

# Hepato-pancreato-biliary surgery in Mexico and Latin America during the COVID-19 pandemic (2020): Results from AMHPB survey

## *La cirugía hepato-pancreato-biliar en México y América Latina durante la pandemia COVID-19 (2020): Resultados de una encuesta de la AMHPB*

Gustavo Martínez-Mier<sup>1,2,3\*</sup>, Javier Melchor-Ruan<sup>4</sup>, José Beristain-Hernández<sup>5</sup>,  
Ismael Domínguez-Rosado<sup>6</sup>, and Andres Palacios-Sarabia<sup>1</sup>

<sup>1</sup>Department of Organ Transplantation, Unidad Médica de Alta Especialidad (UMAE), Hospital Especialidades 14 "Adolfo Ruiz Cortines", Instituto Mexicano del Seguro Social (IMSS), Veracruz; <sup>2</sup>Department of General Surgery, UMAE, Hospital Especialidades 14 "Adolfo Ruiz Cortines", IMSS, Veracruz; <sup>3</sup>Department of Research, UMAE, Hospital Especialidades 14 "Adolfo Ruiz Cortines", IMSS, Veracruz; <sup>4</sup>Gastrointestinal Tumors, Instituto Nacional de Cancerología, Mexico City; <sup>5</sup>Hepato-pancreato-biliary Clinic, General Surgery Service, Hospital de Especialidades "Dr. Antonio Fraga Mouret", Centro Médico Nacional "La Raza", IMSS, Mexico City; <sup>6</sup>Department of Surgery, Instituto Nacional de Ciencias Médicas y Nutrición Salvador Zubirán, Mexico City, Mexico

### Abstract

**Background:** The Mexican Hepato-Pancreato-Biliary Association (AMHPB) conducted a survey, aiming to gather experience and opinions of HPB surgeons about HPB surgery in the 2020 COVID-19 pandemic year. **Methods:** An online survey was conducted (33 items: demographics, patient referral, COVID-19 screening and limitations, hospital occupancy and surgical practice) to AMHPB members and attendees of the previous meetings of the Society through a self-administered questionnaire. Answers were excluded if respondents were not from Latin America. **Results:** 88 participants answered (47.5 ± 10 years, 94% male and 65.9% Mexicans). About 8% worked in COVID-19 converted hospitals. About 1.1% did not perform pre-operative COVID-19 testing. Polymerase chain reaction (33%) was the most common COVID-19 pre-operative test. The number of patient referrals decreased 62.5%. About 29.5% had one patient who died from COVID-19 during preoperative surgical evaluation. About 64.7% answered that surgical case volume decreased. About 17% and 23% respondents considered that surgical morbidity and mortality increased, respectively. Hospital resources and COVID-19 infection were responsible for change in surgical outcomes. Lack of ICU beds (54%) was the most common cause of surgical cancellation. **Conclusion:** COVID-19 had a strong negative impact on HPB surgery in Mexico and Latin America in terms of patient reference, case volume and surgical outcomes.

**Keywords:** Hepato-pancreato-biliary. COVID-19. Outcomes.

### Resumen

**Introducción:** La Asociación Mexicana Hepato-Pancreato-Biliar (AMHPB) realizó una encuesta con el objetivo de recopilar experiencias/opiniones de cirujanos HPB sobre cirugía HPB en el 2020 con pandemia COVID-19. **Métodos:** Se realizó encuesta virtual (33 ítems: demografía, derivación de pacientes, tamizaje/limitaciones COVID-19, ocupación hospitalaria y práctica quirúrgica) a miembros de la AMHPB y asistentes a reuniones previas de la Sociedad a través de un cuestionario auto-administrado. Se excluyeron las respuestas que no fueran de América Latina. **Resultados:** Respondieron 88 participantes

### Correspondence:

\*Gustavo Martínez-Mier

E-mail: gmtzmier@gmail.com; gmtzmier@hotmail.com

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(47.5 ± 10 años, 94% hombres y 65.9% mexicanos). 8% trabajaba en hospitales reconvertidos COVID-19. 1,1% no realizó prueba COVID-19 preoperatoria. La Polymerase chain reaction (33%) fue la prueba preoperatoria COVID-19 más común. La referencia de pacientes disminuyó 62,5%. El 29,5% tuvo paciente fallecido por COVID-19 durante la evaluación preoperatoria. 64,7% respondió que el volumen de casos quirúrgicos disminuyó. El 17% y 23% consideraron que la morbilidad y mortalidad quirúrgicas aumentaron respectivamente. Los recursos hospitalarios e infección por COVID-19 influyeron en los resultados quirúrgicos. La falta de camas de UCI (54%) fue lo más común en cancelación quirúrgica. **Conclusión:** COVID-19 tuvo un fuerte impacto negativo en la cirugía HPB en México y América Latina en referencia de pacientes, volumen de casos y resultados quirúrgicos.

