

Epidemiological Overview of Umbilical and Epigastric Hernias in Brazilian Hospital Records

Julia Sobral Sposito¹, Maria Eliza Marchi² Wagner Ramos Borges^{3,*}

1Third-year medical student at the Bahiana School of Medicine and Public Health, Salvador, Bahia, Brazil

2Fourth-year medical student at the Bahiana School of Medicine and Public Health, Salvador, Bahia, Brazil

3PhD in Medicine and Health from the Bahia School of Medicine, Federal University of Bahia; Vascular Surgeon, full member of the Brazilian Society of Angiology and Vascular Surgery and the Brazilian College of Surgeons, Brazil

ABSTRACT

Introduction: Umbilical and epigastric hernias are among the most common conditions in general surgery, with significant clinical and economic impact in Brazil. They result from weaknesses in the linea alba, a fibrous structure located in the midline of the abdomen that connects the rectus abdominis muscles. 4 Currently, both open and minimally invasive approaches are used for treatment. The choice between them involves variables such as the size of the hernial defect, the patient's clinical profile, the surgeon's experience, and the infrastructure of the service. **Methods:** Observational, retrospective study with data from the SIH/SUS (2008–2024) on abdominal wall hernioplasties (ICD-10 K42 and K43). The number of procedures, costs, hospital stay, mortality, and demographic variables were analyzed. **Results:** A total of 1,444,961 procedures were recorded, with umbilical hernias predominating (77%). There was a 50% drop in volume in 2020, with a recovery to 126,665 surgeries in 2024. Overall mortality was 0.23%, higher in emergencies (0.57%). The average cost was US\$ 100.10, with the lowest cost for laparoscopic procedures. The average length of stay was 1.85 days. **Conclusion:** They are highly prevalent in the SUS. Laparoscopy is cost-effective but still not widely used. The increase in mortality in emergency surgeries reinforces the importance of early and elective management. Investments, equitable access, and modernization of techniques can optimize results.

Keywords: Abdominal Hernia, Hernioplasty, Umbilical Hernia.

INTRODUCTION

Abdominal wall hernias, especially umbilical and epigastric hernias, are among the most prevalent conditions in general surgery. Although often considered low complexity, these conditions have a significant impact from both a clinical and economic perspective, especially in countries with public health systems, such as Brazil [1]. It is estimated that hundreds of thousands of herniorrhaphy procedures are performed annually in the

Vol No: 08, Issue: 02

Received Date: October 17, 2025

Published Date: October 29, 2025

*Corresponding Author

Wagner Ramos Borges

PhD in Medicine and Health from the Bahia School of Medicine, Federal University of Bahia; Vascular Surgeon, full member of the Brazilian Society of Angiology and Vascular Surgery and the Brazilian College of Surgeons, Brazil, Phone: 5571992068592, ORCID: 0000-0001-8653-5265, E-mail: wagner2076@bol.com.br

Citation: Sposito JS, et al. (2025). Epidemiological Overview of Umbilical and Epigastric Hernias in Brazilian Hospital Records. Mathews J Surg. 8(2):40.

Copyright: Sposito JS, et al. © (2025). This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

country, a number that reflects not only the high prevalence of these pathologies [2] but also the disparities in access to different therapeutic approaches and the absence of unified protocols in various regions of the country [3].

Epigastric and umbilical hernias result from weaknesses in the linea alba, a fibrous structure located in the midline of the abdomen that connects the rectus abdominis muscles [4]. Umbilical hernias are characterized by the protrusion of intra-abdominal contents through the umbilical ring and are more common in children and adults with increased intra-abdominal pressure [5]. Epigastric hernias, on the other hand, correspond to the protrusion of preperitoneal fat or, in some cases, intestinal loops through small defects located between the xiphoid process and the navel [4,5]. Several risk factors are involved in its genesis, such as obesity, smoking, pregnancy, repetitive physical exertion, collagen disorders, and chronic obstructive pulmonary diseases [6]. In addition, clinical variables such as hypoalbuminemia, corticosteroid use, and cardiovascular comorbidities are associated with worse postoperative outcomes, including surgical wound infection and prolonged hospital stay [7].

