




Perioperative Cancer Care in the Context of Limited Resources during the COVID-19 Pandemic: Brazilian Society of Surgical Oncology Recommendations

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ABSTRACT

Background. As the COVID-19 pandemic moves from rich to poor nations, the healthcare systems of developing countries have to deal with this extra burden. As cancer care cannot stop and surgery is the main mechanism for cure and palliation, it is important to provide safe and rational access to cancer surgery during the COVID-19 pandemic.

Methods. From April 1st to May 1st, the committee of the Brazilian Society of Surgical Oncology (BSSO) was responsible for reviewing the literature and writing recommendations for perioperative cancer care in the context of limited resources during the pandemic. The recommendations were submitted to the BSSO board of directors. The orientations that were not consensual were removed and the suggestions were added to the text. From May 15 to 30th, the committee revised the recommendations, aligned them with the objectives of the work and standardized the text.

Discussion. The rational use of resources to reduce the risk of surgical cancer patients being operated on during the incubation period of a corona virus infection is important in this context. Prevalence of corona virus in the region, the need for surgery, surgical complexity, patient age and comorbidities, and availability of corona virus testing are central aspects in this matter and are discussed.

Conclusions. We present a protocol, focused on the patients' outcomes, for safe and rational use of resources to reduce the risk of surgical cancer patients being operated on during the virus incubation period, in the context of areas with limited resources.

As the coronavirus disease 2019 (COVID-19) pandemic moves from rich to poor nations, the health care systems of developing countries, normally equipped to work with limited resources, have to deal with this extra burden. Even developed countries have to temporarily manage, in the context of limited resources, and this may happen again in the future. As in a war, the first response to a sudden attack is regrouping the defenses, which we did by cancelling or postponing elective consults and procedures; however, it is now clear that resuming treatment for serious conditions is necessary.

In this context, cancer is one of the serious diseases in which resuming treatment is essential. A British study¹ calculated there will be 6270 excess deaths (a 20% increase) among new cancer patients within 1 year in England, and 33,890 excess deaths in the US. To alleviate the problem, we have to recognize where to focus our

energy. Surgery is the main mechanism for cure and palliation of cancer;² it is so important to patient outcomes that focusing on this as a central part of national cancer control plans has already been suggested.³ Thus, it is important to provide rational and safe access to cancer surgery during the COVID-19 pandemic, especially in areas with limited resources.

Preoperative preparation and corona virus work-up are essential to ensuring safe cancer surgery at this time, considering that 30.8% of patients infected by the virus will be asymptomatic⁴ and the other 25–30% of patients who will present with symptoms may be in the incubation period. A retrospective cohort study⁵ of 34 operative patients who developed pneumonia secondary to COVID-19 shortly after surgery found that 44.1% needed intensive care and the mortality rate was 20.5%. Considering only those patients who have had cancer surgery, the mortality rate was 44.4%.

Our objective was to present the Brazilian Society of Surgical Oncology (BSSO) protocol for rational use of resources and for reducing the risk of surgical cancer patients being operated on during the coronavirus incubation period, in the context of areas with limited resources, and focused on patient outcomes. It may also help in optimizing the use of protection equipment and prevent surgical teams from getting infected by the coronavirus.

GUIDELINE ELABORATION PROCESS

On 16 March 2020, the BSSO published its first announcement⁶ regarding cancer diagnosis and surgery during the approaching COVID-19 pandemic. At the same time, the BSSO board of directors started working on strategies to prepare the national surgical oncology community to face the pandemic, including the creation of the BSSO COVID-19 Crisis Committee, which was assigned to create guidelines addressing preoperative cancer care during the pandemic. Those actions took place even before the first COVID-19 case confirmation in Brazil⁷ on 26 March 2020, from a patient who had recently arrived from Italy.

The guideline process started on 30 March 2020 with an international video conference with oncologic surgeons from Portugal, France, Italy, and the US, and more than 350 Brazilian specialists, to listen to the experience of the areas most affected by COVID-19 from these countries, and its impact on cancer surgery.⁸ Based on this, the BSSO COVID-19 Crisis Committee identified the most critical factors for the perioperative care of cancer patients during the pandemic, considering the Brazilian disparities and limited resources:

- prevalence of coronavirus in the region;

- the need for surgery;
- surgical complexity;
- age and comorbidities;
- availability of COVID-19 testing.