**Palabras clave:** Hepatopancreatobiliar. COVID-19. Resultados.

## Introduction

In December 2019, an outbreak of the 2019 coronavirus (COVID-19) caused by SARS coronavirus 2 (SARS-CoV-2) occurred in Wuhan, China<sup>1,2</sup>; spreading worldwide<sup>3</sup>, with WHO declaring a COVID-19 pandemic on March 2020<sup>3</sup>.

The COVID-19 pandemic has stressed every health system in the world. The impact on the surgical services has been profound and one of the first responses was to cease all non-essential surgical operations. Some elective surgery for time-sensitive conditions continued with prioritization of patients with resectable cancers at risk for progression and patients for whom alternative treatment modalities would be ineffective<sup>4,5</sup>.

Patients undergoing surgery are at risk of SARS-CoV-2 exposure in the hospital. They are particularly susceptible to pulmonary complications, due to pro-inflammatory cytokines, immunosuppressive response to surgery, and mechanical ventilation. Morbidity and mortality in COVID-19 patients are higher than patients without COVID-19<sup>6-8</sup>.

Data on the effects of COVID-19 on surgical hepatopancreato-biliary diseases (HPB) is yet to be fully reported. HPB centers worldwide have reported a reduction their surgical procedures<sup>4,5</sup>. Reported outcomes in HPB surgery during this pandemic are scarce<sup>9-11</sup>.

The impact of the virus in different health-care systems is of great interest in surgery, particularly on HPB surgery<sup>4,5,12-14</sup>. Such a scenario necessitates a snapshot of the management of HPB surgery. Therefore, the Mexican Hepato-Pancreato-Biliary Association (AMHPB) created and conducted a survey, aiming to gather the experience and opinions of HPB surgeons in Latin America to allow comparisons of healthcare, practice, and patient safety to identify chances for improvement and collaboration.

## Methods

### Survey

An online survey was distributed by email invitation to all members of the Mexican Hepato-Pancreato-Biliary Association (AMHPB) and attendees of the three previous Congresses of the Society (2017-2020) through a self-administered electronic questionnaire (<https://docs.google.com/forms/d/1qbp6stuxCWgvcKAuyr068DthM3FWcOsuctZiHbSFoHA/edit>) developed by the survey administration application Google Forms (Google LLC, Mountain View, California, USA) (Supplementary material).

The survey consisted of 33 items based on demographics, preoperative COVID-19 triage/screening and COVID-19 hospital occupancy, patient referral, surgical practice (case volume and outcomes), and COVID-19 limitations/restrictions (surgical cancellations). Respondents were asked to register their names and institutions to prevent duplicate data. Answers were excluded if respondents were not from Latin America. Respondents were asked if they performed one of the following HPB procedures: (Liver resection/Liver transplantation; pancreatoduodenectomy/subtotal pancreatectomy/distal pancreatectomy/surgical procedures related to acute/chronic pancreatitis; choledochal cyst/bile duct resection/repair; and other hepato-pancreato-biliary procedures). Data were not included if the respondents did not perform any of the aforementioned procedures. No minimal cutoff in HPB surgical volume was established to enter the survey. A manual search was performed to find duplicate data. If duplicate data were found, the first fully answered questionnaire was given priority. Questions were open questions, closed-ended questions, or multiple-choice questions allowing the possibility to choose multiple answers. The survey was open for 2 months (April-May/2020) with regular reminders every 2 weeks.



Figure 1. Geographical distribution of survey responses across Mexico and Latin America.

## Statistical analysis

Data are expressed as mean  $\pm$  standard deviation for continuous variables; and frequency and percentage for categorical variables. Data were analyzed using SPSS software version 25 (Chicago, IL, USA).

## Results

### Demographics

After excluding 26 responses (three responses were discarded since the respondents did not perform any of

the listed hepato-pancreato-biliary procedures and 23 were duplicated response data) a total of 88 participants were included for analysis. The mean age of the respondents was  $47.5 \pm 10$  years (32-76 range). The majority were male (94.3%,  $n = 83$ ), and 65.9% ( $n = 58$ ) were Mexicans and the rest from other Latin American countries. Figure 1 shows the geographical distribution of survey responses across Mexico and Latin America.

