

Is Emergency Surgery Back to Pre-Covid-19 Era? Our Cohort Study

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Rezumat

Revenirea chirurgiei de urgență la era pre-Covid-19 – un studiu de cohortă

Introducere: Scopul acestui studiu este de a analiza evoluția spitalizărilor și modul în care intervențiile chirurgicale de urgență din Departamentul de Științe Medicale și Chirurgicale al Spitalului Foggia s-au modificat calitativ și cantitativ de la perioada pre-Covid-19 până în prezent.

Metode: Studiul de cohortă a fost realizat prin analiza a patru grupuri de pacienți internați în regim de urgență în departamentul nostru din 2019 până în 2022.

Rezultate: S-a înregistrat un total de 150 de pacienți pentru grupul 1, 25 de pacienți pentru grupul 2, 71 de pacienți pentru grupul 3 și 110 pentru grupul 4; dintre aceștia 20 au fost internați de urgență în 2019, 16 în 2020, 31 în 2021 și 10 în cursul anului 2020 ($p < 0,05$); internările programate au fost în număr de 130 în cursul anului 2019, 9 în cursul anului 2020, 40 în cursul anului 2021 și 100 în cursul anului 2022 ($p < 0,05$). Dintre internările de urgență, 11 au fost operate în perioada pre-Covid-19 în 2019, 14 în cursul anului 2020, 29 în anul 2021 și 6 în anul 2022.

Concluzii: Reducerea spitalizărilor de urgență în timpul primei perioade de izolare a fost însoțită de implicații pozitive. Măsurile aplicate în spitale pentru a limita răspândirea infecției, au determinat o reducere a cazurilor de Covid-19, permițând reluarea aproape completă a activității chirurgicale asigurate în perioada pre-Covid-19.

Cuvinte cheie: Covid-19, chirurgie generală, pandemie, chirurgie de urgență, chirurgie laparoscopică, chirurgie colo-rectală

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Abstract

Introduction: The aim of this study is to analyze the progress of hospitalizations and how the emergency operations in our Department of Medical and Surgical Sciences of the Foggia Hospital have changed qualitatively and quantitatively from pre-Covid-19 to today.

Methods: Our cohort-study was conducted by analyzing four groups of patients admitted in emergency to our department from 2019 to 2022.

Results: We observed a total of 150 patients for the group 1, 25 patients for the group 2, 71 patients for the group 3 and 110 for the group 4, of these 20 were emergency admission during 2019, 16 during 2020, 31 during 2021 and 10 during 2022 ($p<0.05$); 130 were elective admission during 2019, 9 during 2020, 40 during 2021 and 100 during 2022 ($p<0.05$). Of the emergency admissions 11 were operated during the no covid period in 2019, 14 during 2020, 29 during 2021, 6 during 2022.

Conclusions: The contraction of hospitalizations for urgent and emergency conditions during the first lockdown has been accompanied by positive implications. The measures employed in hospitals to contain the infection determined a reduction in COVID cases, allowing the nearly complete resumption of the surgical activity provided in the pre-COVID era.

Key words: COVID-19, general surgery, pandemic, emergency surgery, laparoscopic surgery, colorectal surgery

Introduction

In December 2019, multiple cases of pneumonia of unknown cause were confirmed in Wuhan, China (1). The pathogen was identified from a throat swab sample collected at the Chinese Center for Disease Control and Prevention (CDC) on January 7, 2020. The disease was later named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), and the World Health Organization (SARS-CoV-2 WHO) named it COVID-19, and the World Health Organization (SARS-CoV-2 WHO) named it COVID-19. It presents with a dry cough on imaging. Other clinical symptoms are wheezing, fever, and bilateral pulmonary infiltrates (2-3).

The current generation of healthcare providers has never seen an infectious disease as devastating and widespread as COVID-19, which is caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (4,5). The consequences of this rapid spread have resulted in patients with significant symptoms (especially respiratory disturbances or respiratory failure) seeking care in hospitals that are

normally already at capacity. This wave of acutely ill patients has placed considerable pressure on an already overwhelmed health-care system globally (6).

