ORIGINAL ARTICLE

Epidemiological analysis of hysterectomies performed at the public health system in the largest Brazilian city

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SUMMARY

OBJECTIVE: To analyze the public data of hysterectomies performed in the only health system in the city of São Paulo between 2008 and 2018.

METHODS: The following public health system data were extracted and analyzed: age, technique, number of surgeries, mortality during hospitalization, length of stay in the establishment (days), and amounts paid by the public network.

RESULTS: A total of 20,119 procedures were analyzed. The most prevalent procedure was total hysterectomy (43.2%), followed by vaginal hysterectomy (26.7%), subtotal hysterectomy (24.3%), and laparoscopic hysterectomy (5.8%). Early discharge (hospital stay of up to 1 day) was more prevalent in cases of vaginal hysterectomy (39%). We observed a marked downward trend in the number of total hysterectomies. Total hysterectomy was the most expensive procedure; no significant difference was noted in the cost of vaginal versus laparoscopic hysterectomy. We noticed a trend of rising costs over the years. The most frequent hospital admission code was that of leiomyoma of the uterus in cases of total, subtotal, and laparoscopic hysterectomy.

CONCLUSION: Despite the decrease in the number of hysterectomies over the 11-year study period in São Paulo, it remains in high demand mainly for the treatment of uterine leiomyomatosis. Laparoscopic hysterectomy has been gaining ground and showed a slightly upward trend with a shorter hospital stay. Laparoscopic and vaginal hysterectomy required less financial support from the health system than open surgery.

KEYWORDS: Big data. Database. Hysterectomy. Public health.

INTRODUCTION

Hysterectomy, the surgical removal of the uterus, is among the most prevalent gynecological surgeries worldwide[1]. Most hysterectomies (70%) are performed for the treatment of benign diseases such as abnormal uterine bleeding, symptomatic uterine fibroids, adenomyosis, and uterine prolapse[2]. In benign diseases, surgery is considered after clinical treatment failure occurs[3].

Hysterectomy can be performed through abdominal, vaginal, laparoscopic, or robot-assisted routes[3] and can be total (if the uterus is entirely removed) or subtotal (if the cervix is preserved)[4]. Multiple variables influence the choice of the benign hysterectomy surgical route according to the surgeon's technical skills and the patient's condition, such as uterine volume, parity, presence of extrauterine pelvic diseases, and history of previous pelvic surgery.

Although hysterectomy is frequently performed, few studies in Brazil have analyzed its epidemiological data from a single large city. Thus, this study aimed to describe the epidemiological aspects of hysterectomies performed between 2008 and 2018 in the city of São Paulo using publicly available data from the Brazilian Public Health System (SUS).

METHODS

The study analyzed data accessible on the TabNet platform belonging to the DATASUS system[5], which provides information on the procedures performed in hospitals at the SUS. The platform has 22 selections for rows, 16 for columns, and 8 for content, providing 2,816 possible formatting combinations separated by monthly periods. The study was conducted at Albert Einstein Israelite Hospital and approved by the institution's research ethics committee.

Data referring to hysterectomies were selected from January 2008 to December 2018 from the TabNet app of the Municipal Health Department of São Paulo. A total of four procedures were analyzed and coded using the SIGTAP codes (SUS Procedures Table, Medicines, and OPM Table Management System): total hysterectomy (04.09.06.013-5), subtotal hysterectomy (04.09.06.012-7), laparoscopic hysterectomy (04.09.06.015-1), and vaginal hysterectomy (04.09.06.010-0).

Data including number of surgeries, age group, mortality during hospitalization, length of hospital stay, and amount paid were analyzed. Four groups were formed to verify the association between procedure type and age: less than 20 years, 20–39 years, 40–59 years, and 60 years or older. Patients were classified according to the International Classification of Diseases, 10th revision (ICD-10) codes reported at the time of hospital admission.

The results were collected using software to access the site content and turn it into web scraping codes. After collection and treatment, the data were organized and grouped in a spreadsheet within Microsoft Office Excel 2016® (v. 16.0.4456.1003, Redmond, WA, USA).

The data were described as absolute and relative frequencies. Comparisons by procedure type were made using the chi-square test[6]. The evolution of procedures and costs over the years were evaluated by generalized estimating equation (GEE) models using the negative binomial and gamma distributions, both with a logarithmic link function[7]. A significance level of 5% was considered, and the analyses were performed using statistical packages R[8] and SPSS v26.0[9].

RESULTS

The search determined that 20,119 procedures were performed between January 2008 and December 2018, with total hysterectomy as the most prevalent (43.2%), followed by vaginal hysterectomy (26.7%), subtotal hysterectomy (24.3%), and video-laparoscopic hysterectomy (5.8%). The analysis of procedural data by age group showed the highest prevalence was in the 40–49 years, corresponding to 54.1% of the procedures.

The results indicated significant differences in hysterectomy types among the age groups, with vaginal hysterectomy being the most frequent surgical route among patients over 60 years of age (82.7%) and total hysterectomy (41–48%) being the most common in the other age groups. The difference was statistically significant (p<0.001).