Sixty-four respondents were working in both public and private hospitals ( $n = 64$ , 72.7%), 20.5% ( $n = 18$ ) were working in private hospitals only, and 6 respondents (6.8%) in public hospitals only. Most of the respondents ( $n = 78$ , 90.9%) were working

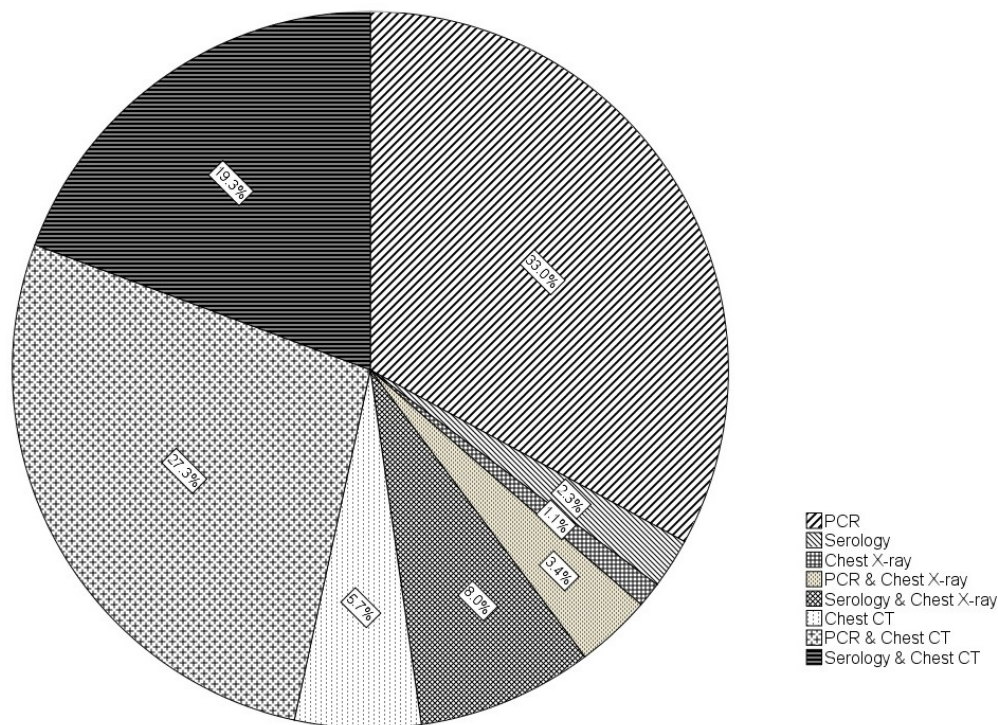


Figure 2. COVID-19 preoperative testing and screening strategy.

in an academic center (either public/private hospitals with medical students/residents/fellows). Twenty-nine (29.5%,  $n = 26$ ) of the respondents were chief of department/division and the rest ( $n = 62$ , 70.5%) were attending. Then mean years of surgical practice were  $14.9 \pm 11.2$  years (1-45 range).

### **Pre-operative COVID-19 triage/screening and COVID-19 hospital occupancy**

During 2020, seven respondents (8%) were working in COVID-19 converted hospitals, nine respondents (10.2%) were working in non-COVID-19 hospitals, and 72 respondents (81.8%) were working in hospitals with COVID-19 dedicated areas. Only one respondent (1.1%) did not routinely perform preoperative COVID-19 testing, 20 respondents (22.7%) only in patients with respiratory symptoms or SARS-CoV-2 suspected infection, and 76.1% ( $n = 67$ ) respondents to all patients. The most common COVID-19 pre-operative testing strategy was polymerase chain reaction (PCR) (33%) followed by PCR and Chest CT (27.3%). Figure 2 display all COVID-19 preoperative testing strategies.

### **Patient reference and HPB surgical practice**

According to the respondents, the number of patient referrals decreased 62.5% ( $n = 65$ ) during 2020; 27.3% ( $n = 24$ ) responded that patient referral was the same and 10.2% ( $n = 9$ ) claimed that patient referrals increased. Thirty-six percent (36.4%,  $n = 32$ ) of the respondents could not finish some of their patient's surgical evaluations and preoperative workup. Sixty respondents (72.7%,  $n = 60$ ) had at least one patient who developed COVID-19 infection during surgical evaluation and preoperative workup ( $4.8 \pm 6.6$  patients). 26 respondents (29.5%) had at least one patient who died from COVID-19 while surgical evaluation and pre-operative workup were performed.

