



# Impacts of the COVID-19 pandemic on surgical specialties at a university hospital in Bahia: a retrospective cross-sectional study

## *Impactos da pandemia de COVID-19 nas especialidades cirúrgicas em um hospital universitário da Bahia: um estudo transversal retrospectivo*

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### ■ ABSTRACT

**Introduction:** Since the beginning of the COVID-19 pandemic, medical specialties have adapted their routine, postponing non-essential procedures, which resulted in a reduction in the number of surgical visits, directly impacting teaching hospitals. This work aims to evaluate the impact of the COVID-19 pandemic on the activities of the surgical specialties at the University Hospital Professor Edgard Santos (C-HUPES), located in Salvador-BA. **Method:** Observational, cross-sectional, retrospective study, which compares the year 2020 to the year 2019, in which the impacts of the pandemic on the surgical activities (especially plastic surgery) of the hospital are analyzed through the total number of procedures, hospitalizations, and outpatient consultations of surgical specialties. **Results:** A reduction of 45,45% of the total number of surgical procedures was observed, with 220 surgeries in 2019 and 120 surgeries in 2020. Reduction of 37,29% in hospitalizations, totaling 236 in 2019 and 148 in 2020. There was a decrease of 40,90% in outpatient consultations, with 2941 consultations performed in 2019 and 1738 consultations in 2020. It is noticed that the worst periods of reduction in 2020 were from March to June, in addition to a new drop in November and December. **Conclusion:** The pandemic impacted the activities of the surgical specialties at C-HUPES due to the total reduction in the number of surgeries, consultations, and hospitalizations in 2020, impairing the care of plastic surgery patients in absolute numbers. It is inferred that the COVID-19 pandemic hampered the training of plastic surgery residents.

**Keywords:** COVID-19; Surgery, plastic; Reconstructive surgical procedures; Health evaluation; Hospitals, university; Pandemics.

### ■ RESUMO

**Introdução:** Desde o início da pandemia de COVID-19, as especialidades médicas adaptaram sua rotina, postergando procedimentos não essenciais, o que resultou em redução no número de atendimentos cirúrgicos, impactando diretamente nos hospitais de ensino. O objetivo desse trabalho é avaliar o impacto da pandemia de COVID-19 nas atividades das especialidades cirúrgicas do Hospital Universitário Professor Edgard Santos (C-HUPES), localizado em Salvador-BA. **Método:** Estudo observacional, transversal, retrospectivo, que compara o ano de 2020 ao ano de 2019, em que são analisados os impactos da pandemia nas atividades cirúrgicas (especialmente na cirurgia plástica) do hospital, através do número total de procedimentos, internações e de consultas ambulatoriais das especialidades cirúrgicas. **Resultados:** Redução de 45,45% no número total de procedimentos cirúrgicos foi observada, havendo um total de 220 cirurgias em 2019 e 120 cirurgias em 2020. Redução de 37,29% no número total de internamentos, total de 236 em 2019 e 148 em 2020. Observou-se diminuição de 40,90% nas consultas ambulatoriais, realizadas 2941 consultas em 2019 e 1738 consultas

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em 2020. Percebe-se que os piores períodos de redução em 2020 foram de março a junho, além de nova queda em novembro e dezembro. **Conclusão:** A pandemia impactou as atividades das especialidades cirúrgicas do C-HUPES, devido à redução total da quantidade de cirurgias, consultas e internamentos em 2020, prejudicando a assistência aos pacientes da cirurgia plástica em números absolutos. Infere-se que a pandemia de COVID-19 prejudicou a formação dos residentes de cirurgia plástica.

**Descritores:** COVID-19; Cirurgia plástica; Procedimentos cirúrgicos reconstrutivos; Avaliação em saúde; Hospitais universitários; Pandemias.

## INTRODUCTION

Since the beginning of the COVID-19 pandemic, the world has faced major challenges to contain its advance, elucidate its treatment and adapt to the impacts generated on health, education, and the economy. The event was first publicized in November 2019 in Wuhan, China. In March 2020, the World Health Organization (WHO) declared a public health emergency of international concern regarding this viral pathogen<sup>1</sup>. The Ministry of Health confirmed the first case in Brazil on February 26, 2020<sup>2,3</sup>.