The relationship between procedure type and length of hospital stay was also statistically significant (p<0.001). Figure 1 shows the distribution of length of stay among the procedure types as percentages. For all procedures, the most frequent hospital length of stay was 2–3 days, while the highest prevalence of early discharge (on the same day or just 1 day after surgery) occurred in the video-laparoscopic hysterectomy group (5.08%).

The death rate for hysterectomies was 1.19 per 1,000 procedures. There were no deaths in the video-laparoscopic surgery group. Mortality was more prevalent in the subtotal (2.25 per 1,000) and total (1.38 per 1,000) hysterectomy groups (p=0.012).

Figure 2 shows that during the study period, there was a marked decrease in the number of total hysterectomies performed and a less accentuated decrease in the number of vaginal hysterectomies performed. The graph also shows a subtle increase in use of the laparoscopic approach. The annual change in the number of procedures was estimated using GEE models that considered the negative binomial distribution and used the year as a covariate to analyze how the numbers changed over time. The estimated mean ratio (MR) indicated a downward trend in the number of vaginal (MR=0.883; p<0.001), subtotal (MR=0.961; p=0.053), and total (MR=0.883; p<0.001)
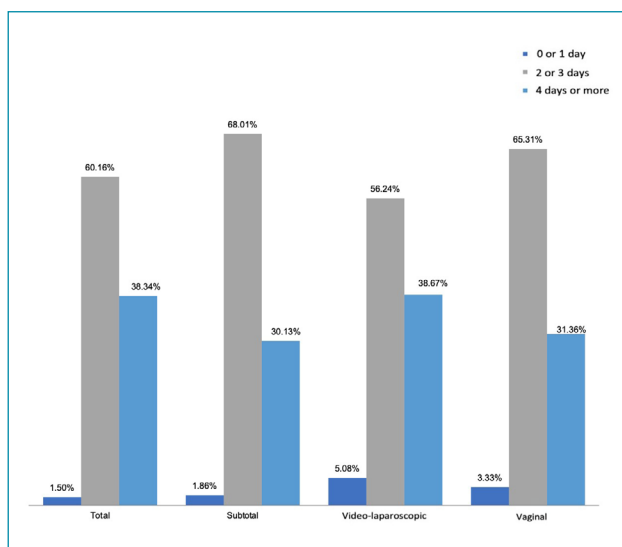

Figure 1. Length of hospital stay in days classified by procedure type.

hysterectomies versus an upward trend in the number of video-laparoscopic hysterectomies (MR=1.070; p=0.158).

The costs of the procedures and their behaviors over the years were also analyzed (Figure 3). The most expensive procedures were total hysterectomies; no significant difference was noted in the costs of vaginal versus laparoscopic hysterectomies. In addition, the data showed a trend of rising costs over the years. However, in 2016, there was an atypical decrease in costs, especially for total hysterectomy. There was a significant cost increase over the years compared with 2008, with the exception of vaginal hysterectomy (p>0.05).

During the survey, the ICD codes from the hospital admission for hysterectomies were also considered. The most frequent ICD code was uterine leiomyoma for total, subtotal, and laparoscopic hysterectomy, reaching 86, 89, and 78%, respectively. In vaginal hysterectomies, the most prevalent ICD was pelvic organ prolapse (54.7%). Other diseases were also documented, such as endometriosis, pelvic varices, and abnormal uterine bleeding; however, their incidence did not reach 5% of cases.
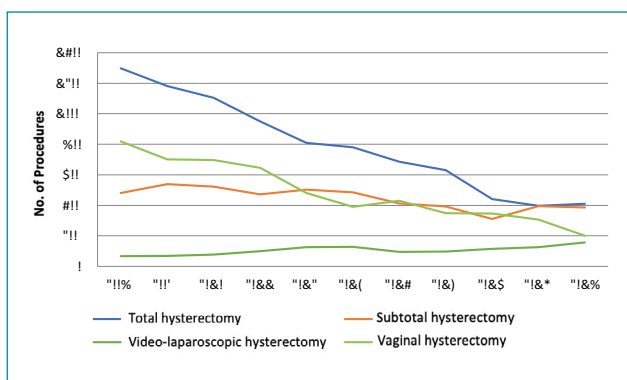

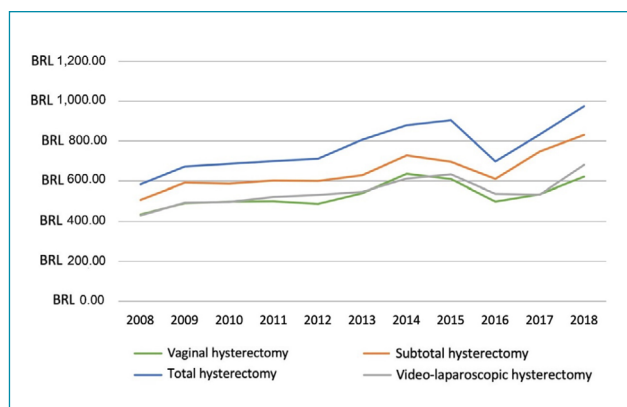**Figure 2.** Number of procedures analyzed, 2008–2018.

