, demographic, and radiological data obtained from medical records and imaging studies.



sex. No significant association was observed between sex and age group among elderly patients with hip fractures ($\chi^2 = 0.597$; $p = 0.440$). Similarly, there was no significant association between sex and fracture type ($\chi^2 = 0.008$; $p = 0.929$), nor between sex and the type of implant used ($\chi^2 = 0.453$; $p = 0.501$).

When analyzing the proportions by age group, among men, a higher proportion was found among those aged 70 to 79 years (40.9%), followed by those aged 80 years or older (36.4%) and those aged 60 to 69 years (22.7%). Among women, the highest proportion was observed in the 80 years or older group (53.7%), followed by the 60–69 years (24.1%) and 70–79 years (22.2%) age groups. Regarding fracture types, among men, femoral neck fractures (40.9%) and trochanteric fractures (40.9%) were most common, while proximal fractures (18.2%) were less frequent. Among women, proximal fractures (38.9%) were the most frequent, followed by trochanteric fractures (31.5%), while femoral neck fractures (29.6%) occurred less frequently. Regarding implant types, among men, a similar distribution was observed between intramedullary nails (31.8%) and prostheses (31.8%), followed by plates with screws (18.2%) and cases with no data available (18.2%). Among women, the intramedullary nail was the most commonly used implant, accounting for 40.7% of cases, followed by prostheses (24.1%), cases with no data available (25.9%), and screw plates (9.3%).

Table 2 presents the proportion of each fracture type and implant type among elderly patients with hip fractures treated at a tertiary hospital in Paraná, by age group. A significant association was observed between age group and fracture type ($\chi^2 = 6.369$;

$p = 0.012$), indicating that the distribution of fracture types varies according to patient age. On the other hand, no significant association was observed between age group and the type of implant used ($\chi^2 = 0.292$; $p = 0.589$). Regarding the proportions, among individuals aged 60 to 69 years ($n = 18$), femoral neck fractures predominated (55.6%), followed by proximal fractures (27.8%) and trochanteric fractures (16.7%). In the 70–79-year-old group ($n = 21$), trochanteric fractures (38.1%) and femoral neck fractures (38.1%) were most common, followed by proximal fractures (23.8%). Among patients aged 80 years or older ($n = 37$), trochanteric fractures (40.5%) and proximal fractures (40.5%) were the most common, while femoral neck fractures accounted for a smaller proportion (19.0%). These results indicate a decrease in the proportion of femoral neck fractures with increasing age and a higher relative frequency of trochanteric and proximal fractures in older individuals.

Regarding the type of implant, although no significant association with age group was observed, it was found that the intramedullary nail was the most commonly used implant across all age groups, accounting for 22.2% of cases among individuals aged 60 to 69 years, 33.3% among those aged 70 to 79 years, and 48.6% among patients aged 80 years or older. In contrast, the use of prostheses was more common in younger age groups (38.9% among those aged 60–69 and 33.3% among those aged 70–79), being less frequent among individuals aged 80 years or older (16.2%).

Based on the data presented in Table 3, a statistically significant association was observed between the type of fracture and the type of implant used ($\chi^2 = 7.088$; $p = 0.008$). This association occurred mainly

Table 1 – Proportion of fracture type and implant type in elderly patients with hip fractures treated at a tertiary hospital in Paraná, by sex.

VARIABLES	Gender		χ^2	p-value
	Male (n=22)	Female (n=54)		
	n (%)	n (%)		
Age group				
60 to 69 years	5 (22.7)	13 (24.1)	0.597	0.440
70 to 79 years	9 (40.9)	12 (22.2)		
80 years or older	8 (36.4)	29 (53.7)		
Total	22 (100.0)	54 (100.0)		
Fracture types				
Trochanteric	9 (40.9)	17 (31.5)	0.008	0.929
Proximal fracture	4 (18.2)	21 (38.9)		
Femoral neck	9 (40.9)	16 (29.6)		
Total	22 (100.0)	54 (100.0)		
Implant types				
Plate with screws	4 (18.2)	5 (9.3)	0.453	0.501
Stem	7 (31.8)	22 (40.7)		
Prosthesis	7 (31.8)	13 (24.1)		
No data available	4 (18.2)	14 (25.9)		
Total	22 (100.0)	54 (100.0)		

*Significant association (Chi-square test) – p < 0.05.

Table 2. Proportion of each type of fracture and type of implant among elderly patients with hip fractures treated at a tertiary hospital in Paraná, by age group.