Almost all medical specialties adapted their routine and procedures to face the emerging challenge, postponing non-essential and outpatient consultations, which resulted in a sharp reduction in elective surgeries, including in teaching hospitals<sup>4</sup>. The CDC (Centers for Disease Control and Prevention) and the American College of Surgeons have recommended canceling elective procedures<sup>5</sup> in private, public, and academic settings. To perform the surgeries, preoperative tests, a reduced surgical team, distancing during intubation and extubation, and complete clothing with personal protective equipment<sup>6</sup> were indicated.

The *Sociedade Brasileira de Cirurgia Plástica (SBCP)*, on March 16, 2020, recommended the suspension of elective surgeries throughout the national territory, following the guidelines of the WHO and the Ministry of Health, aiming to minimize viral transmission and save essential materials<sup>7</sup>.

Under normal conditions, the University Hospital Professor Edgard Santos (C-HUPES) under study, located in the city of Salvador-BA, annually performs an average of 308,147 consultations in the various specialties, 550,531 therapeutic and diagnostic consultations, 9557 hospitalizations, and about 8964 surgeries<sup>8</sup>. We believe there is a reduction in these numbers, as seen in the work by Kara et al.<sup>9</sup> and also observed in the study by Pagotto et al.<sup>2</sup>, in which there was a significant reduction in plastic surgery consultations in a Brazilian university hospital at the Faculty of Medicine of the University of São Paulo compared to pre-pandemic periods in 2019.

In this context, the COVID-19 pandemic did not allow professionals to prepare to experience it, organizing services for health, financial and educational impacts. Despite this, studies have shown that, among the surgical specialties, the lowest risk was presented by plastic surgery, which had no serious postoperative conditions due to COVID-19, without hospitalizations and deaths<sup>9</sup>.

## OBJECTIVE

The objective of this study is to evaluate the impact of the COVID-19 pandemic on the activities of surgical specialties at the University Hospital Professor Edgard Santos, located in Salvador-BA, as well as to evaluate the impact of the pandemic on the care of plastic surgery patients and teaching-learning in the same hospital and period analyzed. The mission of C-HUPES is to be a nationally recognized institution of excellence in teaching, research, and assistance. Even with the change in medical training during this period, the concern with the impacts on practical training could not be disregarded.

## METHOD

This is a cross-sectional, retrospective, observational study that compares the year 2020 to the year 2019, analyzing the impacts of the COVID-19 pandemic on the activities of the surgical specialties of C-HUPES. The absolute monthly frequency of surgical procedures, hospitalizations, and outpatient consultations was evaluated considering the period from January to December 2019 compared to a similar period in 2020. In 2020 there was a suspension of activities and a material crisis, and 2019 was the base year pre-pandemic and material crisis.

## Sample Allocation

This is the population of patients undergoing surgical care at C-HUPES in 2019 and 2020. Data collection was provided by the Care Information

Processing, Monitoring and Evaluation Unit (UPIAMA) and the Surgical Center Unit. Data were collected and processed through spreadsheets specific to the sectors of origin.

## Materials

Variables analyzed in 2020 compared to 2019:

- Monthly number of outpatient consultations for each surgical specialty;
- Monthly number of hospitalizations for each surgical specialty;
- Monthly number of surgical procedures performed by each specialty.

## Inclusion criteria

The population of patients attended by the various surgical specialties at the university hospital in the analyzed period, 2019 and 2020.

## Exclusion criteria

Patients not treated by the surgical specialties during the analyzed period were excluded from the study.