From 1 April to 1 May 2020, the group was responsible for reviewing the literature and writing preliminary recommendations for each question. The recommendations were submitted to the BSSO Board of Directors for review. The orientations that were not consensual were removed and the suggestions were added to the text. From 15–30 May 2020, the committee revised the recommendations, aligned them with the objectives of the work, and standardized the text. The topic orientations have been updated monthly since and, after the journal peer review process, the epidemiological data were also updated for publication.

Recommendations for systemic chemotherapy, radiation, palliative care, and pathological assessment have been considered by other societies but are not discussed in this paper.

PREVALENCE OF CORONAVIRUS IN THE REGIONS

It is not possible to have a ‘one-size-fits-all’ approach in this matter; even within individual countries it is probably not the best approach, unless the nation is very small. For instance, the area of Brazil is bigger than Europe in its entirety, excluding Russia, and probably has much wider disparities from state to state than Europe has from country to country, all of which has to be considered. On 28 May 2020, the states of Amazon and Paraná had 808.5/100,000 and 32.5/100,000 confirmed COVID-19 cases, respectively.⁹ While one state is struggling to manage a catastrophic situation, the other has empty hospitals. Figure 1 provides a good perspective of the different prevalences of COVID-19 in Brazil as at 28 May 2020. From the date of submission of this current paper to 11 July 2020, while the Northern Brazilian state of Amazon is closing temporary hospitals as cases decrease, the southern state of Paraná now has 345.6/100,00 cases/habitants (tenfold more than when this paper was originally submitted),¹⁰ and, despite having a controlled situation, has enhanced self-isolation regulations.

Resuming cancer surgery is especially feasible in areas with a low coronavirus prevalence. In addition, postponing surgeries unnecessarily in those areas may be problematic in the future as they may become areas of high prevalence and patients who were postponed may need surgery.

While defining prevalence in an area is crucial for the rational use of screening tests and patient orientation, it is also challenging. The prevalence of asymptomatic/presymptomatic patients is unknown, but likely varies according to the pretest probability, i.e. prevalence of