VARIABLES	Age group			χ^2	p-value
	60 to 69 years (n=18)	70 to 79 years (n=21)	80 years or older (n=37)		
	n (%)	n (%)	n (%)		
Fracture types					
Trochanteric	3 (16.7)	8 (38.1)	15 (40.5)	6.369	0.012*
Proximal fracture	5 (27.8)	5 (23.8)	15 (40.5)		
Femoral neck	10 (55.6)	8 (38.1)	7 (19.0)		
Total	18 (100.00)	21 (100.0)	37 (100.00)		
Implant types					
Plate with screws	2 (11.1)	4 (19.0)	3 (8.1)	0.292	0.589
Stem	4 (22.2)	7 (33.3)	18 (48.6)		
Prosthesis	7 (38.9)	7 (33.3)	6 (16.2)		
No data available	5 (27.8)	3 (14.3)	10 (27.0)		
Total	18 (100.00)	21 (100.0)	37 (100.00)		

*Significant association (Chi-square test) – p < 0.05.

Table 3. Proportion of each type of implant in elderly patients with hip fractures treated at a tertiary hospital in Paraná, by fracture type.

Fracture types	Implant type				χ^2	p-value
	Plate with screw (n=9)	Nail (n=29)	Prosthesis (n=20)	No data available (n=18)		
	n (%)	n (%)	n (%)	n (%)		
Transobturator	4 (44.4)	14 (48.3)	0 (0.0)	8 (44.4)	7.088	0.008*
Proximal fracture	5 (55.6)	15 (51.7)	0 (0.0)	5 (27.8)		
Femoral neck	0 (0.0)	0 (0.0)	20 (100.0)	5 (27.8)		
Total	9 (100.0)	29 (100.0)	20 (100.0)	18 (100.0)		

*Significant association (Chi-square test) – p < 0.05.

because all femoral neck fractures were treated with a prosthesis (100%), while trochanteric and proximal fractures were predominantly treated with an intramedullary nail or screw plate, with no use of prostheses observed in these fracture types.

Specifically, among patients treated with screw plates (n = 9), a higher frequency of proximal fractures (55.6%) was observed, followed by trochanteric fractures (44.4%); no femoral neck fractures treated with this type of implant were observed (). A similar result was observed among patients treated with an intramedullary nail (n = 29), in whom proximal (51.7%) and trochanteric (48.3%) fractures were the most frequent, with no femoral neck fractures occurring in this group either. On the other hand, among patients treated with prostheses (n = 20), all cases corresponded to femoral neck fractures (100%), with no use of this type of implant observed in trochanteric or proximal fractures. In cases where the type of implant was not available (n = 18), a higher proportion of trochanteric fractures (44.4%) was observed, followed by proximal fractures (27.8%) and femoral neck fractures (27.8%).

DISCUSSION

Table 1 shows that three types of fractures are most common among the elderly, with the trochanteric fracture having the highest incidence (34.2%), followed by the proximal and femoral neck fractures (32.9%). Some authors reached the same conclusions, identifying trochanteric fractures as one of the most frequent types in the proximal femur among the elderly, particularly in cases of low-energy trauma (OLIVEIRA et al., 2021; GRIGORYAN; JAVEDAN; RUDOLPH, 2014). On the other hand, some authors have described a higher prevalence of femoral neck fractures in certain populations, suggesting that factors such as demographic differences, clinical characteristics, and methodological aspects may influence this profile (VERONESE; MAGGI, 2018). This contrast highlights the importance of local studies for a better understanding of epidemiological particularities.

Regarding the predominance of intramedullary nail use (38.2%), followed by prostheses (26.3%) and, to a lesser extent, plates with screws (11.8%). Studies have indicated that the intramedullary nail is the preferred method for treating trochanteric fractures due to its greater biomechanical stability and better functional outcomes,

especially in unstable fractures (ZHANG et al., 2021; ZHANG et al., 2022). The use of prostheses is frequently indicated for femoral neck fractures, particularly in elderly patients at higher risk of complications, with the aim of enabling early mobilization and reducing morbidity. In contrast, the use of plates with screws has become progressively less frequent, reserved for specific cases, due to higher rates of mechanical failure when compared to intramedullary methods (FALOTICO et al., 2025). Furthermore, the high proportion of medical records with incomplete data highlights a significant limitation in the quality of the clinical registry.

