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## The management of surgical patients during the coronavirus disease 2019 (COVID-19) pandemic



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### ARTICLE INFO

#### Article history:

Accepted 20 April 2020

Available online 1 May 2020

### ABSTRACT

**Background:** The coronavirus disease 2019 (COVID-19) pandemic has raised several issues regarding the management of surgical patients. The aim of the current study was to clarify the management of oncologic and surgical patients during the pandemic.

**Methods:** Relevant publications reporting on the epidemiology of the pandemic, the diagnosis of the severe acute respiratory syndrome coronavirus 2 infection, and the clinical management of cancer and surgical patients, as well as studies concerning health care workers' safety, were included. The last date of research for this study was April 4, 2020.

**Results:** We analyzed 28 papers. Real-time polymerase chain reaction was considered the gold standard for the diagnosis of COVID-19, and computed tomography scans were considered useful for cases of diagnostic uncertainty. Cancer patients and surgical patients were confirmed to be particularly at risk of infection and negative outcome. To guarantee adequate care to these patients, while minimizing the risk for infection, the early postponing of elective surgery, the creation of COVID-free facilities and the identification of COVID- dedicated operating theaters and teams have been proposed. The correct use of personal protective equipment was also strongly advocated, along with the institution of facilities for the psychologic support of health care workers.

**Conclusion:** Clinicians should be aware of the importance of providing adequate care to patients with urgent and nondeferrable clinical issues, such as cancer. Every effort should be made to contain the virus spread in the hospital setting. Also, clinicians should value the importance of self-protection and mental health care.

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### Introduction

On January 7, 2020, a novel coronavirus was isolated from the bronchoalveolar lavage samples of 3 patients suffering from severe pneumonia of unknown cause in Wuhan, China. The 2019-nCoV, as it was initially named, was a novel betacoronavirus belonging to the same family of the pathogens responsible for previous severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS) outbreaks.<sup>1</sup> On February 11, 2020, the International Committee on Taxonomy of Viruses announced “severe acute

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respiratory syndrome coronavirus 2 (SARS-CoV-2)” as the name of the new virus, and the clinical syndrome caused by SARS-CoV-2 infection was named “COVID-19” by the World Health Organization (WHO).<sup>2</sup> On March 11, 2020, with 118,000 cases in 114 countries and 4,291 deaths, coronavirus disease 2019 (COVID-19) was declared a pandemic.<sup>3</sup>

The WHO report dated April 5, 2020, reports 1,133,758 confirmed cases and 62,784 deaths attributable to the COVID-19 outbreak worldwide.<sup>4</sup> With 124,632 confirmed cases and 15,362 deaths up to April 5, 2020, Italy has been the first European nation hit by the pandemic, with the first case registered in Rome on January 31, 2020, and followed by the 2 foci of Codogno and Vo' at the end of February and the inexorable spread across Lombardia, Veneto, and Emilia Romagna. In some regions, such as Lombardy and Veneto, the drastic increase of cases in a very short amount of

time required a massive reorganization of the health care system to deal with the limited capacity of intensive care unit (ICU) departments.<sup>5</sup> Apart from the obvious implications on the management of infected patients, this abrupt change in the health system organization brought up several issues regarding the management of patients with nondeferrable diseases other than COVID-19. Particularly, the management of surgical patients has been burdened by several issues, concerning preoperative and intraoperative management and postoperative care. Relevant issues include the following, among others: the correct timing of elective surgery, the management of cancer patients requiring surgical treatment; the role of routine screening for patients scheduled for surgery, the surgical management of COVID-19 suspected or confirmed cases, the workup of postoperative fever, and the organization of follow-up visits. The role of endoscopy and the protection of health care workers have been also questioned by surgeons in the affected areas. We aimed to review the currently available literature to clarify the management of oncologic and surgical patients, to better define the proper available diagnostic tools, and to infer measures to enhance the safety of health care workers.

## Methods

A systematic review was performed according to the guidelines and recommendations from the preferred reporting items for systematic reviews and meta-analyses checklist.<sup>6</sup> Institutional review board approval was not required.

### Search strategy

An electronic search for relevant publications was performed using the following resources: PubMed, Embase, Ovid, and the Cochrane collaboration database from January 1998 to April 2, 2020. The following search headings were used: “Coronavirus,” “COVID-19,” “SARS-CoV-2.” All titles were initially screened, and appropriate abstracts were reviewed. Relevant publication references were also screened. The last date of search was April 4, 2020.