Although no healthcare system is prepared for an event of this magnitude, hospitals and healthcare systems have begun implementing measures to be specific to any country or region based on current conditions (3,7). As with any other pandemic or mass casualty event, some patients with routine medical and surgical issues still require medical care. Many of these medical or surgical conditions can be treated later.

The number of patients requiring sub-intensive or intensive care has grown exponentially, creating a crisis unprecedented in the post-war period for most of the world's healthcare systems. While populations continue to be affected by a variety of pre-existing conditions, hospitals are so overcrowded with COVID-19 patients that these facilities have established COVID-19 specific wards and hospitals to reassign health workers (HCW) from Non-COVID-19 to COVID-19 intensive and sub-intensive units. In this situation,

most surgical departments are forced to reschedule their activities to prioritize urgent/emergent and non-deferrable oncology cases due to manpower/facilities reductions and virus transmission limitations. Patient prioritization is a complex strategy that presents several organizational and ethical challenges (8,9). The rapid and successful development of a COVID-19 vaccine was the hallmark of this pandemic (10,11) and made it possible to control it (12). There are different types of vaccines, including mRNA, vector and inactivated vaccines, and population studies have demonstrated their success (13-17). The introduction of vaccines, the reduction of COVID cases, and the control of clinical manifestations of infection have resulted in an increase in the number of hospitalizations for benign lesions and elective surgeries. The aim of this study was to analyze the trends in hospitalizations and to analyze the changes in quality and quantity of emergency procedures in the Department of Medicine and Surgery of our Foggia Hospital from 2019 (before the COVID era) to the present.

Materials and Methods

Our cohort-study was conducted by analyzing four groups of patients admitted to the Department of Medical and Surgical Sciences of the Hospital of Foggia, Apulia southern part of Italy:

- group 1: patients admitted during the no-COVID period from March 09th, 2019 to May 09th, 2019;
- group 2: patients admitted from March 09th, 2020 to May 09th, 2020;

- group 3: patients admitted from March 09th, 2021 to May 09th, 2021;
- group 4: patients admitted from March 09th, 2022 to May 09th, 2022.

We considered emergency admissions and their treatments (operated and not-operated), demographic and clinical characteristic of urgently operated patients (sex, age and Clavien-Dindo classification).

The statistical analysis was carried out using Chi-Square test, Standard Deviation and T-test unpaired one tailed.

The UIN for ClinicalTrial.gov Protocol Registration and Results System is: NCT05476315 for the Organization UFoggia (<https://clinicaltrials.gov/ct2/show/NCT05476315>).

Results

From the collected data and the statistical analysis carried out we observed a total of 150 patients for the group 1, 25 patients for the group 2, 71 patients for the group 3 and 110 for the group 4, of these 20 (13.3%) were emergency admission during 2019, 16 (64%) during 2020, 31 (43.7%) during 2021 and 10 (9.1%) during 2022 ($p < 0.05$), 130 (86.7%) were elective admission during 2019, 9 (36%) during 2020, 40 (56.3%) during 2021 and 100 (90.9%) during 2022 ($p < 0.05$) (Table 1).

Of the emergency admissions (20 during 2019, 16 during 2020, 31 during 2021 and 10 during 2022), 11 (55%) were operated during the no covid period in 2019, 14 (87.5%) during 2020, 29 (93.5%) during 2021, 6 (60%) during 2022 (Table 2).

Urgently operated patients were equally

Table 1. Emergency admissions to the surgery department in 2019, 2020, 2021, 2022

	09/03/2019 09/05/2019 Group 1	09/03/2020 09/05/2020 Group 2	09/03/2021 09/05/2021 Group 3	09/03/2022 09/05/2022 Group 4	p-value
Emergency admissions, n	20	16	31	10	
Treatment, n (%)					<0.05*
Operated	11 (55)	14 (87.5)	29 (93.5)	6 (60)	
Not-operated	9 (45)	2 (12.5)	2 (6.45)	4 (40)	

*Chi-square test

Table 2. Admissions to the surgery department in 2019, 2020, 2021, 2022

	09/03/2019 09/05/2019 Group 1	09/03/2020 09/05/2020 Group 2	09/03/2021 09/05/2021 Group 3	09/03/2022 09/05/2022 Group 4	p-value
Total admissions, n	150	25	71	110	<0.05*
Type of admission, n (%)					<0.05*
Emergency	20 (13.3)	16 (64)	31 (43.7)	10 (9.1)	
Elective	130 (86.7)	9 (36)	40 (56.3)	100 (90.9)	

*Chi-square test.

distributed between the two sexes in all groups, with a mean age of 64.6 years in 2019, 65.3 years in 2020, 63.4 years in 2021 and 54.8 years in 2022 (*Table 3*) (18).

