Impact of the World's Longest Lockdown on the Diagnosis and Staging of Colorectal Cancer: A Report from a Referral Hospital in Argentina

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ABSTRACT

Introduction: One of the longest, strictest, and most widely observed quarantines in the world was implemented in Argentina during the COVID-19 pandemic. The impact of this quarantine on the diagnosis and staging of colorectal cancer (CRC) has not yet been reported.
Objective: To evaluate the impact of the pandemic on colonoscopy implementation, CRC diagnosis, and tumor staging at the time of surgery.
Design: Retrospective observational and analytical study of a cohort of 175,000 patients at the Hospital Italiano de Buenos Aires from 2018 to 2022.
Methods: The study population included 29,357 patients who underwent colonoscopies for various reasons. A comparison was made between the pre-pandemic (2018 and 2019), pandemic (2020), and post-pandemic (2021 and 2022) periods.
Results: The overall colonoscopy rate was 36 per 1,000 cohort members. During the pandemic, the rate fell to 19 (95% CI 18.2–19.5), which was 54% lower than in 2019 (p<0.001). Screening, surveillance, and diagnostic colonoscopies decreased by 65%, 58%, and 28%, respectively. The absolute number of adenocarcinoma cases diagnosed in 2020 was 41% lower than in 2019 (72 vs. 123), and the adenocarcinoma detection rate per colonoscopy was lower (RR 0.58; p=0.003). While the proportion of distant metastases remained stable, patients operated on post-pandemic exhibited greater loco-regional lymph node involvement (p=0.01).
Conclusion: The negative impact of the pandemic on the implementation of colonoscopy reduced the detection of CRC and was associated with a higher proportion of patients diagnosed in advanced stages at the time of surgery.

Keywords: *COVID-19; Pandemic; Colorectal Cancer; Colonoscopy; Surgery*

INTRODUCTION

Colorectal cancer (CRC) is one of the most prevalent malignancies in Western countries. It ranks second only to prostate cancer in men and to breast cancer in women.[1] The effectiveness of colonoscopy for early detection and reducing mortality has been widely demonstrated, and it is recommended as a prevention strategy with a high level of evidence in population guidelines.[2,3]
Given its complexity, which includes anesthetic sedation, the implementation of colonoscopies was suspended during the pandemic, forcing a reconsideration of its indications, and negatively impacting short- and long-term outcomes.[4-6] A recent study from the Cleveland Clinic reported that canceling consultations and decreasing the number of colonoscopies was associated with a 36% reduction in CRC incidence.[7]
Argentina implemented the longest continuous quarantine in the world, lasting 234 consecutive days. Only Melbourne, Australia, surpassed this, with 267 days of confinement distributed over six discontinuous periods. This quarantine was characterized by its high level of restriction and compliance, ranking fourth according to the *Oxford Rigor Index.*[8] This situation further exacerbated the impact of diagnostic delays for prevalent diseases.[9,10] The only available data on CRC are indirect assessments that estimate a decrease of more than 50% in the number of CRC screening and surveillance visits during the pandemic, with complete recovery in surveillance visits but only 66% recovery in screening visits.[11]
An exploratory study at our institution revealed that, in the first months of 2020, the CRC detection rate decreased by 15%, while advanced-stage diagnoses increased by 12%.[12]

This study aims to assess the impact of the pandemic on the implementation of colonoscopies, CRC diagnosis, and tumor staging during surgery.

MATERIALS AND METHODS

Design

A retrospective observational and analytical study was conducted on a closed cohort of 175,240 members of the Hospital Italiano de Buenos Aires health plan during the period 2018–2022.

Population

Data were obtained from the electronic medical record, which records all contacts with the healthcare system. A total of 29,357 patients (59% women, mean age 63 years, range 17–99 years) were included, who underwent 33,206 colonoscopies. The colonoscopy rate was calculated based on the number of patients who underwent a colonoscopy out of the total number of institution members during the same period per 1,000 patients. The variation in the adenocarcinoma diagnosis rate per colonoscopy among the total number of members (number of new cases diagnosed by colonoscopy out of the total number of members per 1,000 patients) and the incidence of adenocarcinoma in colonoscopies (number of new cases of adenocarcinoma detected in colonoscopies out of the total number of patients who underwent a colonoscopy) were calculated.