### Inclusion criteria

To be included in the analysis, studies had to meet the following criteria: (1) epidemiology of the pandemic, (2) diagnostic details, (3) clinical management of cancer and surgical patients, and (4) health care workers' safety.

### Exclusion criteria

Studies that were not based on clinical findings and opinion papers were excluded from the study.

### Data extraction

Two reviewers (G.C. and G.S.) independently reviewed the literature according to the predefined strategy and criteria presented earlier in this report. Each reviewer extracted the following data variables: title and reference details (ie, first author, journal, year, country), study population characteristics, disease characteristics, and main focus. All data were recorded independently by both literature reviewers in separate databases and were compared at the end of the reviewing process to limit selection bias. The database was also reviewed by a third person (A.R.). Duplicates were removed and any disparities were clarified.

### Eligible studies

A total of 2,442 articles were initially identified, using the aforementioned search strategy. On full text screening, 28 publications that met the inclusion criteria were included in the systematic review. All studies were retrospective and were published between January 2020 and March 2020.

### Epidemiology of the SARS-CoV-2 pandemic

#### SARS-CoV-2 outbreak in China

The first cases of atypical pneumonia attributable to infection from SARS-CoV-2 were reported in Wuhan, capital city of the province of Hubei, China, in early December 2019.<sup>7</sup> Studies conducted in the initial phase of the pandemic reported that the clinical manifestations of the disease resembled those of SARS and could lead to severe and even fatal respiratory failure. Older males with comorbidities were reported to be the population at higher risk.<sup>8</sup>

Recently, a retrospective study was conducted on 1,099 patients with laboratory-confirmed COVID-19, hospitalized in China through January 2020, to further investigate the clinical characteristics of the disease.<sup>9</sup> The median age of patients was 47 years (interquartile range, 35–58) the majority were male (58.1%), and the 3.5% of patients were health care workers. The median incubation period was 4 days (interquartile range, 2–7); 15.7% of patients presented with severe disease on admission, these patients were older than the general population of COVID-19 patients by a median of 7 years and were more often affected by coexisting chronic diseases (38.7% vs 21.0%). Among these patients, the cumulative risk of ICU admission, need for mechanical ventilation, and death was 20.6%, compared with 3.6% of the general COVID-19 population. The cumulative case fatality rate was 1.4%, which is lower than those reported for either SARS-CoV or MERS-related coronavirus (MERS-CoV).

#### SARS-CoV-2 outbreak in Europe

In late January 2020, the pandemic hit Europe. The first 2 cases in Italy were registered on January 30, 2020. These patients were 2 Chinese tourists who were admitted to Istituto Spallanzani in Rome and who completely recovered in a few days. The first case of secondary transmission was reported in Codogno, a small town in the Lodi province, Lombardy, on February 18, 2020. Soon after, 2 cases were reported in the small town of Vo' near Padua, Veneto.<sup>10</sup> Italy was strongly involved in the pandemic. By the end of March, Italy had registered the second-largest number of confirmed cases after China.<sup>11</sup> In work conducted at the beginning of the Italian outbreak, Remuzzi and Remuzzi<sup>12</sup> demonstrated how the number of infected patients in Italy followed an exponential trend, predicted that the national could have more than 30,000 cases by March 15, 2020, and indicated the need for more than 4,000 hospital beds by mid-April 2020. Based on these considerations and on the finding of a crude case fatality approximating 4% in the Italian population, many advocated for European nations to adopt strict measures to avoid social interaction and limit the virus's spread.<sup>5</sup>

#### SARS-CoV-2 outbreak management

Rationale and efficacy of the quarantine measures. Since January 23, 2020, mainland China has adopted and gradually strengthened measures to contain the COVID-19 epidemic.<sup>13</sup> On January 31, 2020, the US Centers for Disease Control and Prevention imposed mandatory quarantine for up to 14 days for all citizens returning from Hubei province, China.<sup>14</sup> In Italy, limitation measurements to drastically reduce social interactions were released by the government on March 8, 2020.<sup>15,16</sup> With the spreading of the virus

