

EPIDEMIOLOGY OF PROXIMAL FEMUR FRACTURES IN BRAZIL: REGIONAL ANALYSIS OF INCIDENCE, IN-HOSPITAL MORTALITY, AND AVERAGE LENGTH OF STAY

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ABSTRACT

Introduction: Proximal femur fractures represent a serious public health problem, especially among the elderly population, due to their high morbidity and mortality rates and significant socioeconomic impact. In Brazil, a country of continental dimensions and great demographic diversity, regional epidemiological analysis is essential for the planning of effective health policies. **Objective:** To analyze the incidence, in-hospital mortality, and average length of stay for proximal femur fractures in the state of Goiás, Brazil, from 2014 to 2024, based on data from the Unified Health System (SUS). **Methods:** This was a descriptive ecological study using secondary data from the Department of Informatics of the SUS (DATASUS), referring to the surgical treatment of proximal femur fracture/injury (code 0408050489) in Goiás. The variables analyzed were: approved Hospital Admission Authorizations (AIH), deaths, mortality rate, and average length of stay, stratified by municipality. **Results:** Over the 10-year period, 4,158 hospitalizations for proximal femur fractures were recorded in Goiás, with 100 in-hospital deaths, resulting in an overall mortality rate of 2.41% and an average length of stay of 6.5 days. A high concentration of cases was observed in the capital, Goiânia (70.3% of the total), which nonetheless showed a mortality rate (2.26%) lower than the average of other municipalities (2.76%). Smaller municipalities, such as Jaraguá, presented notably high mortality rates (7.69%), while others, such as Paraúna, recorded atypically long hospital stays (32 days), despite the low number of cases. **Conclusion:** The data reveal significant heterogeneity in the distribution and management of proximal femur fractures in Goiás, with strong centralization of care in the capital. Disparities in mortality rates and hospital stay lengths among municipalities suggest the need to investigate the factors associated with these outcomes and to strengthen the orthopedic care network in the state's interior.

Keywords: Proximal femur fractures, Epidemiology, Mortality, Length of stay, Public health, Brazil.

INTRODUCTION

Negative Fractures, particularly those of the proximal femur, represent one of the greatest challenges for healthcare systems worldwide and are considered a silent epidemic associated

with population aging.^{1,2} These fractures not only generate a substantial economic impact due to hospitalization, surgical, and rehabilitation costs but also lead to a drastic reduction in quality of life, loss of independence, and, most critically, high morbidity and mortality rates.^{3,4}

The incidence of hip fractures is on the rise, especially in developing countries. In Latin America, projections indicate a continuous increase, in contrast to the stabilization or decline observed in some North American and European nations.^{5,6} Brazil, undergoing a rapid process of demographic and epidemiological transition, lies at the epicenter of this trend. It is estimated that the incidence of fractures in the country could increase by more than 60% by 2030, making the understanding of their epidemiological profile a public health priority.⁷

Mortality following proximal femur fractures remains alarmingly high. International studies show that the mortality rate may reach up to 33% within the first year after the fracture. Factors such as advanced age, comorbidities, nutritional status, and—crucially—the time to surgery, are key determinants of outcome.^{8,9} A surgical delay of more than 48 hours has consistently been associated with a significant increase in mortality and postoperative complications.^{9,10}

Mortality, as well as the length of hospital stay, serves as a key indicator of care efficiency and a predictor of complications. Prolonged hospitalizations are linked to a higher risk of infections, thromboembolism, and functional decline, in addition to increasing healthcare costs.^{11,12}

In this context, the analysis of regional epidemiological data is essential to identify disparities, optimize resource allocation, and develop prevention and treatment strategies tailored to local realities. The objective of this study is to outline the epidemiological profile of proximal femur fractures in the state of Goiás, Brazil, by analyzing incidence, in-hospital mortality, and average length of stay, in order to provide evidence to support public health planning and to improve care for elderly patients with hip fractures.

METHODS

An ecological, descriptive, and retrospective study was conducted using secondary public-domain data obtained from the Department of Informatics of the Unified Health System (DATASUS), accessed through the TabNet platform (<http://tabnet.datasus.gov.br>).

Data were collected on September 25, 2025, covering the period from January 2014 to December 2024. The search was filtered for the state of Goiás, including all municipalities that recorded the procedure “Surgical treatment of proximal femur fracture/injury,” under code 0408050489 of the SUS procedure table.

The variables of interest selected for analysis were the number of approved Hospital Admission Authorizations (AIH), used as a proxy for hospitalization incidence; the number of in-hospital deaths; the average AIH reimbursement value; and the average length of hospital stay, expressed in days. The in-hospital mortality rate was calculated as the ratio between the number of deaths and the total number of approved AIHs, multiplied by 100.