Forty-six respondents (52.3%) reported that they changed their preoperative workup in their procedures and the most common change was COVID-19 testing/screening (67.4%) followed by changes in hospitalization routes (17.4%).

The mean surgical case volume performed by the respondent before 2020 was  $47.7 \pm 47.5$  (1-250 range). The most common type of surgical



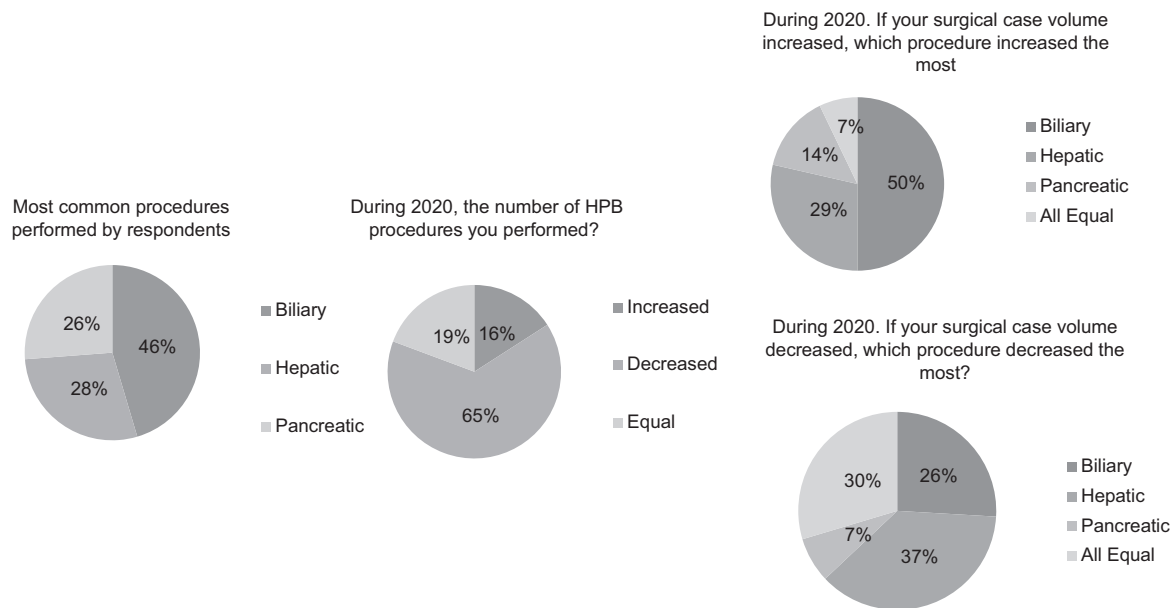


Figure 3. Hepato-Pancreato-Biliary (HPB) Case Volume Changes During 2020.

procedure performed by the respondents was biliary in 45.4% ( $n = 40$ ). In 2020, 64.7% of the respondents ( $n = 57$ ) answered that their surgical case volume decreased. The mean estimated decreased percentage was  $52.5 \pm 20.4\%$ . Fourteen respondents ( $n = 14$ , 15.9%) answered that their surgical case volume increased by a mean estimated percentage of  $29.6 \pm 20.5\%$ . Respondents who were working in both public and private hospitals ( $n = 64$ ) answered that changes in their practice were in hospitals where they have their busiest practice (38.6%) and in both hospitals in which they worked (public/private) (37.5%). Figure 3 details HPB surgical case volume and volume changes.

Based on their answers, 72.7% of the respondents ( $n = 64$ ) considered that the surgical morbidity of their HPB surgical practice stayed equal to prior years, 15 respondents (17%) considered that their surgical morbidity increased and 10.2% ( $n = 9$ ) considered that their surgical morbidity decreased. Reasons related to hospital area and resources were the most common causes of morbidity changes (increase/decrease) according to the respondents (Fig. 4).

Sixty-seven (67%) of the respondents ( $n = 59$ ) considered that the surgical mortality of their HPB surgical practice stayed equal to prior years, 21 respondents (23.9%) considered that their surgical mortality increased and 9.1% ( $n = 8$ ) considered that their surgical mortality decreased. COVID-19 infection was the most

common cause of increased HPB surgical mortality, based on the respondent's answers. The reasons to which the respondents attributed their changes in HPB surgical morbidity and mortality were grouped and exemplified in figure 4.