worldwide, the WHO Strategic and Technical Advisory Group for Infectious Hazards also recommended the adoption of a combination of response measures aimed at containing the outbreak, such as case and contact finding, containment, and public awareness measures.<sup>17</sup> Some issues still exist concerning the efficacy of isolation and quarantine measures. One of the most important issues, is that SARS-CoV-2 has been found to be transmitted by mildly symptomatic and asymptomatic persons.<sup>18,19</sup> Recently, a pooled analysis of confirmed COVID-19 cases reported between January 4, 2020, and February 24, 2020, was conducted, to define the length of the incubation period of SARS-CoV-2 and thus to support or refute the current disposition about isolation and quarantine.<sup>20</sup> The study included 181 patients with confirmed SARS-CoV-2 infection outside Hubei province, China. The median incubation period of COVID-19 was 5.1 days, with nearly all infected symptomatic persons developing symptoms within 12 days of infection. The authors concluded that a period of active monitoring of 14 days, as recommended by the US Centers for Disease Control and Prevention and adopted in many countries, including Italy, can be considered well supported by the available evidences.

#### *Future scenarios. Forecasting the SARS- CoV-2 pandemic*

Many investigators have been questioning the possible evolution of the COVID-19 pandemic and its implications on the global scale. Forecasting has been made difficult by the scarcity of historical data on the pandemic and by a variety of confusing factors, including psychological ones.

Petropoulos and Makridakis<sup>21</sup> proposed an objective approach to predict the trend of the COVID-19 pandemic, using the following premises: the available data are reliable, and the disease will continue to follow the past pattern in the future. With this approach, the authors predicted 83,000 new cases for the period from March 12, 2020, to March 21st, 2020, with a 5% chance that the total confirmed cases would be 413,000 and a 5% chance that the case number would exceed 1,900,000. The authors also observed a recovery rate of 1 out of 2 confirmed cases, and a ratio of recovered cases versus deaths above 14:1. This prediction did not take into account the adoption of measures to contain the outbreak and the potentiation of national health systems to better treat infected patients.

#### *Diagnosis of COVID-19*

Early diagnosis is pivotal to treatment and containment measures. Patients with severe clinical manifestations at the time of admission are more likely to develop major complications and death.<sup>9</sup> In contrast, patients with very mild symptoms are recognized vehicles for the virus spreading.<sup>18,19</sup> According to the guidelines released by National Institute for the Infectious Diseases “L. Spallanzani,” in areas where local transmission is observed, any patient with clinical manifestations of acute respiratory infection (ie, acute onset of at least one of the following signs/symptoms: fever, cough, difficult breathing) should be considered a suspected case.<sup>22</sup> The authors define a “confirmed case” as “a person with laboratory confirmation of SARS-CoV-2 infection by Real Time PCR.”

#### *The role of chest X-ray*

The Spallanzani guidelines also highlighted the utility of chest X-ray as a valuable tool for initial assessment and follow-up of COVID-19 patients, even those patients in stable conditions.<sup>22</sup> A retrospective study carried out in Hong Kong, which included 64 COVID-19 patients evaluated between January and March 2020, reported a baseline sensitivity of 69% for this examination; the radiographic and virologic recovery were not significantly

different.<sup>23</sup> Of note, the extensive use of radiologic studies could also result as counterproductive during an outbreak in which containment of the spread should be the major concern. Thus, some authors have proposed chest ultrasound as a diagnostic tool to limit the number of health care workers involved in patients' initial evaluation. At the Gemelli Hospital in Rome, this procedure has already been introduced for pediatric patients.<sup>24</sup>

#### *The role of chest computed tomography scan in early diagnosis of COVID-19*

Although real-time protein chain reaction (RT-PCR) has been widely adopted as the gold standard for the diagnosis of COVID-19, false negative results have been reported.<sup>25</sup> In addition, the results are not as rapidly available as frequently required, because the test can only be performed at National Reference Laboratories and because of its extensive use as a screening method. To partially obviate to these issues, some have proposed a role for chest computed tomography (CT) scans in the early diagnosis of COVID-19. A retrospective study involving 81 patients with laboratory-confirmed COVID-19 pneumonia who were admitted to 1 of 2 hospitals in Wuhan from December 20, 2019, and January 23, 2020, was conducted to analyze the evolution of chest CT imaging features.<sup>26</sup> A ground-glass opacification was noted in most patients from the very beginning of symptoms. A separate recent study investigated the clinical utility of both RT-PCR and chest CT scan in the workup of suspected COVID-19 patients, treated from January 20, 2020, to February 8, 2020, at the Yichang Yiling Hospital, in Yichang, China.<sup>27</sup> A total of 87 patients underwent both CT and real time reverse transcription polymerase chain reaction (rRT-PCR), with positivity of first or repeated rRT-PCR tests being the gold standard for the diagnosis of COVID-19. A total of 36 cases were diagnosed with COVID-19 pneumonia. Among these cases, only 1 patient had a normal CT scan at admission, and 6 patients had a negative RT-PCR at presentation. These findings led to a sensitivity of 97.2% for CT scan and of 84.6% for first round rRT-PCR. The authors conclude that patients with typical chest CT features should be isolated and RT-PCR should be repeated at intervals of 2-3 days.