The historical trajectory of herniorrhaphy is extensive. There are ancient records, such as those found in Egyptian papyri, that already signaled the recognition of these abdominal protrusions in antiquity [8]. Since then, there has been an important transition from empirical interventions to techniques based on anatomical and biomechanical principles, such as the separation of components and the use of synthetic prostheses [9].

Currently, both open and minimally invasive approaches are used in clinical practice. The choice between them involves variables such as the size of the hernia defect, the patient's clinical profile, the surgeon's experience, and the infrastructure of the service [9]. Although the open technique still predominates in many Brazilian public hospitals, especially in regions with limited resources, evidence shows that laparoscopy can offer significant benefits, including lower morbidity, reduced hospital stay, and a faster return to normal activities [10,11].

Among laparoscopic techniques, the IPOM (Intraperitoneal Onlay Mesh) method remains widely used. However, more recent approaches, such as eTEP (enhanced-view totally extraperitoneal), have been gaining prominence by enabling retromuscular placement of the mesh, combining good functional results with lower recurrence rates [12,13]. Despite this, the adoption of these techniques is still heterogeneous in Brazil, which highlights the gap between

consolidated scientific knowledge and its full incorporation into healthcare practice [14].

Another point that remains under debate is the choice between repairs with or without the use of synthetic meshes. Although there is consensus in the literature on the lower recurrence rates associated with the use of prostheses [15], there is significant variation in the approaches adopted by different institutions that cannot be explained solely by technical characteristics such as the size of the hernia or the type of surgical access used [16].

Thus, there is a growing need for further study of the impact of abdominal wall herniorrhaphy in Brazilian public health services. This article seeks to identify the epidemiological profile of patients, as well as to statistically analyze hospital records on costs, average length of stay, and the nature of care provided for these procedures.

MATERIAL AND METHODS

The study consists of an observational, retrospective, aggregated, and descriptive documentary analysis of secondary data extracted from the Hospital Information System of the Unified Health System (SIH/SUS), available in the DataSUS database. The data refer to patients hospitalized in Brazil between 2008 and 2024, according to their municipality of residence, and classified by the ICD-10 codes K42 (Umbilical Hernia) and K43 (Ventral Hernia).

The data were processed using Microsoft Excel, and tables and graphs corresponding to the information collected were prepared. These data can be verified through the TabNet portal, accessible at the following link: <https://datasus.saude.gov.br/>.

To describe hospitalizations for abdominal wall hernioplasty, the following variables were analyzed: number of Hospital Admission Authorizations (AIH) paid, total cost, average cost, mortality rate, number of deaths, average length of stay, type of care, age group, sex, and race/color.

To calculate costs in US dollars, the exchange rate on July 4, 2024, was used, valued at 5.4084 BRL/USD, according to data from the Central Bank of Brazil.