In 2020, 46.6% of the respondents ( $n = 41$ ) had at least one patient who underwent an HPB procedure who developed postoperative COVID-19 infection. According to their answers, 53.7% of the patients who underwent an HPB procedure who developed post-operative COVID-19 infection had an uneventful postoperative course besides COVID-19 infection, 17.1% had a complication related to COVID-19 infection, and 24.4% died because of COVID-19 infection.

### COVID-19 limitations/restrictions on HPB surgical practice (cancelled surgeries)

The most common cause of HPB cancelled surgeries was a decrease in ICU capacity (beds) in 54% of the cases, followed by hospital policy in 42%. Table 1 shows all answered reasons for HPB surgical cancellations during 2020.

## Discussion

The results of this survey evidence the significant negative impact of COVID-19 in HPB surgery

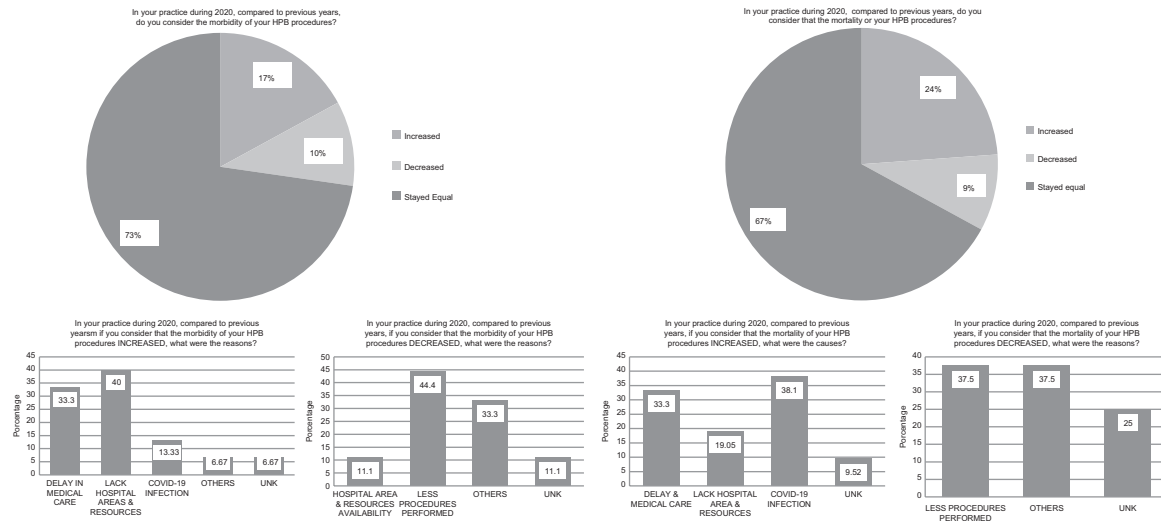


Figure 4. HPB morbidity and mortality perception. HPB: hepato-pancreato-biliary; UNK: unknown.

Table 1. Causes of HPB surgical cases cancellation

Item	Total (n = 234) Percentage
Lack of ICU bed	(48) 20.5%
Hospital Policy	(37) 15.8%
Patient declined surgery	(33) 13.9%
Lack of OR capacity	(25) 10.6%
Lack of OR personnel	(25) 10.6%
Country policy	(20) 8.4%
Lack of Blood Products	(18) 7.5%
Patient fear for COVID-19 infection	(13) 5.5%
Lack of In-Hospital personnel	(11) 4.7%
Others	(4) 1.7%

ICU: intensive care unit; OR: operating room.

practice during 2020 in Mexico and Latin America. In most of the cases (above 50%), there was an important decrease in patient reference. The preoperative surgical evaluation and workup suffered delays and cancellation due to COVID-19 patient's infection and death, and subsequently, the surgical case volume dropped. HPB surgeons quickly adapted to COVID-19 pre-operative screening and testing. Surgical morbidity and mortality increased during the midst of the pandemic and finally, most of the surgical cancellations/restrictions were hospital-related (lack of hospital facilities, hospital policy, and lack of personnel).