Another study with the same aims was conducted among patients admitted at Taizhou Enze Medical Center (Group) Enze Hospital, Taizhou, Zhejiang Province, China, from January 19, 2020, to February 4, 2020. In this series of 51 patients, the sensitivity of CT was 98% versus an RT-PCR sensitivity of 71% ( $P < .001$ ).<sup>28</sup> A main limitation with large-scale CT use would increase radiation exposure of the population.<sup>29</sup> In addition, the need for extensive cleaning between cases would make this method also not readily available.<sup>30</sup> Thus, CT scans are currently reserved for severe patients and for cases of diagnostic uncertainty.<sup>22,30</sup>

#### *Clinical management of cancer patients: Current evidence and guidelines*

##### *Increased risk of SARS-Cov-2 infection and COVID-19-related death in cancer patients*

During any pandemic outbreak, patients with previous health issues are at higher risk of infection and negative outcomes. For cancer patients, this is true not only because of the state of immunosuppression consequent to systemic therapies, but also because of the high number of hospital contacts required for therapies and follow-up appointments. Several studies have evaluated the impact of COVID-19 on cancer patients. A retrospective study was conducted on 1,524 patients with cancer who were admitted to the Department of Radiation and Medical Oncology, Zhongnan Hospital of Wuhan University, China, from December 30, 2019, to February 17, 2020. The authors reported an infection rate of

0.79% in this population, which was higher than the cumulative incidence of all diagnosed COVID-19 cases that was reported in the city of Wuhan during the same time period (0.37%). Of the 12 infected cancer patients, 5 (41.7%) were receiving systemic therapy for their primary disease. Three patients (25.0%) developed a severe respiratory syndrome, 1 patient required intensive care, and 3 patients (25.0%) died.<sup>31</sup>

A similar trend was noted in an analysis of 1,590 COVID-19 cases, conducted on behalf of the National Clinical Research Center for Respiratory Disease and in collaboration with the National Health Commission of the People's Republic of China until January 31, 2020.<sup>32</sup> According to this study, a history of cancer was the highest risk factor for severe events (ie, admission to the ICU, need for invasive ventilation, or death) in the study population. Moreover, patients who underwent chemotherapy or surgery in the past month had a numerically higher risk of clinically severe events (75%). Based on these findings, the authors proposed the following strategies to reduce the risk of infection and death among cancer patients during the COVID-19 pandemic:

- Postpone adjuvant chemotherapy and elective surgery for stable cancer patients in endemic areas.
- Provide adequate personal protection devices to these patients.
- Intensify surveillance and potentiate treatment in cancer patients infected by SARS-CoV2.

#### *Cancer care at the time of COVID-19*

Since the beginning of the pandemic, the reorganization of cancer care has represented one of the most crucial issues worldwide. The main goal has always been “treating patients with cancer in the same way as under normal circumstances,” as stated by Alan Boyd (Academy of Medical Royal Colleges, London, UK) in an interview.<sup>33</sup> The management of cancer patients in those countries heavily involved in the pandemic remains a challenge. To provide guidance on the subject, the Italian Association of Medical Oncology (AIOM) along with the boards of Academic Oncologists and of Oncology Unit Directors, as well as the Italian Association of Oncologic Surgery (SICO) provided some practical suggestions. Three categories of patients have been proposed: patients currently receiving active treatment, patients in follow-up, and patients who require admission to the hospital. Clinicians have been recommended to consider a delay of active treatments based on case-by case evaluation, avoid follow-up visits for disease-free patients, and verify the clinical conditions prior to hospitalization to avoid contact of suspected cases with other patients and caregivers.<sup>34</sup> These suggestions have raised several concerns, particularly considering the possible effects of treatment delay in cancer patients and the issue of screening deferral. Italian Young Oncologists have also expressed their opinions on the subject, supporting AIOM positions and advocating for more extensive use of telemedicine. The Young Oncologists Perspective can be summarized as protect yourself, oncological care of our patients, and patients themselves.<sup>35</sup>