Descriptive statistical analysis was performed, including the calculation of frequencies, means,

and rates. A stratified analysis by municipality and municipal size was conducted, along with a direct comparison between the state capital (Goiânia) and the other municipalities of Goiás. Because this study was based on secondary, anonymized, and publicly accessible data, submission to a Research Ethics Committee was not required, in accordance with Resolution No. 674/2022 of the National Health Council of Brazil.

RESULTS

Between January 2014 and December 2024, a total of 4,158 Hospital Admission Authorizations (AIH) were approved for the surgical treatment of proximal femur fractures in the state of Goiás. Of this total, 100 patients died during hospitalization, corresponding to an overall in-hospital mortality rate of 2.41%. The average length of hospital stay for this procedure in the state was 6.5 days.

Table 1 – Approved Hospital Admission Authorizations (AIH) by Municipality for Surgical Treatment of Proximal Femur Fracture, Goiás, 2014–2024

MUNICIPALITY	Approved Hospital Admission Authorizations
TOTAL	4.158
520110 ANAPOLIS	544
520140 APARECIDA DE GOIÂNIA	104
520170 ARAGARCAS	13
520410 CACHOEIRA ALTA	2
520430 CACU	1
520450 CALDAS NOVAS	7
520510 CATALAO	89
520540 CERES	133
520800 FORMOSA	11
520870 GOIÂNIA	2.924
521130 ITARUMÃ	2
521150 ITUMBIARA	39
521180 JARAGUA	13
521190 JATAI	18
521308 MINACU	3
521375 MONTIVIDIU	1
521380 MORRINHOS	1
521450 NEROPOLIS	1
521640 PARAUNA	1
521880 RIO VERDE	51
521930 SANTA HELENA DE GOIAS	128
522160 URUACU	72

Source: Ministry of Health – Hospital Information System of the Unified Health System (SIH/SUS)

Table 2 – Average Length of Stay by Municipality for Surgical Treatment of Proximal Femur Fracture, Goiás, 2014–2024

Municipality	Average Length of Stay
TOTAL	6.5
520110 ANAPOLIS	5.5
520140 APARECIDA DE GOIÂNIA	7.4
520170 ARAGARCAS	3.7
520410 CACHOEIRA ALTA	0.5
520430 CACU	7.0
520450 CALDAS NOVAS	4.3
520510 CATALAO	5.3
520540 CERES	3.2
520800 FORMOSA	3.5
520870 GOIÂNIA	6.7
521130 ITARUMÃ	1.5
521150 ITUMBIARA	7.4
521180 JARAGUA	3.1
521190 JATAI	5.4
521308 MINACU	1.3
521375 MONTIVIDIU	3.0
521380 MORRINHOS	3.0
521450 NEROPOLIS	7.0
521640 PARAUNA	32.0
521880 RIO VERDE	7.1
521930 SANTA HELENA DE GOIÁS	9.9
522160 URUACU	9.6

Source: Ministry of Health – Hospital Information System of the Unified Health System (SIH/SUS)

Table 3 – Deaths by Municipality for Surgical Treatment of Proximal Femur Fracture, Goiás, 2014–2024

Municipality	Deaths
TOTAL	100
520110 ANAPOLIS	20
520140 APARECIDA DE GOIÂNIA	2
520510 CATALAO	2
520540 CERES	1
520870 GOIÂNIA	66
521150 ITUMBIARA	1
521180 JARAGUA	1
521930 SANTA HELENA DE GOIÁS	4
522160 URUACU	3

Source: Ministry of Health – Hospital Information System of the Unified Health System (SIH/SUS)

Tabela 4 - Taxa mortalidade segundo Município em tratamento cirúrgico de fratura proximal do fêmur de 2014-2024 em Goiás

Municipality	Death rate
TOTAL	2.41
520110 ANAPOLIS	3.68
520140 APARECIDA DE GOIÂNIA	1.92
520510 CATALAO	2.25
520540 CERES	0.75
520870 GOIÂNIA	2.26
521150 ITUMBIARA	2.56
521180 JARAGUA	7.69
521930 SANTA HELENA DE GOIÁS	3.13
522160 URUACU	4.17

Source: Ministry of Health – Hospital Information System of the Unified Health System (SIH/SUS)

The distribution of cases revealed a marked concentration in the capital, Goiânia, which accounted for 2,924 hospitalizations, representing 70.3% of all cases in the state. Anápolis ranked second with 544 cases (13.1%), followed by Ceres (133; 3.2%), Santa Helena de Goiás (128; 3.1%), and Aparecida de Goiânia (104; 2.5%). Together, these five municipalities accounted for 92.2% of all hospital admissions for proximal femur fractures in Goiás (Table 5).