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Received: April 30, 2025. Accepted: July 7, 2025

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Indicators were adjusted based on the purpose of the colonoscopy: CRC screening, surveillance, or diagnosis of symptomatic patients. Tumor stage variation was calculated in 395 patients undergoing surgical resection for colon adenocarcinoma who did not receive neoadjuvant treatment, comparing the proportion of early stages (I-II), III, and IV.

Year-on-year comparisons were made between the pre-pandemic (2018 and 2019), pandemic (2020), and post-pandemic (2021 and 2022) periods.

The protocol was implemented in accordance with the Declaration of Helsinki. The study was registered with the Buenos Aires Computerized Health Research Registry Platform (PRIISA-BA, protocol no. 6333) and received approval from the HIBA Institutional Ethics Committee (CEPI, protocol no. 6762).

Statistical analysis

Relative risks (RR) were calculated with 95% confidence intervals (95% CI) for rates, and the chi-square test for stage comparison. Statistical analysis was performed using STATA software, version 13. All p-values ≤0.05 were considered statistically significant.

RESULTS

The overall colonoscopy rate was 36 per 1,000 patients. During the pandemic, the rate fell to 19, representing a 54% decrease compared to 2019 (RR: 0.46, 95% CI 0.4-0.5; p<0.001). Since 2021, the rate has gradually increased, reaching a level in 2022 that exceeded the 2019 rate by 12% (RR: 1.12, 95% CI 1.07-1.5; p<0.001) (Table 1).

Table 1. *Rate of screening and diagnostic colonoscopies per 1,000 patients.*

Year	Overall rate RR (95% CI)	Screening rate RR (95% CI)	Diagnostic rate RR (95% CI)
2018	38 (37.4-39.2)	20 (20-21)	0.86 (0.8-0.9)
2019	41 (39.9-41.8)	21 (20-22)	1 (0.9-1)
2020	19 (18.2-19.5)	0.7 (0.7-0.8)	0.6 (0.6-0.7)
2021	38 (36.7-38.5)	19 (18-19)	0.9 (0.8-0.9)
2022	46 (45.4-47.3)	25 (24-25)	0.8 (0.8-0.9)
Overall	36 (36 – 36.8)	18 (18-19)	0.9 (0.8-0.9)

Concerning the number of colonoscopies, the variation in frequency of a total of 33,206 colonoscopies was analyzed. As illustrated in Fig. 1, the 2020 data indicate a significant deviation from the historical trend, which typically sees a rise in colonoscopies in March. Instead, there was a substantial decrease of over 95% in the number of procedures compared to 2019, due to the implementation of a strict and mandatory quarantine. This decline was gradually reversed beginning in May/June with the easing of restrictions and the reopening of hospitals, although it did not reach pre-pandemic levels. Even in May 2021, as the recovery continued, a further decrease was recorded. This was attributable to a resurgence of the disease, although this variation was smaller and of shorter duration than in 2020.

Regarding variation in the rate according to colonoscopy indications, during the pandemic, there was a significant decrease in the screening rate compared to 2019 (0.7 vs. 2, respectively). During the pandemic, there was a 65% decrease in screening colonoscopies, a 58% decrease in surveillance colonoscopies, and a 28% decrease in diagnostic colonoscopies for patients with clinical suspicion of CRC. Although the proportion of surveillance colonoscopies remained stable, screening colonoscopies decreased while diagnostic colonoscopies increased significantly compared to pre-pandemic levels (25% vs. 41%; p=0.001) (Fig. 2).