## Statistical analysis

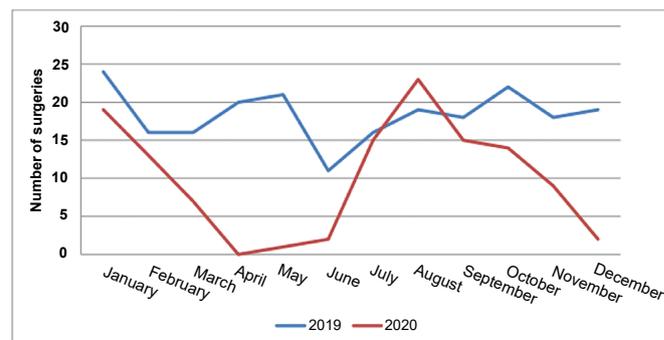
Using the electronic spreadsheet (LibreOffice Calc) and population data extracted from the AGHU Reports program provided by the Surgical Center Unit and by UPIAMA, the absolute and relative frequencies of surgeries, hospitalizations, and outpatient consultations, monthly of all surgical specialties of the C-HUPES comparing the years 2020 and 2019, assessing whether there was an increase or decrease in activities. The relative frequency in the percentage of activities performed by plastic surgery through surgical procedures, hospitalizations, or consultations was also calculated, comparing this specialty to other surgical specialties and evaluating the reduction or increase in 2020 compared to 2019.

## Ethical aspects

The project was evaluated by the Research Ethics Committee (CEP) of the Professor Edgar Santos University Hospital of the Federal University of Bahia following the Guidelines and Regulatory Norms for Research Involving Human Beings - Resolution 466/12 of the CNS (National Health Council) and approved under CAAE 52923521.5.0000.0049 published on Plataforma Brasil.

## RESULTS

There was a 45.45% reduction in the number of plastic surgeries, with a total of 220 surgeries in 2019 and 120 surgeries in 2020. It is noticed that the worst period of reduction was from March to June 2020, being in March 56, 25%, April 100%, May 95%, and June 81.82%, and a new fall in November (50%) and December (89.47%). We noticed recovery from July to October, still with a lower quantity in 2020 compared to 2019, except for August, when there was a 21.05% increase in surgeries (19 procedures in 2019 and 23 in 2020) (Figure 1).

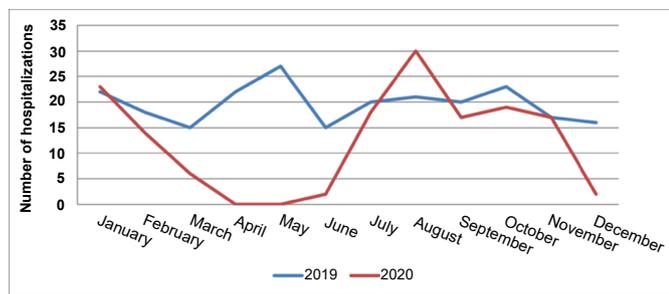


**Figure 1.** Number of plastic surgeries performed each month in 2019 (blue line) and 2020 (red line) at Professor Edgard Santos University Hospital.

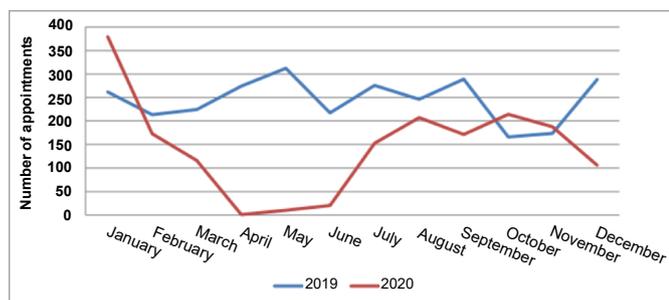
There was a 37.29% reduction in hospitalizations, 236 in 2019 and 148 in 2020. A reduction in hospitalizations can be seen from March to June and December: in March, 60%, April 100%, May 100%, June 86.67%, and December 87.5%. In August, there was a peak in hospitalizations, representing an increase of 42.86% in 2020 compared to 2019 (Figure 2).

Regarding the number of outpatient consultations, there was a total decrease of 40.90%, as 2941 consultations were carried out in 2019 and 1738 consultations in 2020. A more abrupt reduction was observed in the periods from March to July, with a further decrease in December: in March, it reduced by 48.21%; in April, 99.64%; in May, 96.79%; in June, 90.78%; in July 44.57% and in December 63.19% (Figure 3).