The need to delay nonessential treatments have been underlined by several studies. Kutikov et al<sup>36</sup> have proposed “Guidance on decisions about immediate cancer treatment” based on the risk of progression of various neoplasms, to be used by nonspecialists to stratify the acceptability of treatment delay. The risk for progression has also been linked to significant morbidity from COVID-19, stratified by age groups (ie, <50 years of age, 50–70 years of age, >70 years of age).

#### *Clinical management of surgical patients: Current evidence and guidelines*

The outbreak of the COVID-19 pandemic has raised several issues in the management of surgical patients. These patients may

represent a high-risk group because of either the increased risk of nosocomial infection and the effects of surgical and anesthetic stress. The increased risk of COVID-19 related deaths among patients undergoing elective surgery has been underlined by a retrospective case series of 4 patients who developed perioperative pulmonary complications after otherwise uncomplicated surgical procedures in Teheran, Iran, in February 2020.<sup>37</sup> In this series, 3 patients developed postoperative fever and pulmonary symptoms after elective operations, and 2 patients died because of respiratory complications.

It is widely recognized that the goal of surgical care during any pandemic should be to guarantee essential care and minimizing the risk of spread and conserving valuable resources. To ensure this, several authors have furnished evidence-based and empirically supported recommendations. Dexter et al<sup>38</sup> provided recommendations relative to anesthesiologists aimed at an evidence-based approach to minimizing perioperative transmission in the management of surgical patients with confirmed or suspected SARS-CoV-2 infection. Similarly, Wong et al<sup>39</sup> described several measures that have been adopted by the Division of Anesthesiology at Singapore General Hospital to facilitate care of surgical patients with known or suspected COVID-19, as well as reduce the risk of perioperative viral transmission.

Based on the reported experiences from the areas most affected, Brindle and Gawande<sup>40</sup> from the Brigham Health and Harvard TH Chan School of Public Health in Boston identified 7 strategies to plan the approach to surgery during the COVID-19 outbreak. SICO has also provided guidelines concerning the management of cancer patients who are in need of a surgical treatment.<sup>41</sup> These strategies and recommendations cover the entire field of surgical care, from preoperative management of positive and suspected cases, to organization of the operating theaters and postoperative patient care.

#### *Preoperative management of suspected or confirmed COVID-19 patients*

Several studies have supported mandatory postponement of elective surgery.<sup>37-40</sup> For patients with cancer, case-by-case evaluation should be performed and surgery for this population of patients may be warranted, especially among patients in whom a delay would lead to negative long-term outcomes (eg, cancer patients scheduled for diagnostic or therapeutic procedures).<sup>40</sup> In contrast, some have argued that among confirmed COVID-19 patients only emergency and not elective surgery should be performed.<sup>39</sup>

Routine screening for all patients scheduled for surgery has also been proposed to avoid perioperative transmission.<sup>37,41</sup> Particularly, SICO recommends to screen patients for COVID-19 48 hours before surgery. Negative patients should then continue with surgical management as planned. Patients who test positive should be treated in dedicated hospitals or units with further care of the infection or managed at home until testing negative for COVID-19. This approach has been judged, however, to be impractical in many settings. Indeed, RT-PCR requires longer times than the delay feasible in the urgent or emergent setting, while CT scan has not been deemed adequate to serve as a screening tool.<sup>22,29,30</sup> In fact, some authors also recommend considering all patients admitted to the hospital as suspected SARS-CoV-2 cases.<sup>38</sup>

In this setting, the use of personal protective equipment (PPE) has been recognized to be of primary importance in both the preoperative and intraoperative management of surgical patients.<sup>38-40</sup> The identification of team members who will manage COVID-19 cases for the day should also be taken in consideration,<sup>40</sup> along with the adoption of relatively long shifts to reduce potential COVID-19 exposure.<sup>39</sup> The use of PPE, although essential, should be considered as less efficient than reorganization measures apt to

minimize health care workers' contact with suspected or confirmed cases.<sup>39</sup> Regular screening of health care workers, as it is currently conducted in Veneto, Italy, has also been advocated as a necessary measure to minimize the risk of virus spreading in the hospital setting.<sup>41</sup>