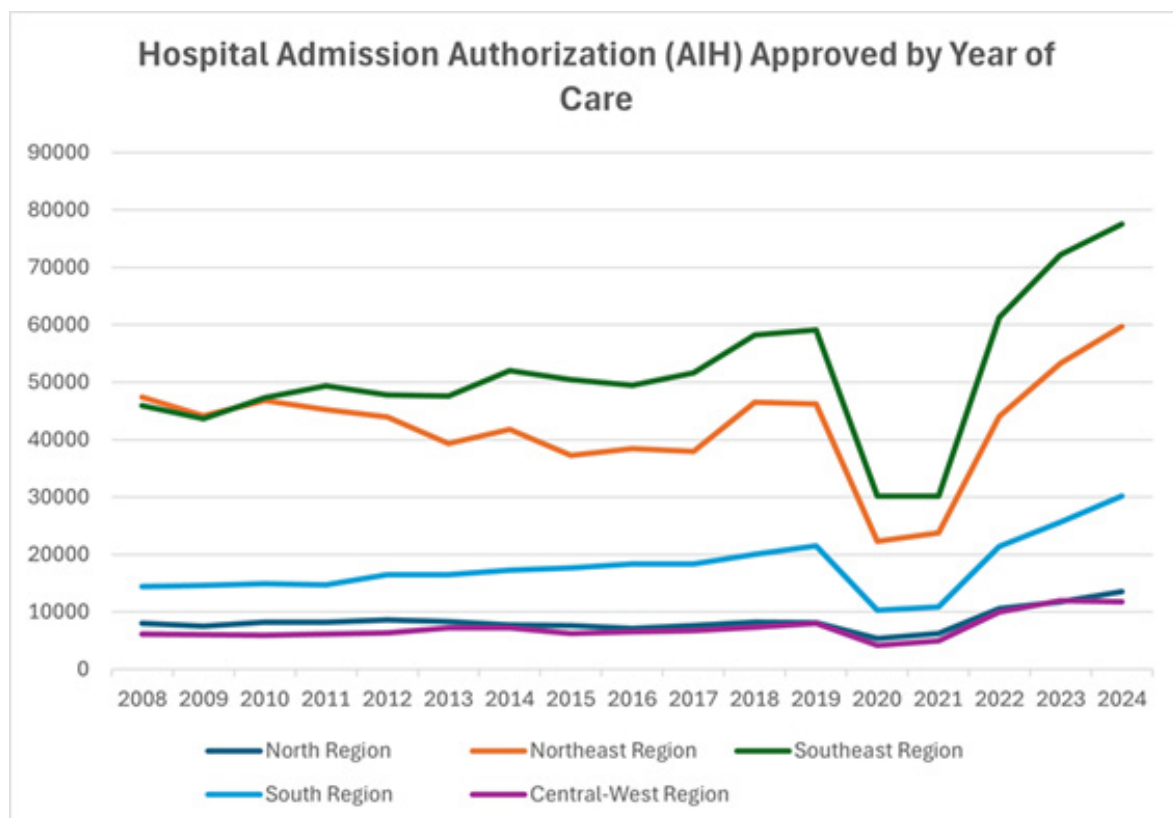
Regarding ethical considerations, this study was exempted from submission to a Research Ethics Committee, as it exclusively used publicly accessible data, in accordance with current legislation. Nevertheless, the researchers followed the ethical principles established by Resolution No. 466/2012 of the Brazilian National Health Council, ensuring confidentiality and responsible use of the analyzed information.

RESULTS

The total number of herniorrhaphy procedures performed during the period analyzed was 1,444,961. Of these, 320,402 were epigastric hernioplasties, 1,058 were laparoscopic epigastric hernioplasties, 1,115,972 were umbilical hernioplasties, and 7,629 were laparoscopic umbilical herniorrhaphy procedures. The average per year was 84,997 over the period analyzed. The temporal analysis showed a general trend of stability over the years. However, there was a significant drop in the number of procedures in 2020 (in the context of the coronavirus pandemic), with a reduction of approximately 50% compared to 2019—from 95,175 to 46,012 procedures—a pattern that continued in 2021.