Regarding the participation of plastic surgery in the total percentage of surgeries performed by all surgical specialties of the C-HUPES in the years 2019 and 2020, it is identified that plastic surgery in 2019 had average participation of 6.49% of the 3390 procedures performed, and in 2020 average representation of 5.8% of the 2070 procedures performed. In 2020, a large reduction in participation in plastic surgery can be seen in the period from March - June and November - December: March representing 3.78%, April 0%, May 0.98%, June 1.69%, November 4.39%, and December

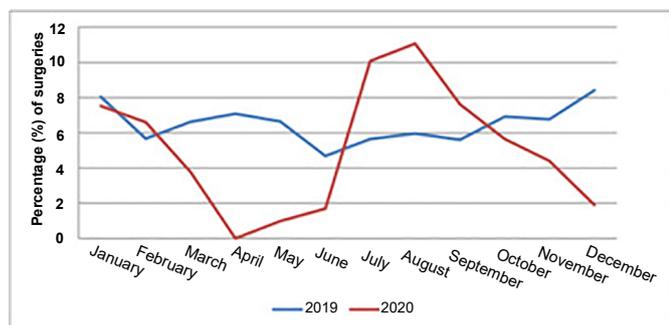


**Figure 2.** Number of plastic surgery hospitalizations at the University Hospital Professor Edgard Santos, monthly, in 2019 (blue line) and 2020 (red line).



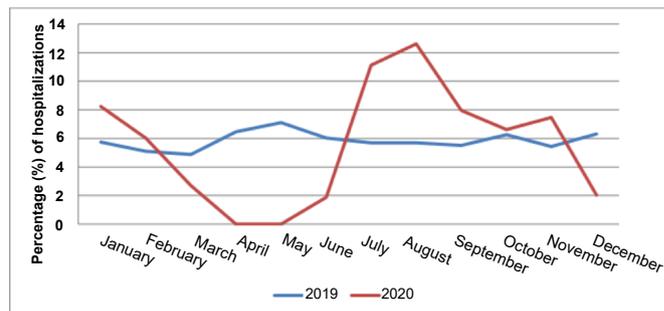
**Figure 3.** Number of monthly outpatient plastic surgery consultations in 2019 (blue line) and 2020 (red line).

1.89%. A peak of participation can also be seen in July at 10.07%, August at 11.06%, and September at 7.61% (Figure 4).



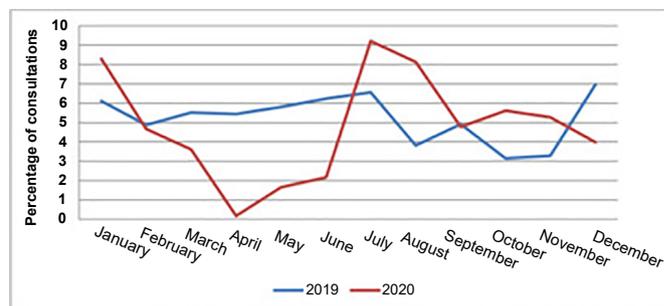
**Figure 4.** Percentage of participation in plastic surgeries concerning the total number of surgeries performed by all surgical specialties at Hospital Universitário Professor Edgard Santos in 2019 (blue line) and 2020 (red line).

Comparing the participation of plastic surgery in the total percentage of hospitalizations, it is identified that in 2019 the specialty had an average participation of 5.85% of the 4035 hospitalizations, and in 2020 an average of 5.54% of the 2258 hospitalizations at C-HUPES. In 2020, the periods with the lowest contribution of plastic surgery to total hospitalizations were: March 2.69%, April 0%, May 0%, June 1.89%, and December 2.02%. The months with the greatest contribution of plastic surgery to total hospitalizations were July and August, with 11.11% and 12.61% (Figure 5).



**Figure 5.** Percentage of plastic surgery hospitalizations concerning total hospitalizations of all specialties in 2019 and 2020.