When surgery is decided, consent and charting should be filled out electronically. Suspected or confirmed infected patients should be transported to the operating theatre after a designated route, designed to minimize contact with others. All patients should wear a surgical mask.<sup>39</sup> The SICO, along with many other organizations, also advocates for the creation of COVID-free hospitals/units, to guarantee the best possible care to surgical cancer patients, minimizing the risk of COVID-19 infection during hospitalization. In fact, surgical cancer patients are particularly at risk, because of the immunosuppression caused by their disease and to the inevitable surgical and anaesthesiologic stress inherent to the operation. The creation of facilities exclusively dedicated to cancer care, as already realized in Lombardy, may allow for a safer, COVID-free pathway for these patients and potentially guarantee the presence of completely dedicated health care professionals.<sup>41</sup>

#### *Intraoperative management of suspected or confirmed COVID-19 patients*

When surgery is planned, a team meeting should be organized to accurately plan anaesthesia and surgical approaches.<sup>39</sup> When planning the intervention, surgeons should prefer approaches that may decrease the exposure of the operating staff and shorten the duration of surgery.<sup>40</sup> Regional anaesthesia is preferred if feasible. If general anaesthesia is mandatory, a definitive airway with an endotracheal tube is then preferred.<sup>39</sup> Operating room staff should be limited to people who are necessary to complete the procedure. In this setting, trainees should not be involved if not necessary, and staff who are not needed should preferably be left out.<sup>40</sup> Necessary surgical equipment should be selected in advance and brought to the designated operating room. Preference should be given to single-use equipment.<sup>39</sup> There is a necessity to identify a separate theatre or small operating room complex for suspected or confirmed COVID-19 patients.<sup>38–40</sup> Such a theatre should ideally be a negative pressure environment.<sup>38,39</sup> Alternatively, frequent air changes (25 per hour) should be guaranteed.<sup>39</sup> Specific areas should be identified for donning and doffing of PPE, all doors of the operating room should be locked, and traffic in and out the theatre should be strictly controlled.<sup>38,39</sup> The principle of “3 zones and 2 passages” should be followed, with identification of a contaminated zone, a potentially contaminated zone, and a clean zone, separated by adequate buffer areas.<sup>42</sup>

Dexter et al<sup>38</sup> provided an extensive explanation on the organization of the ideal operating theatre in COVID-19 times. The authors stressed the importance of designing and respecting clean and dirty areas, as well as placing hand sanitizing devices and disinfection caps for syringes and hubs in proximity to the providers. Proper patient decolonization, using preprocedural chlorhexidine tips, nasal povidone iodine, and chlorhexidine mouth rinse are critical.<sup>38</sup> At the end of every intervention, extensive cleaning should be carried out.<sup>38,39</sup> Staff should be given the opportunity to shower and change into clean scrubs.<sup>39</sup> Patient recovery should be carried out in the same operating room as where surgery was performed.<sup>38–40</sup> Anesthetic drugs could also be selected to minimize recovery whenever possible.<sup>39</sup>

#### *Notes on postoperative management*

Surgical patients are at a higher risk of developing severe complications from the SARS-CoV-2 infection. A high index of suspicion for COVID-19 is necessary to monitor for the development of postoperative fever or respiratory manifestations,<sup>37</sup> so as to

minimize the time for diagnosis and thus reduce the risk of negative outcomes. Diagnosis of COVID-19 in surgical patients should follow the same rules as noted earlier in this report. Follow-up visits should also be limited to essentials. Telemedicine should also be extensively adopted in follow-up.<sup>37</sup>

#### *Endoscopy: General recommendations*

Lui et al<sup>43</sup> have provided a summary of endoscopy societies and expert groups recommendations concerning the use of endoscopy during the COVID-19 outbreak.<sup>43</sup> Endoscopy is generally considered a high-risk procedure because of the potential contact with pulmonary and gastric secretions. Therefore, its use during the COVID-19 pandemic should be limited to the management of endoscopic emergencies (ie, gastrointestinal bleeding, acute cholangitis, biliary pancreatitis, foreign body retrieval), as well as some suspected or confirmed cancer cases after accurate case-by-case evaluation. The same principles that have been adopted for surgical interventions should be applied when performing high-risk endoscopic procedures, including bronchoscopy, upper gastrointestinal procedures and any procedure performed in suspected or confirmed patients. In such cases, an adequate space with specific areas for donning and doffing of PPE should be identified, and adequate personal protections should be used (including N95 respirators or equivalent and water-resistant gowns). Adequate sedation should also be carried out to minimize patient retching and aerosolizing of nasopharyngeal secretions.