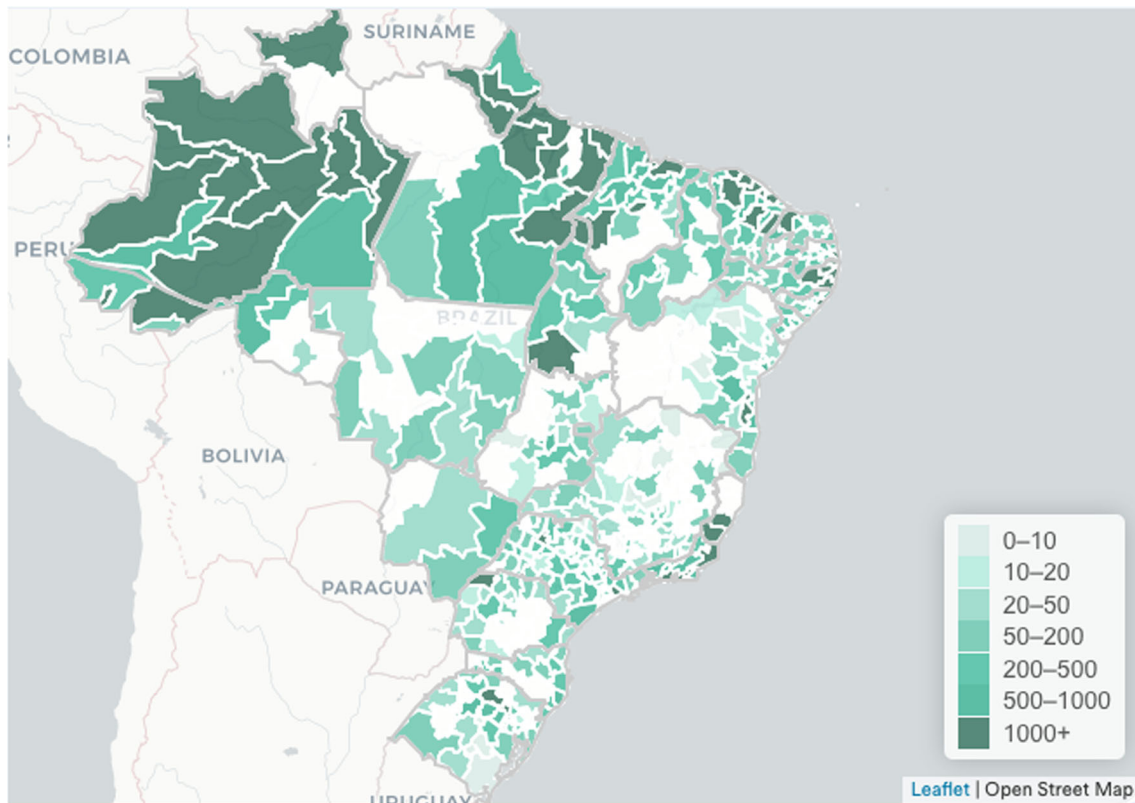


FIG. 1 Brazilian COVID-19 incidence coefficient by health region notification⁹ on 28 May 2020. COVID-19 coronavirus disease 2019

disease in the community.¹¹ Ideally, every region should have their own prevalence study, such as in the state of Rio Grande do Sul,¹² where a populational study found that just 20% of all COVID-19 cases were confirmed. Considering the average duration of the infection is 15 days,¹³ it is possible to affirm that the prevalence of coronavirus infections in Rio Grande do Sul is five times the number of cases confirmed in the last 15 days.

Another option for estimating prevalence in an area where populational studies are not available is to calculate the prevalence rate based on the number of hospitalized patients. The Diamond Princess cruise ship¹³ is probably the most controlled incidence to evaluate the percentage of patients infected by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) who will need hospitalization. After screening 3618 of 3711 individuals on board, 696 individuals (19.2%) were confirmed positive for COVID-19. Of these, 70 patients were transferred to the study's participating hospitals for further medical care.¹³ Considering the Japanese high standards of confirmation, it is fair to affirm that approximately 10% (70/696) of infected patients will require hospitalization. Thus, the prevalence of COVID-19 in one area is approximately 10 times the number of hospitalized patients in the last 15 days.

Obviously, these two methods for estimating the prevalence rate are approximations and are more useful during the plateau of the curve of COVID-19 incidence, as they tend to underestimate the prevalence rate during the ascending phase of the curve and to overestimate during the descending phase. Nonetheless, these methods are useful in helping to decide public policies regarding preoperative orientations and testing.

To optimize the clinical benefit and rational use of the resources, we have empirically divided the preoperative orientations into three groups according to the estimated prevalence rate of COVID-19 in the area, i.e. < 0.1%, 0.1–1%, and > 1%. This way, in areas where it is very unlikely to operate on a patient with a subclinical SARS-CoV-2 infection, testing may be saved for future use. On the other hand, in areas of high prevalence, testing in a more liberal fashion can effectively reduce patients' risk.

THE NEED FOR SURGERY

Resuming cancer surgery does not mean all cancer surgeries must be performed. The Society of Surgical Oncology (SSO)¹⁴ acknowledged that “in these unprecedented times of COVID-19, surgical oncologists are being forced to consider triage and rationing of cancer surgery cases”, the reasons for which include the potential shortage

of hospital personnel, protective equipment, hospital beds, intensive care unit (ICU) beds, and ventilators.¹⁴ For these reasons, the need for cancer surgery must be evaluated on a case-by-case basis.

Patients need to be informed about the necessity of the surgery, all non-surgical options of treatment, and the possible complications related to the risk of a SARS-CoV-2-infected patient being inadvertently operated during the incubation period.¹⁵ In addition, if needed, it is important to explain to the patient the difference between an essential surgery and one that can be safely postponed.