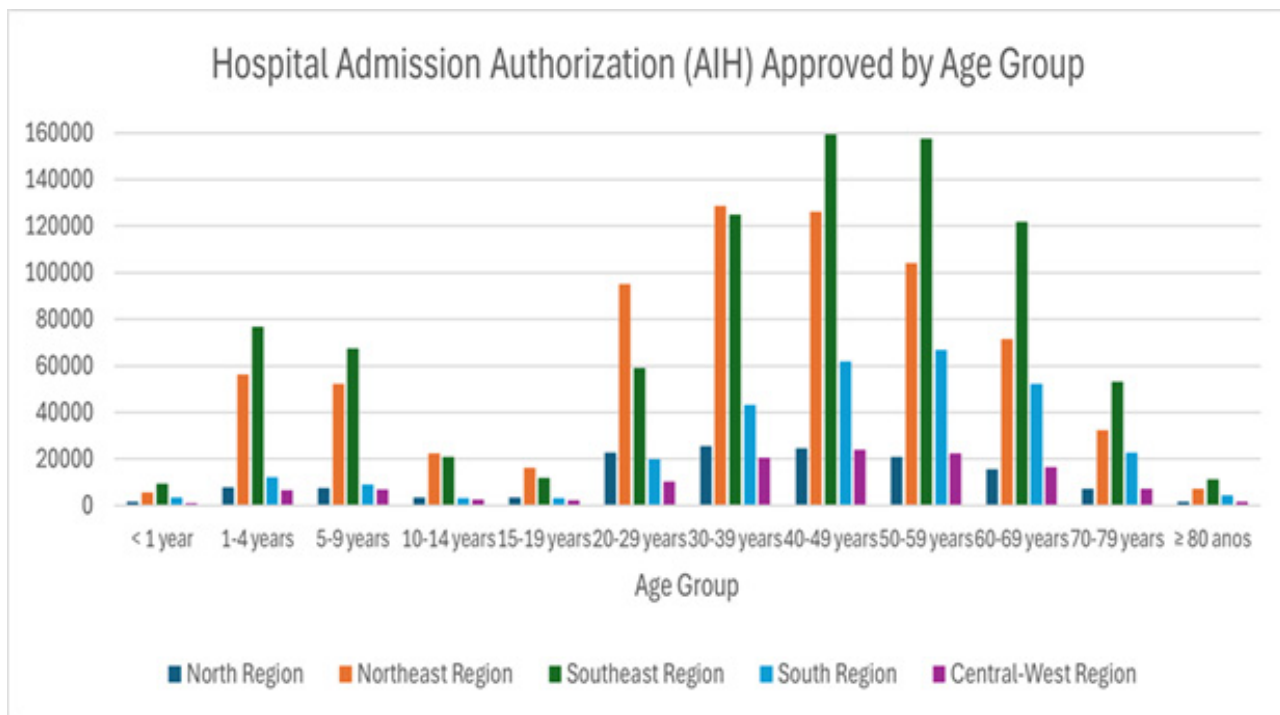
Starting in 2022, there was a resumption in surgical volume, with 97,010 procedures recorded, followed by a growth trend, ending in 2024 with the highest number of procedures in the historical series, a total of 126,665 herniorrhaphy procedures performed that year.

The Southeast region had the highest number of procedures, totaling 563,644, which corresponds to approximately 39% of the national total. It is the economically richest region in the country. Next is the Northeast Region, with 538,074 procedures (37%), followed by the South Region, with 167,137 (11%), the North Region, with 98,367 (6%), and finally the Central-West Region, with 77,739 surgeries performed (5%).



A balanced distribution between sexes was observed, with 51% of procedures performed on female patients and 49% on male patients. The 30-59 age group accounted for the highest proportion of cases, representing 51% of the total, with the 40-49 age group alone accounting for 18% of records. Regarding the color/race variable, the brown

population was the most representative, corresponding to 40% of cases, followed by the white population, with 30%. The black population represented 3%, while the yellow and indigenous categories together accounted for less than 2% of the records—it is important to note that in 23% of cases, there was no information recorded regarding color/race.



The total expenditure was \$150,154,049.40 over the period analyzed, with an average cost of \$100.10 per procedure. Among the subgroups evaluated, open epigastric hernioplasty stood out, with the highest average cost, reaching \$131.60 per procedure, while its laparoscopic approach had a lower average cost of \$94.50. For umbilical hernioplasty, this pattern was also repeated, with the open technique being more expensive, with an average cost of \$96.10, while the laparoscopic approach had an average cost of \$78.30 per procedure.

In the analysis by region, the South recorded the highest average cost per procedure (\$109.40), followed by the Midwest (\$102.00). The Southeast and North regions had similar average costs, both around \$98.00. From a temporal perspective, there was a trend of progressive increase in the cost of hernioplasties. In 2008, the average cost per procedure was \$70.30, while in 2024 this figure reached \$145.50, representing more than double the initial cost.

Regarding the average length of hospital stay, a general average of 1.85 days was observed over the period analyzed. In the evaluation of the subgroups, a pattern was observed in which procedures performed laparoscopically resulted, on average, in a longer hospital stay compared to the open approach. Specifically, epigastric hernioplasty had an average length of stay of 1.6 days for the open technique and 2.6 days for the laparoscopic technique. For umbilical hernioplasty, these averages were 1.4 days and 1.8 days, respectively. From a longitudinal perspective, a trend toward stability was observed over the years, with a reduction in the average

length of stay recorded in 2024, which reached 1.4 days.