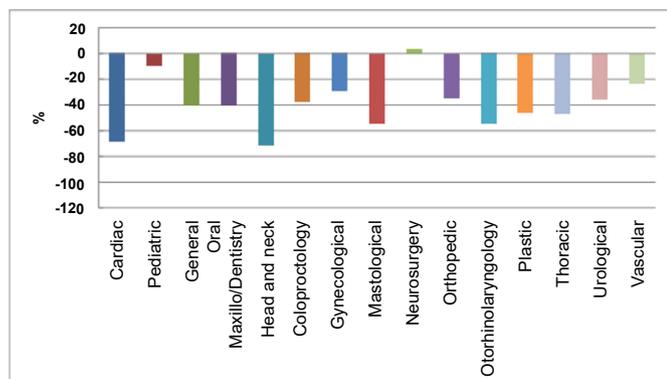
Plastic surgery represented 5.09% of the 57,835 outpatient consultations carried out by all surgical specialties in 2019 and 5.54% of the 31,387 outpatient consultations in 2020. Also, in 2020, in the periods of greatest decrease, plastic surgery represented 3.61% in March; 0.18% in April; 1.67% in May; 2.18% in June, and 3.98% in December. In periods of greater participation, plastic surgery represented 9.21% in July and 8.14% in August (Figure 6).



**Figure 6.** Percentage of plastic surgery consultations concerning the total number of consultations performed by all specialties in 2019 and 2020.

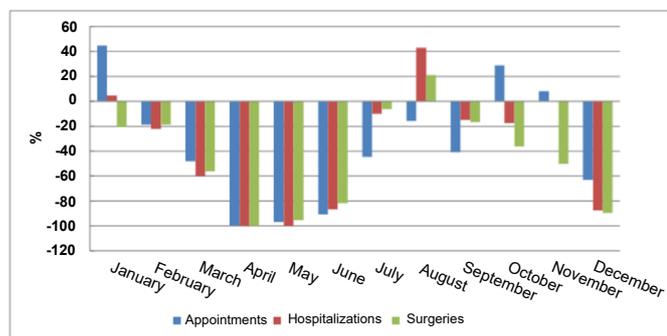
Overall reduction in the number of surgeries (surgical productivity) is identified in the various specialties of C-HUPES in 2020 compared to 2019. The 3 specialties that achieved the greatest reduction are head and neck surgery, with a decrease of 71.08%; cardiac surgery, with 68.69%; otorhinolaryngology, with 54.66%. The 3 specialties with the lowest reduction were: pediatric surgery, with a decrease of 8.91%; vascular surgery, with 22.92%; and gynecological surgery, with 29.08%. Neurosurgery showed an increase of 3.13% compared to the previous year. As previously mentioned, plastic surgery had a 45.45% reduction in surgical productivity (Figure 7).

Plastic surgery maintained congruence in the activities provided in the analyzed period, with similar periods of decline and recovery. It can be seen that the percentage drop in services provided



**Figure 7.** Percentage of change in surgical productivity of all specialties analyzed at Hospital Universitário Professor Edgard Santos, comparing 2020 to 2019.

(outpatient consultations, hospitalizations, and surgical procedures) occurred from March to June, with a recovery period and a smaller percentage drop from July to October. A new period of percentage decline in all services provided is seen in November and December (Figure 8).



**Figure 8.** Percentage change in plastic surgery activities (appointments/hospitalizations/surgeries) monthly comparing 2020 and 2019.

## DISCUSSION

The Complexo Hospitalar Universitário Professor Edgard Santos is a highly complex institution comprising several clinical and surgical specialties, operating primarily on an elective basis, with a limited number of patients because it does not have an urgent/emergency service. This hospital was not converted into an exclusive unit for treating COVID-19; even so, the pandemic brought changes in the services provided by this institution, in line with reports in the literature<sup>7</sup>.

According to Brito et al.<sup>10</sup>, due to operating on a primarily elective basis, the surgical specialties of this institution were affected and changed their medical care since the COVID-19 pandemic had an impact on routines, imposing restrictions in order to reduce the spread of the disease and the overload of the health system. However, this generated losses, as surgical

specialties require face-to-face care, which is essential and cannot be replaced by telemedicine or remote care.

One of the main reasons for delaying elective procedures is the risk of postoperative complications and a worse prognosis for patients who acquire COVID-19. However, the concern with practical training could not be disregarded. The predominant profile of reconstructive surgeries in plastic surgery allowed the continuity of residents' procedures, learning, and practice in plastic surgery, as well as maintenance of care<sup>2</sup>.

Regarding educational impacts, the study by Mehrzad et al.<sup>11</sup> evaluated the changes experienced by plastic surgery programs as a result of the pandemic in a service in Turkey, concluding that academic plastic surgery programs had impactful changes in their operational, educational programming, in teaching and patient care by identifying the following data: Reduction in the average number of surgeries to 23% of the total number of surgeries in the pre-COVID periods; decrease in case volume to approximately 45% of normal and 95.6% reduction in usual workload.