#### *Health care workers' safety during COVID-19 pandemic*

##### *Health care workers' protection during COVID-19 pandemic*

As of February 20, 2020, WHO reported 2,055 laboratory-confirmed COVID-19 cases among health care workers in China.<sup>44</sup> Up to April 9, 2020, a total of 100 doctors and 26 nurses died of COVID-19 in Italy. Health care workers are generally more exposed to the risk of infection during pandemics attributable to the contact with infected patients, to the immunosuppressive effect of long and stressful work shifts, and to the possible shortage of PPE.<sup>45</sup> Chen and Huang<sup>46</sup> described 3 distinct phases in the COVID-19 outbreak in China and each phase's impact on health workers' protection: a first stage, in which the disease was virtually unknown and health workers were subsequently poorly protected; a second stage of partial disease recognition and lack of protection supplies; and a third stage, in which the disease impact on health was fully recognized, and health workers were finally fully protected. The authors reported an infection rate from 3.5%–29% among health care workers in Wuhan during the first stage.

To better characterize the risk profile of health care workers, a retrospective cohort study was carried on among the health care personnel with acute respiratory symptoms in Wuhan.<sup>47</sup> The population was divided into a high-exposure group and a general group, with high exposure being defined as work in high-risk departments (ie, the respiratory, infectious diseases, ICU, and surgical departments). The authors reported a relationship between the infection risk and the contact with a diagnosed family member, diagnosed patients, and suspected patients. A high infection risk was connected to poor hand washing and incorrect use of PPE. Overall, workers in the high-risk group had more than a two-fold higher risk of developing COVID-19.

PPE shortages have been responsible for health workers' infections during the COVID-19 outbreak.<sup>45–47</sup> Zhang et al<sup>45</sup> underlined the importance of theoretical courses and practical training concerning PPE use and infectious diseases management and proposed that such activities should be regularly carried out by both medical students and medical professionals. The Singapore

experience also demonstrated the utility of in situ simulation training, as a meaning to improve clinical skills, teamwork, and behavior.<sup>39</sup>

#### Health care workers' mental health during COVID-19 pandemic

In a review concerning health care worker safety, Zhang et al<sup>45</sup> also underlined the importance of easy access to mental health facilities for people who are involved in the management of epidemics. Stress, anxiety, depressive symptoms, and insomnia have all been documented in the medical workers in Wuhan during the COVID-19 outbreak.<sup>48</sup> Moreover, the inability to provide all patients with the best possible care, because of the shortage of resources that occurs during a pandemic, could cause some health workers to experience “moral injury” (ie, the development of negative thoughts about themselves or others and feelings of shame, guilt, or disgust).<sup>49</sup> Such symptoms may also evolve into depression, post-traumatic stress disorder, and even suicidal ideation. In China, psychologic intervention teams were set up by the RenMin Hospital of Wuhan University and Mental Health Center of Wuhan to deal with these challenges.<sup>48</sup> Greenberg et al<sup>49</sup> proposed several strategies to minimize mental health issue development for health care workers facing the pandemic: provide correct and exhaustive information of what will be the actual work conditions and psychologic challenges, discuss such challenges in groups, and introduce routine support processes (ie, peer support programs).<sup>49</sup> Moreover, the authors underlined the importance of “active monitoring” of staff in time, even after the acute phase of the pandemic has passed.

#### Conclusion

In conclusion, the COVID-19 pandemic represents a major challenge to national health systems around the world. While facing the outbreak, clinicians should be aware of the importance of providing adequate care to patients with urgent and nondeferrable clinical issues, such as cancer. Every effort should be made to reach a common goal: Contain the virus spread and ensure the best possible care to our patients in critical times. Clinicians should value the importance of self-protection and mental health care so as to preserve their physical and psychologic integrity.

#### Funding/Support

The authors did not receive any funding or financial support for this project.

#### Conflict of interest/Disclosure

The authors declare no competing interests.

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