A retrospective view of the ongoing COVID-19 pandemic showed an initial cancellation of all elective surgical activities worldwide, and HPB surgery was not the exception. This cancellation generated a backward influence in the reference of patients, as two different surveys conducted in Europe described, in which patient reference dropped 60%-90% in all HPB centers across the continent<sup>4,5,12</sup>. Only few centers (10%) considered that their reference stayed equal and some brief reports described an increased number of HPB procedures performed<sup>11</sup>. The results of this survey tell us that patient reference similarly decreased in our continent as occurred in Europe; however, we encountered 10% of HPB surgeons stating that their actual patient reference increased. This number is similar to the number of HPB who worked in 2020 in non-COVID-19 hospitals, raising the chance that these were the HPB surgeons who increased their patient referrals as well. In addition to a slow down pace of patient reference, the patient's COVID-19 infection during surgical evaluation and pre-operative work-up, resulted in a reduction of the surgical case volume in most of the cases. Furthermore, there was not a specific pattern in terms of a particular type of HPB procedure that changed (either decrease or increase) during 2020.

Studies assessing delays in HPB surgery during the first COVID-19 wave showed that patients waited more days for surgery than usual and predictors referral pathway, and presenting pathology<sup>15</sup>. In the case of hepatocellular carcinoma, the first wave of the COVID-19 pandemic had a tremendous impact on the

routine care of patients. Modifications in screening, diagnostic, and treatment algorithms significantly impaired the outcome of patients<sup>16</sup>. Cancer surgery systems worldwide were fragile to lockdowns, with one in seven patients who were in regions with full lockdowns not undergoing planned surgery and experiencing longer preoperative delays<sup>17</sup>.

The results of the survey state that the majority of HPB surgeons in Mexico and Latin America performed some sort of preoperative COVID-19 screening and testing. This is similar to several surveys such as the Italian survey focused on minimally invasive HPB surgery that reported an 87% COVID-19 patient screening<sup>12</sup>, the European-African Hepato-Pancreato-Biliary Association survey of HPB surgery that informed that 35% of the participants did not perform any COVID-19 testing<sup>5</sup> and the global survey conducted by 7 international pancreatic associations and study groups on pancreatic surgery during the COVID-19 pandemic in which they described that 87% of the participants screened their patients for COVID-19<sup>13</sup>, and had a 75% agreement that COVID-19 preoperative testing/screening is recommended but not mandatory<sup>13</sup>. COVID-19 PCR (nasal swab) and chest CT was the most common testing strategy in our study, which is the most common test, performed either individually or in combination in different places<sup>4,5,12-14</sup> in almost the same proportion (40%).

The survey results suggest that the morbidity and mortality of HPB surgery raised during 2020 (around 20%) was attributable to COVID-19 infection and directly related COVID-19 causes, such as lack of hospital areas and resources as well. It is well known that COVID-19 infection increases surgical morbidity and mortality<sup>6-8</sup>. Nevertheless, some initial experiences on HPB procedures did not describe augmented morbidity and mortality<sup>9-11</sup>; although they are small single-center series, which permits to think that the smaller number of procedures performed, less morbidity and mortality will occur (one of the answers in our survey about why morbidity and mortality on HPB procedures did not change according to the respondents). Finally, the analysis of the survey regarding surgical cancellations reveals an indirect problem, such as hospital overcrowding, with limited personnel, in limited resources countries regarding supplies availability to handle health-care challenges during the COVID-19 pandemic.

The major drawback of the study is the low survey responses, which offers limitations to the data and conclusions collected and obtained in a single shot

survey. Nevertheless, the low response rate leaves blank the fact that impact of COVID-19 in HPB surgery could have been worse instead. Despite the aforementioned limitation, several issues merit attention after reading the results of this survey: i) A consensus should be made to support the mandatory routine testing of patients to reduce potential complications of surgery regarding COVID-19 infection in HPB surgery in the new COVID-19 era; ii) a clear guidance on the prioritization of HPB treatments depending upon the availability of local resources and regional infection rates should be established; and iii) a defined strategy should be implemented to restore patient reference and surgical evaluations in HPB centers.

## Conclusion

COVID-19 had a negative impact on HPB surgery in Mexico and Latin America. There is an urgent need for new strategies, guidelines, and consensus to revert this impact.

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## Conflicts of interest

None to declare by any of the authors.

## Ethical disclosures

**Protection of human and animal subjects.** The authors declare that no experiments were performed on humans or animals for this study.

**Confidentiality of data.** The authors declare that they have followed the protocols of their work center on the publication of patient data.

**Right to privacy and informed consent.** The authors declare that no patient data appear in this article.

## Supplementary data

Supplementary data are available at Cirugía y Cirujanos online DOI: <https://10.24875/CIRU.22000063>. These data are provided by the corresponding author and published online for the benefit of the reader. The contents of supplementary data are the sole responsibility of the authors.

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