The plastic surgery service at C-HUPES is made up of 5 assistant professors providing services in the areas of outpatient surgery, rhinology, palpebral orbit, post-bariatric reconstructive plastic surgery, hand surgery, microsurgery, complex reconstructions, body contouring and aesthetic surgeries, ear reconstructions, eventually breast reconstructions and oncological reconstructions. This service also has 4 residents per training year (total of 12 residents), selected through a public tender and linked to the Federal University of Bahia, which has the university hospital and other hospitals associated with them as fields of practice throughout the academic year.

All C-HUPES patients are treated on an outpatient basis; cases are discussed with the assistant professors and placed on the agenda according to the waiting list. Usually, there is a prior surgical appointment and pre-hospitalization notice, aiming not to have surgeries suspended due to the unavailability of hospital beds. Surgeries in an urgent/emergency are performed jointly with other specialties or through internal demand through consultations.

Following global practices, as seen in the work of Chi et al.<sup>4</sup>, after the start of the pandemic, essential services were prioritized and elective activities were canceled or postponed. At the university hospital, these standards were defined by Technical Note GVIMS/GGTES/ANVISA No. 06/2020 -Guidelines for the prevention and control of infections by the new coronavirus (SARS-CoV-2) in surgical procedures<sup>6</sup>, published on April 29, 2020, which provided the following information:

"All elective procedures should be carefully reviewed to minimize, postpone, or cancel non-essential elective surgery, endoscopies, or other invasive procedures until the inflection point of the epidemiological curve is passed and a trend stabilizes so that they can be confident that healthcare infrastructure can support a potentially rapid increase in critical patient care needs."<sup>6</sup> "The moment of execution and the risks and benefits of essential and non-essential elective surgical procedures that may have important sequelae due to non-performance of surgery must be carefully evaluated."<sup>6</sup>

This GVIMS/GGTES/ANVISA Technical Note No. 06/2020 also provides information on the resumption of elective surgical procedures:

"It is recommended to resume performing elective surgeries when there is a sustained reduction in new cases of COVID-19 for at least 14 consecutive days in the geographic area, in addition to evaluating other conditions specific to the health service, such as: Availability of a safe number of hospital beds, considering beds in intensive care units (ICU) and regular beds and guaranteeing the existence of PPE, life support equipment and a qualified team to meet the demand"<sup>6</sup>.

In this study, we noticed a significant reduction in surgical activities at the university hospital from March to July 2020, with a more pronounced reduction in April and May, concomitant with the peak periods of the COVID-19 pandemic, called the first wave, in that there was an absolute restriction on all non-essential activities, starting on March 16, 2020, with an average duration of 2 and a half months, until the end of May. There was a further drop in activities at the end of 2020, in November and December, compatible with the occurrence of the second wave of the pandemic due to the new viral strain (delta type), with a peak in infections, hospitalizations, and the need for a new restriction on non-essential services.

There are increases in surgical activities from July to October, with an increase in elective hospitalizations, outpatient consultations, and surgical procedures, showing that the reduction of the pandemic allows the recovery of usual activities and greater flexibility in the execution of non-essential activities, as published by Søreide et al.<sup>12</sup> In the evaluated hospital, the highest number of surgeries is attributed to the confluence of the release of elective procedures, availability of hospital materials, as well as the occurrence of extra surgical shifts, as seen in August 2020, in which absolute productivity exceeds the same period of 2019.

In the months in which there were fewer surgeries than hospitalizations, this was due to the

cancellation of elective procedures due to lack of materials (e.g., gloves, masks, antiseptics materials, sedatives, and neuromuscular blockers) or due to the room rotation, in which other more essential or urgent/emergency procedures were prioritized. In the months in which there were more surgeries than hospitalizations, this was due to the demand for surgeries on inpatients (interconsultations), such as patients from the medical clinic, infectology, ICU who needed reconstruction of wounds or pressure injuries, or patients addressed by other surgical specialties, which required the participation of plastic surgery to close a complex defect<sup>2</sup>.