Table 2 shows that as age increased, there was also an increase in the number of hip surgeries. Recent studies demonstrate that aging is directly related to bone mass loss, reduced muscle strength, and impaired balance, significantly increasing the risk of falls and, consequently, of fractures (TAYYAB et al., 2025; SOARES; NASCIMENTO, 2025). While trochanteric and femoral neck fractures were predominant in elderly men (40.9%), the highest incidence among women was for proximal fractures (38.9%). This contrast can be understood based on the biological and clinical differences between the sexes. In women, especially after menopause, there is a marked reduction in estrogen levels, which accelerates bone loss and compromises the microarchitecture of trabecular bone, making regions such as the proximal femur more susceptible to fractures, even in the face of low-energy trauma (EASTELL et al., 2022). Furthermore, studies have indicated that women have greater longevity and, consequently, greater exposure to frailty, sarcopenia, and recurrent falls, which contributes to this pattern of impairment (NICHOLSON et al., 2025). Thus, the differences observed

reflect the interaction between hormonal, structural, and clinical factors.

The results presented in Table 3 demonstrated that, in cases of femoral neck fractures, prosthetic replacement was performed in nearly 100% of patients, highlighting a strong association between this type of fracture and the choice of surgical treatment. Some studies recommend arthroplasty as the preferred approach for these fractures, as it has a lower failure rate and allows for early mobilization (LEWIS et al., 2019). In a study conducted by Lewis et al. (2019), involving patients with a mean age over 75 years, a high rate of prosthesis indication was observed in intracapsular fractures, similar to that found in the present study. Thus, they found that, in a sample composed primarily of elderly women, arthroplasty was also the most commonly used treatment. Therefore, the results of this study corroborate current evidence, indicating that arthroplasty remains the gold standard in the management of femoral neck fractures in the elderly, especially in older populations with greater bone fragility.

For trochanteric and proximal fractures, the results showed greater use of intramedullary nails and, to a lesser extent, plates with screws. Studies indicate that intramedullary nails have been widely recommended as the first choice for trochanteric fractures, especially unstable ones, due to their greater mechanical strength, shorter surgical time, and better functional outcomes (WINNOCK DE GRAVE et al., 2012; SAHOTA et al., 2022). In contrast, fixation with plates and screws is still used in cases of stable fractures or when there are contraindications to the use of a nail, although it is associated with a higher risk of mechanical complications in osteoporotic bones (MERT et al., 2025).

Although the findings are consistent with the literature, this study has limitations that should be considered. The retrospective design and the use of secondary data are subject to biases related to the quality of medical record documentation, in addition to the lack of control for potentially relevant variables, such as comorbidities and prior functional status. Furthermore, the single-center setting limits the generalizability of the results.

Given this, we recommend conducting prospective, multicenter studies with greater methodological rigor and the inclusion of clinical and functional variables to deepen our understanding of the factors associated with hip fractures in older adults. Furthermore, future research could explore outcomes such as mortality, length of hospital stay, complications, and functional recovery, contributing to the improvement of prevention and management strategies for this condition.

CONCLUSION OR FINAL CONSIDERATIONS

According to the data collected, a predominance of hip fractures was observed in female patients, with a mean age of 80 years, with the trochanteric fracture being the most common. A significant association was found between femoral neck hip fractures and the use of prostheses as the procedure employed in all surgeries.

These findings underscore the significant impact of this condition on the elderly population, confirming its relevance as a public health issue due to high rates of morbidity, loss of functionality, and demand for hospital care. In light of this, the importance of developing high-quality preventive strategies—such as initiatives aimed at re-

ducing falls and managing risk factors—is emphasized, as is the need for further studies to expand understanding of the topic and contribute to improving healthcare for this population.

ACKNOWLEDGMENTS AND FUNDING *

We would like to thank Hospital Santa Tereza for authorizing the study, providing the necessary data, and supporting the research, as well as Dr. Igor Fiorese Vieira for all his assistance and guidance during the development of this work.