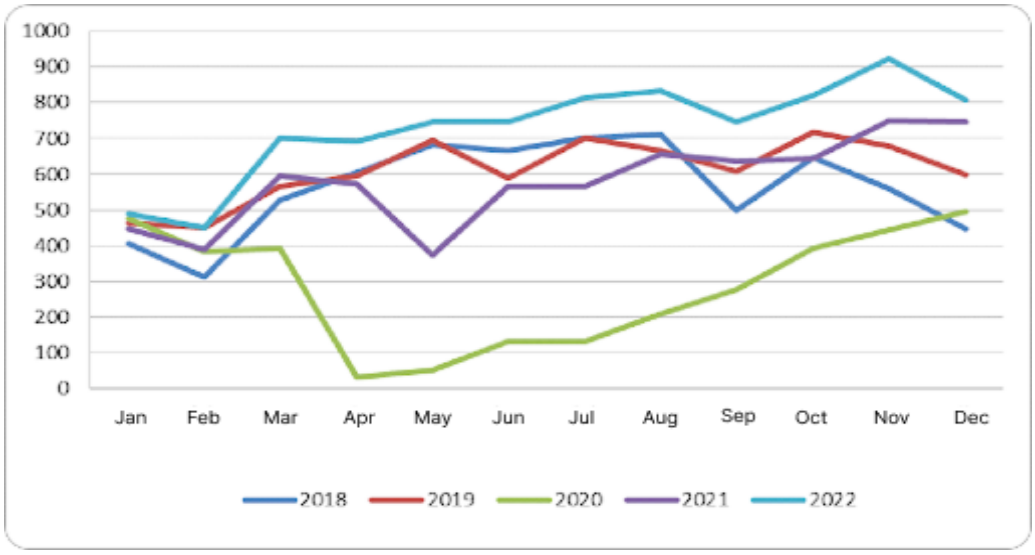

Figure 1. *Monthly and year-over-year variation in the number of colonoscopies performed on members of the Hospital Italiano de Buenos Aires Health Plan during the period 2018-2022.*

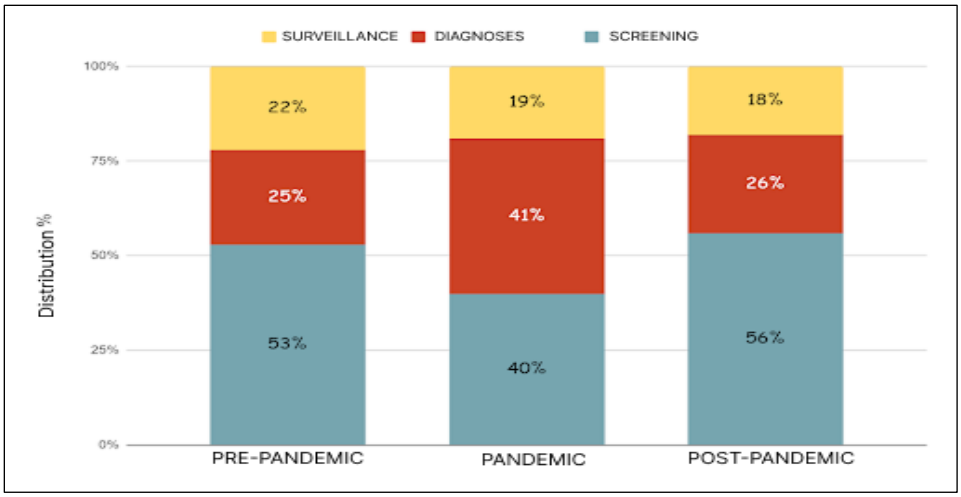

Figure 2. *Percentage distribution of colonoscopy indications during different periods.*

The overall rate of endoscopic resections was 32%, with no difference between the pre-pandemic (31.7%), pandemic (30%), and post-pandemic (32.6%) periods. Regarding the detection of adenocarcinoma, 85% (370/488 cases) were diagnosed in symptomatic patients. The absolute number of adenocarcinoma cases diagnosed during 2020 was 41% lower than in 2019 (72 vs. 123). This difference was also evident in the detection rate of adenocarcinoma by colonoscopy (RR 0.58, 95% CI 0.43–0.78; p=0.003) (Table 2).

Table 3 details the distribution of pathological stages. More than 75% of cases underwent scheduled surgery, with no significant differences observed between periods. Although the proportion of patients with distant metastases remained stable during all periods, those operated on in the post-pandemic period had a significantly higher proportion of stage III (RR 1.53, 95% CI 1.08–2.18; p=0.01).