In November and December, we noticed a change in the profile of activities. In November, the number of hospitalizations remained constant. However, with an abrupt reduction in the number of surgeries, showing surgical cancellations, in December, we noticed a significant reduction in surgeries and hospitalizations, showing new restrictions on elective activities due to the second wave of the pandemic.

Regarding consultations, periods of critical reduction were observed (from April to June) due to the acute phase of the first wave of the pandemic and greater restriction of activities. There is an increase in consultations from July to October, in line with the improvement of the pandemic and the return to non-essential activities, with a new period of decline in November and December - the second wave period. A global reduction in plastic surgery consultations throughout 2020 is evident compared to 2019. This occurred, in general, probably due to the reduction in the number of vacancies made available for outpatient consultations to avoid crowding and less movement of people<sup>5</sup>.

Comparing plastic surgery to other specialties, we noticed a loss in activities due to its predominantly elective profile. However, this specialty was not the most affected in 2020, behind head and neck surgery, cardiac surgery, and otorhinolaryngology. It is believed that other factors have influenced such as, for example, the reduction of team members due to illness, leave, or dismissal; unavailability of special materials that were not prioritized during the pandemic; reduction in the number of patients since many people did not seek health services with problems other than COVID-19; or lack of criteria for surgical indication in the analyzed period<sup>13</sup>. It is also identified that comparatively, the least affected specialties were: neurosurgery,

As seen in the work by Pagotto et al.<sup>2</sup>, which was also carried out in a university hospital, the C-HUPES had a reduction in the absolute total of services provided by all surgical specialties, based on the

reduction in the frequency of surgeries, hospitalizations and outpatient consultations of 2020 compared to 2019. In this context, it is important to highlight that plastic surgery also suffered reductions and increases in its absolute numbers congruent with the fluctuations of the pandemic; however, in percentage, in 2020, the specialty maintained the assistance provided in a similar way to that performed in the previous year, as it was responsible for 5.8% of total surgeries, 6.55% of total hospitalizations and 5.54% of total outpatient consultations, compared to 2019 data: 6.49% of total surgeries, 5.85% of the total number of admissions and 5.09% of the total queries.

According to Mehrzad et al.<sup>11</sup>, who showed changes in the medical residency program in plastic surgery with a decrease of approximately 45% of the pre-pandemic normal<sup>10</sup>, in the plastic surgery service of C-HUPES it was also identified that the COVID-19 pandemic caused 45.45% reduction in the number of surgeries (100 fewer patients were operated on in 2020) and a 40.90% reduction in consultations (1203 fewer outpatient consultations), showing an important impact on the activities provided by residents of this service.

Thus, even with data brought by Teitelbaum et al.<sup>14</sup>, which demonstrated the low risk presented by plastic surgeries during the pandemic, since there were no severe cases of COVID-19 in patients in the postoperative period, without deaths or prolonged hospitalizations, we identified that plastic surgery had a large reduction in consultations, hospitalizations and surgeries in 2020 compared to 2019.

## CONCLUSION

The pandemic impacted the activities of the surgical specialties at C-HUPES, causing damage to the population, as there was a total reduction (in absolute numbers) in the number of surgeries, consultations, and hospitalizations performed in 2020.

The pandemic harmed the care of plastic surgery patients in absolute numbers, as there was a significant reduction in the total number of surgeries, hospitalizations, and consultations performed. However, comparing the assistance provided in 2019, it was noticed that in 2020 plastic surgery maintained a similar percentage of performance compared to the total activities of all surgical specialties of C-HUPES.

It is inferred that the COVID-19 pandemic hampered the training of plastic surgery residents since, in 2020, each plastic surgeon in training operated on a smaller number of patients and performed a smaller number of consultations.

## COLLABORATIONS

- AOLN** Analysis and/or data interpretation, Conception and design study, Data Curation, Formal Analysis, Investigation, Methodology, Project Administration, Writing - Original Draft Preparation, Writing - Review & Editing.
- MSC** Analysis and/or data interpretation, Final manuscript approval, Supervision, Validation.
- LMAV** Writing - Original Draft Preparation, Writing - Review & Editing.
- JVLM** Final manuscript approval, Supervision, Visualization.

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