REFERENCES

1. ALVES JED. Envelhecimento populacional no Brasil e no mundo. *Revista Longevidade*, 2019.
2. BARROS FILHO TEP, LECH O, CRISTANTE AF. Exame físico em ortopedia. 3. ed. Sarvier: São Paulo-SP, 2017.
3. BRASIL. Ministério da Saúde. Diretrizes brasileiras para o diagnóstico e tratamento da osteoporose. Ministério da Saúde: Brasília-DF, 2022.
4. EASTELL R, et al. Management of osteoporosis in postmenopausal women. *Menopause*, 2022; 29(7): 767-794.
5. EDELMUTH, Stephanie Victoria Camargo Leão et al. Comorbidities, clinical interurrences, and factors associated with mortality in elderly patients admitted for a hip fracture. *Revista Brasileira de Ortopedia*, v. 53, n. 5, p. 543-551, 2018.
6. FALOTICO, Guilherme Guadagnini et al. Total hip arthroplasty versus hemiarthroplasty for displaced femoral neck fracture: an overview of systematic reviews. *Journal of Orthopaedic Surgery and Research*, v. 20, p. 718, 2025.

7. GRIGORYAN, Konstantin V.; JAVEDAN, Houman; RUDOLPH, James L. Ortho-geriatric care models and outcomes in hip fracture patients: a systematic review and meta-analysis. *Journal of Orthopaedic Trauma*, v. 28, n. 3, p. e49–e55, 2014.
8. INTERNATIONAL OSTEOPOROSIS FOUNDATION. *Fragility fractures and their impact*. IOF: Nyon, 2021.
9. INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA (IBGE). *Projeções da população do Brasil e das Unidades da Federação*. IBGE: Rio de Janeiro-RJ, 2023..
10. LEWIS, Daniel P. et al. Hemiarthroplasty versus total hip arthroplasty for the management of displaced neck of femur fractures: a systematic review and meta-analysis. *The Journal of Arthroplasty*, v. 34, n. 8, p. 1837–1843, 2019.
11. MERT, Ü. et al. Intramedullary Nailing vs. Plate Fixation for Trochanteric Femoral Fractures: A Systematic Review and Meta-Analysis of Randomized Trials. *Journal of Clinical Medicine*, [s. l.], v. 14, n. 15, p. 5492, 4 ago. 2025.
12. NICHOLSON, W. K. et al. Screening for Osteoporosis to Prevent Fractures: US Preventive Services Task Force Recommendation Statement. *JAMA*, [s. l.], v. 333, n. 6, p. 498–508, 11 fev. 2025.
13. OLIVEIRA, R. S. et al. Perfil epidemiológico das fraturas de fêmur em idosos no Brasil: uma revisão integrativa. *Research, Society and Development*, [s. l.], v. 10, n. 14, p. e333101422119, 2021.
14. SAHOTA, O. Management of hip fracture in the older person. *Aging Clinical and Experimental Research*, [s. l.], v. 34, n. 1, p. 111–122, jan. 2022.
15. SOARES, F. X.; NASCIMENTO, L. D. S. Estudo epidemiológico das internações e óbitos de idosos com fratura de fêmur decorrentes de quedas no Piauí de 2019 a 2023. *Arquivos Catarinenses de Medicina*, [s. l.], v. 54, n. 3, p. 4–12, jul./set. 2025.
16. SOCIEDADE BRASILEIRA DE ORTOPEDIA E TRAUMATOLOGIA. *Manejo da fratura do quadril no idoso*. SBOT: São Paulo-SP, 2021.
17. TAYYAB, Muhammad et al. Trends in hip fracture-related mortality among older adults in the United States from 1999 to 2023: a Centers for Disease Control and Prevention's Wide-Ranging Online Data for Epidemiologic Research (CDC WONDER) analysis. *Cureus*, v. 17, n. 8, e90305, 2025.
18. VERONESE, N.; MAGGI, S. Epidemiology and social costs of hip fracture. *Injury*, [s. l.], v. 49, n. 8, p. 1458–1460, ago. 2018.
19. WINNOCK DE GRAVE, Philip et al. Intramedullary fixation of intertrochanteric hip fractures: a comparison of two implant designs – a prospective randomized clinical trial. *Acta Orthopaedica Belgica*, v. 78, n. 2, p. 192–198, 2012.
20. WORLD HEALTH ORGANIZATION. *Decade of Healthy Ageing: baseline report*. WHO: Geneva, 2021.
21. ZHANG Y, et al. Surgical management of intertrochanteric fractures. *International Orthopaedics*, 2022.
22. ZHANG, S. et al. What Is the Effect of Intramedullary Nailing Compared With Sliding Hip Screws on Functional Outcomes and Complications in Patients With Unstable Intertrochanteric Fractures? A Systematic Review and Meta-analysis. *Clinical Orthopaedics and Related Research*, [s. l.], v. 479, n. 6, p. 1234–1244, jun. 2021.