There were 1,504 deaths during the period analyzed, of which 68% were related to umbilical hernioplasty. The overall mortality rate, considering all hernioplasties analyzed, was 0.23%. Emergency procedures accounted for 80% of deaths related to epigastric hernioplasty. This condition directly impacted the specific mortality rate for this category, which reached 0.57% — more than double the overall mortality rate observed for hernioplasty as a whole.

DISCUSSION

Over the 16 years analyzed, umbilical and epigastric hernioplasty proved to be extremely frequent procedures in the SUS, reflecting the relevance of these conditions in Brazilian surgical practice, as already pointed out in the international literature. 2,5 The fact that umbilical hernias account for about 77% of all procedures reaffirms their higher prevalence in certain population groups, especially adults with risk factors such as obesity, multiparity, and collagen disorders [6].

When observing the regional distribution of these surgeries, the concentration of cases in the Southeast (39%) and Northeast (37%) regions is noteworthy. Although these figures are in line with the higher population density in these regions, the contrast with the North and Midwest, which together account for less than 12% of procedures, raises important questions about structural inequalities in access to surgical care, as already discussed by other authors. 3.14 The lack of supply in these regions may end up contributing

to the worsening of clinical conditions and the consequent need for emergency approaches, which, in turn, directly affects postoperative outcomes.

In this regard, one of the most sensitive findings of this study was the mortality associated with emergency epigastric hernioplasty. Although the overall mortality rate is considered low, at around 0.23%, procedures performed outside the elective context accounted for 80% of deaths in this subgroup, with a specific rate of 0.57%. These data reinforce previous findings that link the emergency approach to higher risks of complications, especially when there are comorbidities, infections, or instability [7,13].

The impact of the COVID-19 pandemic on surgical services is also clearly reflected in this study. The nearly 50% drop in the number of procedures in 2020, with only 46,012 surgeries performed, reflects the effects of the suspension of elective surgeries and the reorganization of the system to prioritize care for the health crisis. This phenomenon has been widely documented in the literature [10,11]. The gradual recovery observed from 2022 onwards, culminating in 2024 with the highest number of herniorrhaphy procedures in the historical series, indicates the efforts made by services to absorb pent-up demand, even though this represents a considerable logistical and financial challenge for the SUS.

From an economic point of view, the analysis of the average cost per procedure shows a consistent increase over the period, from \$70.30 in 2008 to \$145.50 in 2024. This increase may reflect accumulated inflation, updates to the remuneration table, and greater use of inputs and technologies. However, a particularly interesting finding is that laparoscopic surgeries, traditionally seen as more expensive, had a lower average cost than open techniques for both epigastric and umbilical hernias. While the open epigastric approach had an average cost of \$131.60, the laparoscopic approach cost \$94.50. For umbilical hernias, the open technique had an average cost of \$96.10, while the laparoscopic technique had a lower cost of \$78.30. These results are consistent with studies that highlight the potential clinical and economic benefits of minimally invasive techniques, especially when used appropriately and with trained teams [9,10].

On the other hand, the average length of hospital stay was slightly longer for laparoscopic procedures, which may seem contradictory in light of the literature, which often associates this approach with shorter hospital stays [10]. However, in Brazilian practice, this difference may be related to a number of contextual factors, such as the complexity of the cases

selected for minimally invasive approaches, the learning curve of the teams, or even different institutional routines. The stability of the overall average length of stay over time, with a downward trend starting in 2022 and the lowest value recorded in 2024, at 1.4 days, suggests a possible positive evolution in hospital management, with greater efficiency in discharge flows.

Another point worth noting is the limitation of SIH/SUS data in accurately identifying the surgical techniques used. Despite growing interest in more modern approaches, such as eTEP, which allows the mesh to be placed in the retromuscular plane and has low recurrence rates, these techniques are not yet adequately coded in official databases. This represents a significant barrier to monitoring technical progress in healthcare practice and reinforces the need to update databases, as already pointed out by other authors [14].