In a major cancer center in US¹⁶, approximately 5–10% of the surgical volume consists of cases that are truly elective (e.g., incisional hernia repairs, cholecystectomy for biliary colic and ostomy takedowns), and another 20–30% of cases are cancer-specific but can safely be deferred for several months (e.g., prostatectomy for low-grade prostate cancer and thyroidectomy for low-grade thyroid malignancies). These numbers are probably repeated in most cancer centers. The cancer center must have policies regarding which surgeries must be delayed. Clear recommendations, such as “no surgeries that have a readily available, appropriate, and equivalent nonsurgical option are allowed” and “no surgeries that may be delayed 2–3 months without a negative impact on patient survival are allowed”, and others,¹⁶ are useful in guiding surgeons and must be updated frequently. It is important to understand that such recommendations may last from a few days to a couple months, but they are not long-lasting. Postponing surgeries avoids expending resources and can protect patients, but must be done rationally.

A recent publication¹⁷ suggested that elective procedures can pragmatically be stratified into essential, which implies that there is an increased risk of adverse outcomes by delaying surgical care for an undetermined period, versus non-essential or discretionary, which alludes to purely elective procedures that are not time-sensitive for medical reasons. For this reason, the BSSO adopted a new classification, which better classifies surgeries regarding its urgency (Table 1). Other countries may use different cut-off periods. The reason for adopting 8 weeks as the cut-off

point between elective-essential and pure elective procedures is that Brazil has a law that ensures patients initiate cancer treatment within 60 days from diagnosis confirmation.¹⁸ This law has been made flexible because of the pandemic, allowing doctors to delay procedures if safe.

More so than having a specific cut-off, the classification time frame is a guide for communication and is not obligatory, hence flexible use of it is advised. One has to consider that patients may have their surgery classification changed for many reasons, including tumor or symptom progression, such as tumor bleeding or gastrointestinal obstruction, for instance.

Several publications^{14,19,20} providing recommendations on the management of specific cancer types during the pandemic, including the perspective of countries with limited resources,²¹ can help cancer surgeons to decide which surgery can be safely postponed.

SURGICAL COMPLEXITY

As expected, and as reported by Lei et al.,⁵ most of the operative patients who developed COVID-19 complications shortly after surgery had complex procedures. For day hospital procedures, the risk of COVID-19 complications are minor, and clinical screening is probably sufficient. These patients do not stay at the hospital and the procedure usually offers minimal risk of contamination of health care workers and other patients. However, special consideration has to be made regarding procedures performed in close proximity to the airways. Front-line health care workers caring for SARS-CoV-1 patients in China who had performed tracheotomies during the epidemic had 4.15 times greater odds of contracting the virus than controls who did not perform tracheotomy (95% confidence interval [CI] 2.75–7.54).²² Taking this into consideration, extra care may be taken during the preoperative screening of those patients, not because of the patients' risk but to reduce the risk of the health care team from acquiring infection. Still, we do not recommend reverse transcription polymerase chain reaction (RT-PCR) testing for those patients, but rather the use of appropriate protection equipment instead.

TABLE 1 Surgical urgency classification and oncologic examples (modified from Stahel¹⁷)

Classification	Urgency	Examples
Emergent	< 1 h	Tracheostomy for laryngeal obstructing tumors
Urgent	< 24 h	Gastrointestinal tumor perforation, tumoral intestinal obstruction
Urgent-elective	< 2 weeks	Orchiectomy for testicular cancer, excisional biopsy for suspected lymphoma
Elective-essential	2–8 weeks	Cancer surgeries in general
Elective	> 8 weeks	Thyroidectomy for small well-differentiated thyroid tumors, basocellular carcinoma excision in non-risky areas