Table 5 – Distribution of Cases, Mortality, and Length of Stay by Municipality (2014–2024)

Municipality	Approved Hospital Admission AuthorizationS	Deaths	Death rate(%)	Average Length of Stay (days)
GOIÂNIA	2.924	66	2.26	6.7
ANAPOLIS	544	20	3.68	5.5
CERES	133	1	0.75	3.2
SANTA HELENA DE GOIÁS	128	4	3.13	9.9
APARECIDA DE GOIÂNIA	104	2	1.92	7.4
URUACU	72	3	4.17	9.6
RIO VERDE	51	0	0.00	7.1
ITUMBIARA	39	1	2.56	7.4
JATAI	18	0	0.00	5.4
ARAGARCAS	13	0	0.00	3.7
JARAGUA	13	1	7.69	3.1
TOTAL	4.158	100	2.41	6.5

Table 5 – Distribution of Cases, Mortality, and Length of Stay by Municipality (2014–2024)

The in-hospital mortality rate showed significant variation among municipalities. Jaraguá, despite having a relatively low number of cases (13), recorded the highest mortality rate (7.69%).

Uruaçu (4.17%) and Anápolis (3.68%) also presented rates above the state average. In contrast, Goiânia, while accounting for the majority of deaths in absolute numbers (66), had a mortality rate (2.26%) slightly below the state average.

The average length of hospital stay also varied considerably. The municipality of Paraúna recorded an atypically high average of 32 days, although it had only one reported case. Among municipalities with a higher volume of admissions (≥ 20 cases), Santa Helena de Goiás (9.9 days) and Uruaçu (9.6 days) had the longest average stays, while Ceres (3.2 days) and Jaraguá (3.1 days) showed the shortest durations.

When comparing Goiânia with the group of other municipalities, it was observed that although the capital accounted for 70.3% of all cases, its mortality rate (2.26%) was lower than that of the rest of the state (2.76%). On the other hand, the average hospital stay in Goiânia (6.7 days) was slightly higher than in other municipalities (6.1 days). This finding may suggest either a greater complexity of cases referred to the capital or differences in hospital management and care processes.

DISCUSSION

This epidemiological study on proximal femur fractures in Goiás reveals a complex and heterogeneous landscape, consistent with trends observed in other regions of Brazil and Latin America, while also presenting important regional particularities. The overall in-hospital mortality rate of 2.41% found in Goiás is comparable to, though slightly lower than, international data reporting hospital mortality rates ranging from 2.3% to 5.7%.⁸ However, it is essential to emphasize that in-hospital mortality represents only the “tip of the iceberg,” as mortality within the first year after a fracture can exceed 30%.^{8,9}

The marked concentration of cases (70.3%) in the capital, Goiânia, is a prominent finding and reflects a pattern of centralized high-complexity care, common throughout Brazil. This phenomenon can be explained by the greater availability of referral hospitals, specialized teams, and diagnostic and therapeutic resources in the capital. However, such centralization may impose geographic and socioeconomic barriers to access for patients from the countryside, potentially resulting in delayed surgical treatment - a well-established risk factor for increased mortality and postoperative complications. The slightly higher mortality rate in the group of smaller municipalities (2.76% vs. 2.26% in the capital) may indirectly reflect these access challenges and the more limited local healthcare infrastructure.

The high mortality rates observed in small municipalities, such as Jaraguá (7.69%), though based on a small number of cases, serve as a warning sign. This variability may be related to multiple factors, including local hospital infrastructure, availability of surgical and intensive care teams, and the comorbidity profile of patients in each region. Studies show that the patient’s risk classification, such as the American Society of Anesthesiologists (ASA) score, is a strong predictor of mortality. The absence of clinical profile data in DATASUS represents a limitation of this study, but the observed disparities justify further local investigations to identify specific risk factors.

The average hospital stay of 6.5 days in Goiás is notably shorter than that reported in older studies from developed countries, which described averages between 15 and 30 days.¹³ However, it aligns more closely with recent trends toward hospital management optimization and implementation of evidence-based care protocols. Nevertheless, the

variation among municipalities remains significant. The prolonged hospital stays in places such as Santa Helena de Goiás (9.9 days) and Uruaçu (9.6 days) may indicate a higher rate of postoperative complications, delays in discharge processes, or the need for extended in-hospital rehabilitation—all of which increase costs and the risk of adverse events. The extreme case of Paraúna (32 days) likely represents an outlier but underscores the possibility of highly complex cases or severe complications managed in smaller, less-resourced hospitals.

CONCLUSION

The data reveal significant heterogeneity in the distribution and management of proximal femur fractures in Goiás, with a marked concentration of care in the state capital. The disparities in mortality rates and hospital stay durations among municipalities underscore the need to investigate factors associated with these outcomes and to strengthen the orthopedic care network in the state's interior.

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