Post-operative Intensive Care Unit admissions were 2 (17.3%) during 2019, 5 (37.2%) during 2020, 6 (21.3%) during 2021 and 1(15.3%) during 2022 ($p<0.05$).

We observed 3 (31.2%) post-operative complications during 2019, 7 (50%) during 2020, 9 (31%) during 2021 and 2 (29.2%) during 2022 ($p<0.05$) (*Table 4*).

Discussion

In December 2019, the World Health Organization (WHO) defined the 2019 novel coronavirus disease (COVID-19) as a global pandemic affecting 212 countries worldwide (19-20). The pathogen designated by the World Health Organization as SARS-CoV2 causes a new type of pneumonia that affects the lower respiratory tract, known as coronavirus disease 2019.

In our institutional and surgical depart-

Table 3. Demographic and clinical characteristics of urgently operated patients in 2019, 2020, 2021, 2022

	09/03/2019 09/05/2019 Group 1 (n = 11)	09/03/2020 09/05/2020 Group 2 (n = 14)	09/03/2021 09/05/2021 Group 3 (n = 29)	09/03/2022 09/05/2022 Group 4 (n = 6)
Sex, n (%)				
F	7 (63.6)	8 (57.1)	20 (69)	2 (33.3)
M	4 (36.4)	6 (42.9)	19 (31)	4 (66.7)
Age (y)				
Mean (SD)	64.6 (20.2)	65.3 (19.3)	63.4 (13.5)	54.8 (12.9)
Median	68	71	66	59.5

SD: Standard Deviation

Table 4. Intra and postoperative characteristics of urgently operated patients in 2019 and 2020

	09/03/2019 09/05/2019 Group 1 (n = 11)	09/03/2020 09/05/2020 Group 2 (n = 14)	09/03/2021 09/05/2021 Group 3 (n = 29)	09/03/2022 09/05/2022 Group 4 (n = 6)	p-value
Post-op ICU admission, n (%)	2 (17.3)	5 (37.2)	6 (21.3)	1 (15.3)	<0.05*
Post-op complications, n (%)	3 (31.2)	7 (50)	9 (31.0)	2 (29.2)	<0.05*
Clavien-Dindo classification, n (%)					NS
I	1 (33.3)	0 (0)	4 (44.4)	1 (50)	
II	1 (33.3)	1 (14.3)	2 (22.2)	0 (0)	
III	1 (33.3)	4 (57.1)	2 (22.2)	1 (50)	
IV	0 (0)	0 (0)	0 (0)	0 (0)	
V	0 (0)	2 (28.6)	1 (11.1)	0 (0)	

ICU, Intensive Care Unit; *Chi-square test; NS, not significant

ments, we are asked to face new challenges (21,22). Following the declaration of a pandemic, we had to suppress our electoral activity given the high risk of virus spread (23,24). Our facility decided to postpone elective surgery and discharge all medical patients. On the other hand, we had to rapidly expand our capacity to accommodate all patients requiring respiratory support.

In this work, we compare the number of surgical hospitalizations in our department from 2019 (pre-COVID era) to date. The data highlight a notable reduction in hospitalizations in 2020, due to the suppression of elective activities for benign diseases, a light increase in 2021 and the substantial restoration of the number of patients treated in 2022 thanks to the benefits coming from the introduction of the vaccines (*Graphic 1*).

Graphic 1 displays the qualitative changes concerning the treatments provided: in 2019 the elective hospitalizations numerically prevailed, we then witnessed the preponderance of emergency ones, until 2022, when the elective cases came back to their primacy.

This information shows how the suppression of hospitalization for non-urgent cases severely impacted the numbers we were accustomed to, from a quantitative and

qualitative standpoint. The availability of vaccines and the precautionary measures introduced in 2021, instead, granted an increase in the number of hospitalizations which became comparable to the pre-COVID era (*Graphic 2, Graphic 3*).