TABLE 2 Cancer surgery complexity classification

Classification	Hospitalization	Expected mortality	Examples
Low complexity	Usually not needed	< 0.1%	Incisional biopsy, skin tumor excision with/without simple local flaps, sentinel lymph node dissection, breast nodule excision, oophorectomy, salpingo-oophorectomy, diagnostic laparoscopy, placement of totally implantable venous access ports
Medium complexity	Usually needed, but low chance of the ICU being needed	0.1–1%	Large skin cancer resection with pedicle flap, breast quadrantectomy, mastectomy, breast reconstruction, axillary lymphadenectomy, inguinal lymphadenectomy, pelvic lymphadenectomy, thyroidectomy, cervical lymphadenectomy, hysterectomy, small hepatectomy, limb amputations, splenectomy, distal pancreatectomy, enterectomy, adrenalectomy, radical hysterectomy, para-aortic lymphadenectomy, partial nephrectomy, radical nephrectomy
High complexity	Needed, and significant chance of the ICU being needed	> 1%	Laryngectomy, glossectomy, glosso-pelvi-mandibulectomy, pulmonary lobectomy, pneumonectomy, thoracotomy, esophagectomy, gastrectomy, duodenopancreatectomy, total pancreatectomy, major hepatectomy, colectomy, rectosigmoidectomy, radical cystectomy, pelvic exenteration

ICU intensive care unit

There is no universally accepted classification for cancer surgery complexity. Surgical complexity is usually related to both hospitalization in an ICU and mortality. Taking all that into consideration, and associated with the imperative to design and implement a clinically relevant decision-making classification, we suggest the following classification (Table 2) to help in rationalizing the preoperative preparation and COVID-19 screening of such patients.

AGE AND COMORBIDITIES

COVID-19 outcomes are worse in elderly patients and/or those with comorbidities.²³ There is conflicting data regarding whether cancer itself or cancer treatment might be a risk factor for COVID-19 patients. A Chinese nationwide analysis²⁴ found that patients with cancer might have a higher risk of COVID-19 than individuals without cancer. However, a cohort from the UK Coronavirus Cancer Monitoring Project²⁵ was not able to identify evidence that cancer patients receiving chemotherapy or other anticancer treatment were at an increased risk of mortality from COVID-19 disease compared with those not receiving active treatment. The authors²⁵ suggested that mortality from COVID-19 in cancer patients appears to be principally driven by age, sex, and comorbidities. As the American Society of Anesthesiologists (ASA) classification²⁶ uses pretty much the same risk factors and has been used universally to stratify risks groups for complications in surgical patients, expanding its use to stratify risks groups for COVID-19 can be a useful tool. We recommend (Table 3) to consider more intensive preoperative COVID-

19 screening in patients with worse ASA classification. This can be especially helpful in the context of limited resources, where testing all patients is not possible, and surgeons may have to choose which patients to test.

AVAILABILITY OF CORONAVIRUS DISEASE 2019 (COVID-19) TESTING

The regional disparities have a strong influence in the COVID-19 testing capacity. In March 2020, Brazil had the capacity to perform 6000 RT-PCR tests per day for COVID-19.²⁷ For this reason, the national recommendation was to only test patients who required hospitalization. In the beginning of May 2020, as testing capacity improved, the government started to offer the test to all symptomatic patients as well as serologic tests for epidemiological control.²⁸ On 12 July 2020, Brazil had a confirmed 1,842,127 COVID-19 cases and had performed 4,572,796 tests,²⁹ which signifies a very low RT-PCR availability at this point, even considering that the number of tests is likely underestimated once registry in private practice examinations is deficient.

Even developed countries may face some limitation to use RT-PCR as a screening tool. A survey applied in Japan³⁰ reported that 87% of head and neck cancer specialists felt the need for RT-PCR preoperative testing, but only 38% actually tested patients, most of which (21%) were in a limited fashion. This may be due to the low capacity of the RT-PCR testing in each institution and the delay in the introduction of RT-PCR testing at the administrative level in Japan.³⁰

According to the authors,³⁰ the preoperative observation and screening tests, including RT-PCR testing and chest computed tomography (CT) scan, are considered essential to preventing perioperative cluster infection of SARS-CoV-2 in the perioperative period and to avoid wastage of medical resources.

It must be kept in mind that embezzled tests from suspected COVID-19 patients to screen preoperative asymptomatic patients is not an option. On the other hand, preoperative screening tests in high-prevalence areas may help to save protective equipment and reduce contamination of health workers and costs related to absenteeism.