It is also worth mentioning the significant number of records without information on color or race, present in 23% of cases. This gap not only compromises epidemiological analysis with an ethnic-racial focus, but also limits the formulation of public policies aimed at equity. Ensuring the completeness and standardization of these variables is essential for a truly inclusive and representative health system.

CONCLUSION

Epigastric and umbilical herniorrhaphy remain high-demand procedures in the SUS. Despite the predominance of open approaches, the data show that laparoscopy can be an effective and economically advantageous alternative. The increase in mortality in emergency surgeries reinforces the importance of early and elective management. To improve clinical outcomes and optimize resources, it is essential to invest in the modernization of techniques, the training of professionals, and equitable access among different regions of the country.

ACKNOWLEDGEMENTS

None.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

REFERENCES

1. Brooks DC, Petro CC. (2023). Management of Ventral Hernias. Available at: <https://www.uptodate.com/contents/management-of-ventral-hernias/print?search=Management>

2. Brooks DC. (2024). Overview of Abdominal Wall Hernias in Adults. Available at: www.uptodate.com
3. Shah SK, Liang MK. (2025). Laparoscopic Ventral Hernia Repair. Available at: www.uptodate.com
4. Scheuerlein H, Thiessen A, Schug-Pass C, Köckerling F. (2018). What Do We Know About Component Separation Techniques for Abdominal Wall Hernia Repair? *Front Surg*. 5:24.
5. Pauli EM, Rosen MJ. (2013). Open ventral hernia repair with component separation. *Surg Clin North Am*. 93(5):1111-1133.
6. Alves JR, Spengler LFM, Justino LB, Justino GB, Silva IK, Amico EC. (2024). UMBILICAL AND EPIGASTRIC HERNIA REPAIR: A SYSTEMATIC REVIEW. *Arq Bras Cir Dig*. 37:e1807.
7. Dunne JR, Malone DL, Tracy JK, Napolitano LM. (2003). Abdominal wall hernias: risk factors for infection and resource utilization. *J Surg Res*. 111(1):78-84.
8. Sanders DL, Kingsnorth AN. (2012). From ancient to contemporary times: a concise history of incisional hernia repair. *Hernia*. 16(1):1-7.
9. Faylona JM. (2017). Evolution of ventral hernia repair. *Asian J Endosc Surg*. 10(3):252-258.
10. Mason RJ, Moazzez A, Sohn HJ, Berne TV, Katkhouda N. (2011). Laparoscopic versus open anterior abdominal wall hernia repair: 30-day morbidity and mortality using the ACS-NSQIP database. *Ann Surg*. 254(4):641-652.
11. Minatti WR, Rosales A, Mugianesi E, Bertani DJ. (2024). Proposal for encoding the surgical treatment in abdominal wall pathology based on a multidimensional analysis of history. *Hernia*. 28(5):1789-1808.
12. Quezada N, Grimoldi M, Besser N, Jacobovsky I, Achurra P, Crovari F. (2022). Enhanced-view totally extraperitoneal (eTEP) approach for the treatment of abdominal wall hernias: mid-term results. *Surg Endosc*. 36(1):632-639.
13. Earle DB, McLellan JA. (2013). Repair of umbilical and epigastric hernias. *Surg Clin North Am*. 93(5):1057-1089.
14. Blatnik JA, Michael Brunt L. (2019). Controversies and Techniques in the Repair of Abdominal Wall Hernias. *J Gastrointest Surg*. 23(4):837-845.
15. Hodgkinson JD, Leo CA, Maeda Y, Bassett P, Oke SM, Vaizey CJ, et al. (2018). A meta-analysis comparing open anterior component separation with posterior component separation and transversus abdominis release in the repair of midline ventral hernias. *Hernia*. 22(4):617-626.
16. Howard R, Ehlers A, Delaney L, Solano Q, Shen M, Englesbe M, et al. (2023). Hospital-level variation in mesh use for ventral and incisional hernia repair. *Surg Endosc*. 37(2):1501-1507.