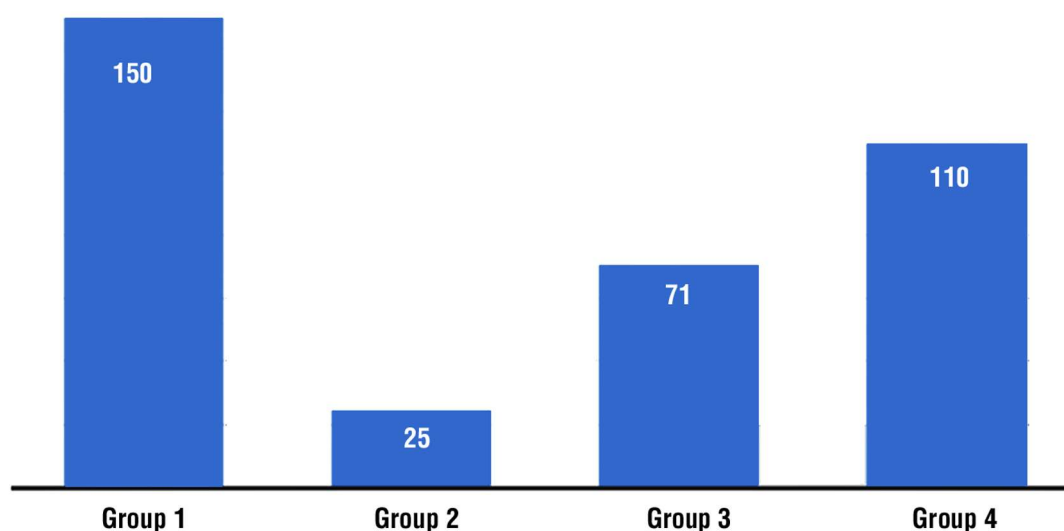
Over 55% of patients who were pre-pandemic and visited the ER were hospitalized and treated surgically. In 2020, 87.5% of these patients were treated surgically and 2021 93.5% were treated interventionally.

Data suggest that the number of inappropriate entries to the emergency room decreased during the pandemic. This likely led to fewer non-medical entries to the surgical department, resulting in a higher likelihood of needing an operative treatment.

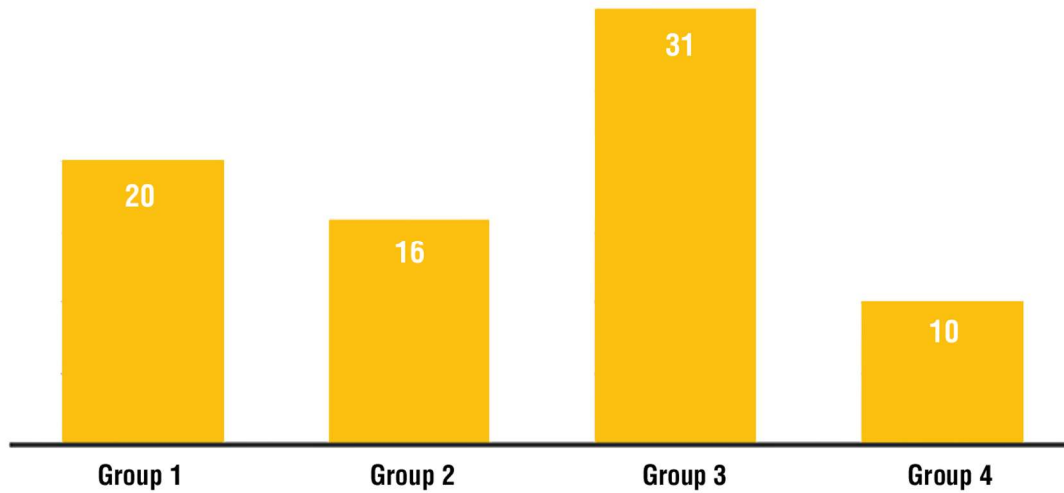
Prevalence rates indicate that 60% of all hospital beds were used for urgent surgeries in 2022. This indicates that many patients gathered in the emergency room again due to the COVID virus. They received treatment without confidence in fighting the virus.