In case of availability of the RT-PCR, we suggest that it be performed 24–48 h before surgery and after at least 7 days of self-isolation. Considering that RT-PCR has a false negative rate of 20–30%,³¹ it is possible to affirm that in combination with the clinical screening, likely < 10% of the of SARS-CoV-2-infected patients will be inadvertently operated during the incubation period.

In areas where RT-PCR is not available, using other methods is even more controversial. Regarding the use of chest CT, the Fleischner Society³² recognized that “in highly prevalent areas, an additional uncertainty is whether CT should be used as a screening tool either as a stand-alone or as an adjunct to RT-PCR to exclude occult infection prior to surgery or intensive immunosuppressive therapies”. In the Japanese survey,³⁰ 90% of head and neck cancer specialists perform preoperative CT, at least as frequently as possible. It is important to consider that those professionals are at risk for SARS-CoV-2 infection due to aerosol and droplet exposure during examinations and procedures within the head and neck region and airway. Thus, the authors seem more concerned about preventing the collapse of the medical facility due to the occupational hazard for physicians and other health care workers.

We consider that in the absence of RT-PCR in high-prevalence areas, it is acceptable to offer to perform CT 24–48 h before hospitalization in high-risk surgical candidates, once it is possible to diagnose 54% of the asymptomatic cases of COVID-19.³³ If the patient has an indication of a CT for cancer staging, this strategy may be even more interesting if performed 2 days before surgery as it can work for cancer staging and COVID-19 screening at the same time.

PERIOPERATIVE CARE PROTOCOL FOR CANCER SURGERY PATIENTS IN THE CONTEXT OF LIMITED RESOURCES

In light of all the previous considerations, Table 3 presents our suggested protocol for the rational use of resources to reduce the risk of surgical cancer patients from

being operated on during the COVID-19 incubation period, in the context of areas with limited resources. We divided patients into low-risk, intermediate-risk and high-risk for postoperative or SARS-CoV-2 complications, considering a subclinical infection. As the risk of complications increases, the screening is stricter, but is still flexible, respecting local limitations. As it is our objective to provide options for areas with severely limited resources where RT-PCR may not be available at all, we considered not performing PCR for high-risk patients when surgery cannot be postponed and its benefits overcome the SARS-CoV-2 infection risk.

CLINICAL SCREENING FOR COVID-19

As the majority of patients infected by SARS-CoV-2 will be symptomatic, clinical screening is an important tool. The Fondazione IRCCS–Istituto Nazionale dei Tumori di Milano had a successful experience in the most affected area of Italy.³⁴ They used two levels of clinical screening. At first, every patient underwent a telephone screening process conducted by a member of the anesthesia team. A second screening-line was applied for patients admitted to the hospital, looking for the presence of acute symptoms, defined as persistent fever (> 37.5 °C), suspicion of respiratory infection, and at least one of the following: respiratory rate > 30/min, oxygen saturation (SpO₂) < 90% without oxygen supplementation, or dyspnoea.³⁴ Associated with laboratory and imaging testing, the authors concluded that despite not considering their institution to be ‘COVID-19-free’, they were able to increase the surgical activity to fulfil their cancer-hub role assigned by the local (Lombardy) government.³⁴

As in the Italian experience,³⁴ we suggest clinical screening (modified from the Brazilian Ministry of Health³⁵) for COVID-19 (Table 4) be applied in two levels: prehospital and hospital. The first part of the screening can be applied by telephone, preventing symptomatic patients from going to the hospital. The second level is when patients arrive at the hospital. One must consider that in poor areas, patients may not have access to telephones and the entire screening has to be conducted at the hospital. If any of the answers are positive for suspicion of infection, the patient is referred for clinical evaluation and further testing, if necessary.