Figure 3. Values transferred by SUS (Brazilian public health system) per procedure for all hospitals analyzed, 2008–2018.

DISCUSSION

The increase in procedures performed between 2008 and 2018 indicated a marked downward trend in the number of total hysterectomies. This trend was reported by other studies, including in Brazil, in which data on hospitalizations for hysterectomies between 2008 and 2017, available at DATASUS, for the five regions of Brazil were analyzed, totaling 1,004,668 hysterectomies during that period. This period also presented a decreasing number of hysterectomies (16%), with the Southeast region showing the greatest downward trend[10]. This decrease was probably due to patients' access to less invasive or nonsurgical treatments, such as the use of the levonorgestrel intrauterine device and surgical hysteroscopy. These data show a positive perspective that the reduction of surgeries may be due to successful clinical control of gynecological symptoms.

The increasing trend of video-laparoscopic hysterectomies demonstrates a beneficial technological transition. Despite the upward trend, the total value in São Paulo remained low as laparoscopic devices are more commonly available in private hospitals and the number of gynecologists skilled at this procedure type is small. A cohort study conducted in the United States that analyzed 264,758 women undergoing hysterectomy for benign diseases showed a prevalence of 40% for laparoscopic hysterectomies; 46% of the patients were discharged on the same day[11].

Hysterectomy was the most commonly performed in the 40–49 years age group, corresponding to 54.1% of the procedures. However, vaginal hysterectomy was the most common surgical route in patients aged 60 years or above (82.7%). These data were corroborated by those of different studies that also observed a predominance of surgeries performed in women aged 40–49 years[12]. This predominance may have been caused by the high prevalence of uterine leiomyoma in women in this age group[13].

The length of stay can be a measure of health care efficiency[14]. The most frequent hospital length of stay for all procedures was 2–3 days, and early discharge (hospital stay up to 1 day) was more prevalent in vaginal hysterectomies (39%). The literature corroborates these data, showing that a prolonged hospital stay is less common after minimally invasive and vaginal hysterectomies. An American study that identified 157,589 women undergoing benign hysterectomy from 2006 to 2015 indicated that intraoperative factors were the most important contributors to length of stay in laparoscopic and abdominal hysterectomy, while demographic factors such as age and ethnicity dominated in vaginal hysterectomy[15].

The overall mortality rate in this study was 1.19 per 1,000 procedures, being more prevalent in subtotal (2.25 per 1,000) and total (1.38 per 1,000) hysterectomies. In the literature,

the described overall mortality rate of hysterectomy for benign diseases is about 0.4 per 1,000 cases[16]. The mortality rate analyzed in the present study refers only to data collected during hospitalization; our use of anonymous information prevented the identification of deaths after hospital discharge.

The present study has some limitations because the comparison in the literature included in-hospital and out-of-hospital mortality data. Another limitation is the fact that 673 patients (3.34%) had malignant diseases. There are some SITGAP-specific codes for oncologic hysterectomies; however, they were not used to describe the surgery performed, causing study selection bias.

The monetary value provided by the SUS for total hysterectomies was higher than those for laparoscopic and vaginal procedures with a tendency for increasing costs over the years. Results similar to the current cost analysis studies indicate that vaginal hysterectomy is the most cost-effective route and laparoscopic hysterectomy can be cost-effective compared with open surgery[17]. The length of hospital stay, use of disposable surgical devices, and length of operating room stay are the main determinants of hospital costs[18]. One of the limitations of this study is the fact that the SUS has a remuneration table for procedures that usually do not reflect the real cost. Therefore, the monetary analysis was based only on the financial volume provided by the SUS and does not necessarily indicate the full hospital expenses. Additional limitations are the scarcity of information about reoperation and the analysis of patient mortality rates after hospitalization. These are secondary limitations due to the anonymity of the data available in a government information database.

Finally, uterine leiomyoma was the most frequent ICD code for the procedures (proportion higher than 75%), with the exception of vaginal hysterectomies, for which pelvic organ prolapse was more common (54.7%). The literature corroborates this finding, presenting uterine myomatosis as the main indication for hysterectomy. However, pelvic organ prolapse predominates as the indication for hysterectomy in postmenopausal women, with vaginal hysterectomy as the most commonly chosen surgical route[19].

CONCLUSIONS

Conducting studies that trace epidemiological profiles of diseases and the analysis of trends in a particular type of procedure, costs, length of stay, among others, are important from the perspective of public health planning and resource allocation.

The present study demonstrated a decrease in the number of hysterectomies over time, possibly related to the increasing effective use of clinical methods to control symptoms. In addition, considering the surgical procedures analyzed, laparoscopic hysterectomy has been gaining ground and showed a slight upward trend and shorter hospital stay in addition to lower cost than total hysterectomy.

New analyses must be conducted to trace the epidemiological profile of and treatment methods for gynecological diseases to provide tools for the management and planning of public and private health care resources in Brazil.

AUTHORS' CONTRIBUTIONS

CFA: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing– original draft, Writing – review & editing. **DBC:** Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing– original draft, Writing – review & editing. **SP:** Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing– original draft, Writing – review & editing.

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