During the pandemic, it was reported that there had been a significant decrease in A&E visits.

During the pandemic, people had fewer chances to enter the emergency room due to patient hesitation to enter the room. This sig-



Graphic 1. Admissions to the surgery department from 2019 to 2022



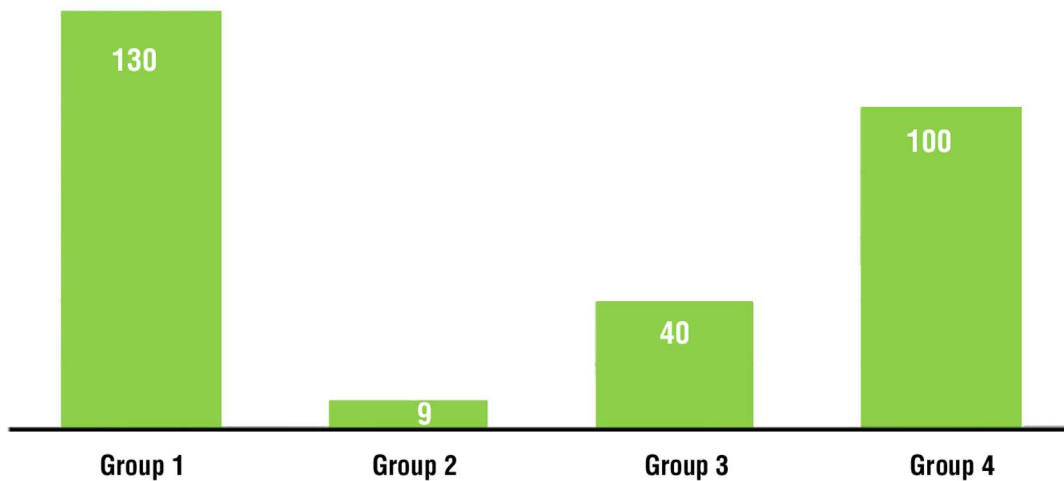
Graphic 2. Emergency admission to the surgery department from 2019 to 2022

nificant delay in treatment caused more patients to suffer post-operative complications. On the other hand, many people stopped coming every time they suffered a health problem. This was seen as a positive effect by some because it decreased the burden on the emergency room.

In our study we analyzed the postoperative

complications considering the Clavien-Dindo classification: 50% of patients treated during the COVID period have suffered from post-operative complications, compared to the 31.2% in 2019, the 31% in 2021 and the 29.2% in 2022.

Because of all the critical care patients required during the COVID-19 pandemic,



Graphic 3. Elective admission to the surgery department from 2019 to 2022

about 37.2% of all patients who visited the ER were in intensive care. This compares to the years before the pandemic, which had 15.3%, and the year of the pandemic which had 17.3%. These statistics indicate that patients who visit the ER in 2022 will not delay care to avoid complications. This leads to the conclusion that clinicians can properly treat critically ill patients and reduce the probability of complications (25-27).

Considering the disparity in the number of patients between the two groups, our work tightly pertains to the shortness of the studied period. In addition, since our study gathered two disparate groups of individuals, our work stands out as exceptional.

Conclusions

Two kinds of considerations can be exercised studying the collected data.

The contraction in the number of hospitalizations for urgent and emergency conditions during the first lockdown was accompanied by positive implications, like the decrease of non-relevant accesses to the ER as well as negative ones, such as the delay in presentation of severely ill patients, with a substantial worsening of the treatment outcomes.

In addition, the measures employed in hospitals to contain the infection and the availability of vaccines determined a reduction in COVID cases, allowing the nearly complete resumption of the surgical activity provided in the pre- COVID era.

Ethics Approval and Consent to Participate

The ethics committee of our institution approved the study.

Consent for Publication

Informed consent was obtained from all individual participants included in the study.

Competing Interests

The authors declare no competing interests.

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Authors' Contributions

Giovanna Pavone and Alberto Gerundo performed the study conception and design. Mario Pacilli and Alberto Fersini contributed to acquisition of the data. Antonio Ambrosi analysed and interpreted the data. Nicola Tartaglia revised the manuscript.

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