Table 2. *Detection rate of adenocarcinoma diagnosed by colonoscopy in members of the Hospital Italiano de Buenos Aires Health Plan per 1,000 patients.*

Year	Adenocarcinoma detection rate RR (95% CI)
2018	0.57 (0.46 – 0.69)
2019	0.63 (0.58 – 0.83)
2020	0.48 (0.32 – 0.51)
2021	0.54 (0.43 – 0.6)
2022	0.53 (0.43 – 0.64)
Overall	0.55 (0.50 – 0.60)

Table 3. *Pathological staging at the time of surgery according to the 8th ed. of the American Joint Committee on Cancer TNM staging system.*

Stage	Prepandemic (n=179)	Pandemic (n=59)	Pospandemic (n=175)	P value*
I-II (n=191)	64% (n=115)	51% (n=30)	48% (n=76)	0.003
III (n=94)	22% (n=40)	32% (n=19)	34% (n=54)	0.01
IV (n=51)	14% (n=24)	17% (n=10)	18% (n=27)	0.3

* Difference between pre and post pandemic groups.

DISCUSSION

This study is the first report in Latin America to analyze the medium-term impact on CRC of the restriction strategies implemented during the pandemic. The analysis revealed a substantial decrease in CRC rates, particularly among the average-risk population. This decline was reversed after the pandemic, but failed to offset the reduction even years after restrictions were lifted. Furthermore, pathological analysis showed a migration to stages with a higher proportion of lymph node metastases.

One of the key indirect outcomes of the pandemic was the limitation of prevention strategies for highly prevalent diseases. In the context of CRC, the implementation of colonoscopies was restricted due to the complexity of the procedure and the potential risk of aerosolization associated with anesthetic sedation. Our study demonstrated a decrease in colonoscopy performance comparable to that reported in other countries, where decreases ranging from 28% to 100% were reported compared to previous years,[13-15] a decrease similar to the reduction recorded in the United Kingdom (90% at the beginning of the pandemic).[16] The 54% reduction in the colonoscopy rate during 2020 was recovered after two years, even exceeding the pre-pandemic rate. A comparison of these data with other studies is not possible at this time. The reason for this is that no studies have been found that evaluate the impact of the pandemic on the CRC rate in a given population.

Contrary to the 70% decrease in diagnostic colonoscopies noted in a systematic review,[14] our study shows a slight decline of 28%. Notably, screening and surveillance colonoscopies decreased by 65% and 58%, respectively. This discrepancy can be attributed to the hospital's strategic prioritization of high-risk patients,[11-13] an approach that may mitigate the long-term implications. Eighty-five percent of CRC cases were detected through diagnostic colonoscopies, representing a significant increase from the 70% recorded before the pandemic.

This finding aligns with the results of a multicenter study of Spanish public hospitals, which found that 81% of CRCs were diagnosed in symptomatic patients.[5]

As adenoma detection was not documented in the medical records, the endoscopic resection rate was used as an indicator of colonoscopy quality, which remained stable during the periods analyzed.[17,18] These data confirm that the quality of the procedures was not compromised despite the difficulties experienced. This is likely due to the selection of the most experienced operators to perform them.

A notable increase in the adenocarcinoma detection rate per number of procedures performed was also observed. This can be attributed to the prioritization of studies in symptomatic patients, which increased proportionally by 15%. Despite this increase, the number of newly diagnosed CRC cases decreased by 41% during the pandemic, placing this figure among those reported worldwide (22–39%).[5,20]

We were able to determine that, in the period following the pandemic, there was an increase in the proportion of patients with lymph node involvement in our series, which exceeded the increases reported worldwide (5–7%).[21,22] In contrast, a study of Spanish patients reported a rise in tumor stage in the post-pandemic period, but this was at the expense of stage IV (20 vs. 16%).[5] We consider that this stage migration phenomenon is likely due to delays in diagnosis as a consequence of the restrictive measures implemented. While the study did not concentrate on survival in our population, progression to advanced stages of CRC has significant clinical and therapeutic implications. It is a key prognostic factor associated with a higher risk of recurrence and lower overall survival. This progression also increases treatment complexity and costs. [23,24]

Considering the study's limitations, while the design is retrospective, all data were obtained prospectively and recorded in a certified electronic medical record with healthcare validity.

CONCLUSION

During the COVID-19 pandemic, there was a significant decrease in the use of colonoscopies, particularly for screening and surveillance purposes, which disrupted key prevention strategies. This decline led to a substantial reduction in the number of new CRC diagnoses during that period.

Finally, in patients undergoing surgery in the post-pandemic period, an increase was observed in the proportion of locally advanced stages with greater lymph node involvement, reflecting a diagnostic delay with a persistent clinical impact even several years after the end of restrictions.

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