PERIOPERATIVE SELF-ISOLATION

Self-isolation seems to be a strong weapon against infection by SARS-CoV-2. Recently, the English National Health System (NHS)³⁶ recommended admitting for elective surgery only those patients who remained

TABLE 3 Preoperative self-isolation, clinical screening, and COVID-19 testing for surgical cancer patients

Age and ASA ²⁶ classification	Low-complexity surgery	Medium-complexity surgery	High-complexity surgery
<i>COVID-19 low-prevalence area</i>			
Age <60 years and ASA I	CS	CS	CS + PIS
Age 60–70 years or ASA II	CS + PIS	CS + PIS	CS + PIS
Age >70 years or ASA >II	CS + PIS	CS + PIS	CS + PIS ± PCR
<i>COVID-19 medium-prevalence area</i>			
Age <60 years and ASA I	CS + PIS	CS + PIS	CS + PIS ± PCR
Age 60–70 years or ASA II	CS + PIS	CS + PIS ± PCR	CS + PIS ± PCR
Age >70 years or ASA >II	CS + PIS ± PCR	CS + PIS ± PCR	CS + PIS ± PCR ^a
<i>COVID-19 high-prevalence area</i>			
Age <60 years and ASA I	CS + PIS	CS + PIS ± PCR	CS + PIS ± PCR
Age 60–70 years or ASA II	CS + PIS ± PCR	CS + PIS ± PCR	CS + PIS ± PCR ^a
Age >70 years or ASA >II	CS + PIS ± PCR	CS + PIS ± PCR ^a	CS + PIS ± PCR ^a
Color coding	Low risk	Intermediate risk	High risk

CS clinical screening, PIS preoperative self-isolation, PCR reverse transcription polymerase chain reaction (RT-PCR) for SARS-CoV-2, COVID-19 coronavirus disease 2019, ASA American Society of Anesthesiologists, SARS-CoV-2 severe acute respiratory syndrome coronavirus 2

^aIn the absence of PCR, chest tomography is acceptable as a screening tool

asymptomatic after isolation for 14 days prior to admission and, where feasible, who tested negative prior to admission. This recommendation is especially useful in the context of limited resources and must be strongly advised, even when RT-PCR is available. For outpatients, the NHS ³⁶ is more liberal in accepting asymptomatic patients to attend to, ensuring they can comply with normal social-distancing requirements. We prefer to also recommend self-isolation to this group of patients, especially in high-prevalence areas. We also recommend surgical cancer patients to self-isolate for 7 days after minor surgery and

14 days after major procedures. In areas where self-isolation is mandatory by governmental regulation, this obviously has to be adhered to.

CONCLUSION

There is no ‘one-size-fits-all’ preoperative recommendation regarding the protection of surgical patients from COVID-19. The rational use of resources is mandatory in the context of limited resources, and local policies must consider the prevalence of COVID-19 in the region, the

TABLE 4 Preoperative clinical screening for SARS-COV-2 infection (modified from the Ministry of Health of Brazil³⁵)*Prehospital screening (telephone or other remote technology)*

1. Have you had cough, sore throat, shortness of breath, runny nose, headache, loss of smell or taste, body pain, chills or fever in the last 14 days?

In children: Nasal obstruction is also considered, in the absence of another diagnoses

In the elderly: Fever may be absent. Specific worsening criteria, such as syncope, mental confusion, excessive sleepiness, irritability, and inappetence should also be considered

2. Have you had close or home contact in the last 7 days with a laboratory-confirmed case for COVID-19?

Note: Also consider contact with suspected cases in medium- and high-prevalence areas

3. Ask the patient to measure their temperature and report any fever (temperature > 37.5 °C)

Hospital screening

Look for the presence of acute symptoms, such as persistent fever (> 37.5 °C), suspicion of respiratory infection, and at least one of the following: respiratory rate > 30/min, oxygen saturation (SpO₂) < 90% without oxygen supplementation, or dyspnea

In children, observe flapping of the nose, cyanosis, intercostal circulation, dehydration, and lack of appetite

SARS-CoV-2 severe acute respiratory syndrome coronavirus 2, COVID-19 coronavirus disease 2019

need for surgery, patients' age and comorbidities, surgical complexity, and the availability of COVID-19 testing. Simple and affordable solutions, such as clinical screening for COVID-19 and self-isolation, may be especially helpful in this scenario, and, along with the rational use of testing, the risk of a cancer patient to be operated on during the incubation period of COVID-19 can be minimized.

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