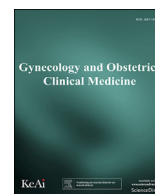




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## Expert consensus on the management process of gynecological emergency under the regular epidemic prevention and control of COVID-19



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### ABSTRACT

At present, China is in the stage of the COVID-19 epidemic where regular prevention and control measures are required to contain the spread of disease. Reports of new sporadic cases are still widespread across China and medical personnel remain at high risk of exposure to infection. This is especially the case for medical staff working within emergency departments. Most gynecological emergency cases are complex and a high proportion require emergency surgical treatment. By referring to national regulations and requirements on COVID-19 prevention and control, and by summarizing our experiences in the battle against COVID-19 within Wuhan, this consensus report provides recommendations on the triage, reception, consultation, admission and surgical management of gynecological emergency patients. We also make suggestions for the environmental layout and disinfection and the medical waste management. This consensus aims to optimize the diagnosis and treatment process of gynecological emergency patients and reduce the exposure risk of medical staff within the current context of routine COVID-19 prevention and control.

### 1. Introduction

Following the outbreak of the 2019 novel coronavirus disease in December 2019,<sup>1</sup> its causative pathogen has spread rapidly into 192 countries, causing over 100 million known infected cases and over 2.2 million deaths to date. The World Health Organization (WHO)

announced the official name for the epidemic disease: Corona virus disease 2019 (COVID-19) on 11 February 2020; the International Committee on Taxonomy of Viruses renamed the pathogen of COVID-19 as severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2).<sup>2</sup> Through joint national efforts in 2020, China survived the most difficult period of the COVID-19 epidemic; however, we remain in a period where

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regular prevention and control of COVID-19 is required to contain the spread of this infectious disease. New sporadic cases are still being reported across many places in China. Medical personnel therefore remain at high risk of exposure to COVID-19, and this is especially the case for healthcare staff working within emergency departments (includes emergency gynecology clinics). In response to the continued risk, the National Health Commission issued the "Notice on Standardizing the Diagnosis and Treatment Process of Medical Institutions under the Regular Prevention and Control of the Epidemic".<sup>3</sup> Medical institutions across the country should adhere to the requirements of this notice, standardizing the diagnosis and treatment process with strict implementation of prevention and control measures. These guidelines aim to optimize both the medical treatment of patients and the safety of medical personnel.

Abdominal pain and vaginal bleeding are the chief complaints amongst gynecological emergency patients. Most of these emergency cases are complex and can involve a wide variety of diseases. In the context of the ongoing COVID-19 epidemic, medical staff are at a greater risk of infection and face greater difficulties in clinical practice than in the past. This raises a number of questions surrounding the management of gynecological emergencies. Therefore, in order to improve the diagnosis and treatment of gynecological emergencies during the COVID-19 pandemic, we carefully summarize our experiences with prevention and control measures within the hospitals of Wuhan and Hubei, discussing the characteristics of emergency gynecological diseases and exposure risk of relevant healthcare personnel during clinical work. In addition, we make recommendations for standardizing emergency pre-examination, admissions, gynecological surgery strategies, environment layout and disinfection management, alongside other medical procedures for gynecological emergency patients.

## 2. Transportation process of gynecological emergency patients

### 2.1. Pre-hospital transportation

For patients seeking emergency medical services, the 120 command and dispatch center should identify potential risks using the early warning score.<sup>4</sup>

The 120 command and dispatch center must quickly determine whether patients have fever, any travel history in high-risk epidemic areas, any contact history with COVID-19 patients, etc., to assess emergency cases. Patients with low-risk of COVID-19 infection can undergo rapid home visits with primary protection. When receiving medium- and high-risk patients, medical staff should adopt secondary protection and transfer patients within a negative pressure ambulance.<sup>5</sup> During transfer, the fever clinic should be informed in advance and should receive patients through a specific channel to the designated area.<sup>6</sup> The requirements of primary and secondary protection see [Table 1](#).

### 2.2. Patient transport in hospital

Transport procedure for suspected or confirmed COVID-19 patients

**Table 1**  
The requirements of primary and secondary protection.

Primary protection	Strict adherence to the principle of standard prevention; Strictly abide by the rules and regulations of disinfection and isolation. Wear overalls, caps and surgical masks. Wear latex gloves when necessary. Strictly practice hand hygiene. Pay attention to the protection of respiratory tract and mucous membrane
Secondary protection	Strict adherence to the principle of standard prevention; Strictly abide by the rules and regulations of disinfection and isolation. Wear medical protective masks, work clothes, isolation clothing, shoe covers, gloves and work caps. In strict accordance with the regional management requirements, properly wear and take off protective equipment, and pay attention to the respiratory tract, oral cavity, nasal mucosa and eye hygiene and protection.

should refer to the "Pre-hospital emergency transport scheme for COVID-19 cases"<sup>7</sup> and the "Transport route of emergency department for COVID-19 patients."<sup>6</sup> During transport, medical personnel should strictly implement the three-level protection measures; hospitals with negative pressure isolation stretchers should make use of these during transportation to avoid the spread of the SARS-CoV-2. For patients needing emergency surgery, a designated transport channel should be established for entry to the emergency isolation operating room. Specially assigned personnel should ensure the passage is unobstructed to prevent the need for stopping on route, reducing exposure risk to other hospital staff.<sup>8</sup>

## 3. Emergency Inquiries at triage station

Prior to reception on site, when imaging results and SARS-CoV-2 nucleic acid or antibody test cannot be obtained to determine COVID-19 status of the patient, careful assessment of patient history and preliminary analysis of clinical manifestation of disease should be made.<sup>4,9</sup>

The triage station should first assess whether the patient's vital signs are stable. For critically ill patients, emergency treatment should be performed under secondary protection. For non-critically ill patients with stable vital signs, the triage station should evaluate whether the patient is of medium- or high-risk. Care should be taken to determine whether the patient has travelled from a high-risk COVID-19 region within the last 14 days. Assessment of the patient for history of close contact with a confirmed/suspected COVID-19 case or demonstration of respiratory infection symptoms such as fever (axillary temperature  $\geq 37.3$  °C), cough, etc., should also be made.<sup>10</sup> SARS-CoV-2 nucleic acid and antibody examination should be performed in a timely fashion. In the absence of fever, respiratory symptoms or epidemiological history of potential COVID-19 exposure, medical staff can quickly receive patients for examination and treatment under first-level protection.

## 4. Reception process of gynecological emergencies

### 4.1. Characteristics of gynecological emergencies

Gynecological emergencies can involve a wide range of disease and are often accompanied by other complications. Most gynecological emergency patients present with abdominal pain and vaginal bleeding. Fever is common with pelvic infectious diseases, posing a challenge for medical personnel when distinguishing acute abdomen from COVID-19. Gynecological emergencies include ectopic pregnancy, ruptured corpus luteum, torsion of an ovarian tumor, ruptured ovarian tumor, inevitable miscarriage, abnormal uterine bleeding, intra-abdominal hemorrhage causing hemorrhagic shock, vaginal stump bleeding, severe bone marrow suppression with fever following chemotherapy, pelvic cavity malignant tumors with associated large volume pleural effusion or ascites, vulvo-vaginal trauma, and hematomas cause hemorrhagic shock. These may be accompanied by abdominal pain or fever. As COVID-19 patients may also present with abdominal pain and/or fever, careful differential diagnosis is required by the attending physician.<sup>11</sup>

Patients with a history of gynecological surgery or cancer have reduced immune function and are at increased risk of pulmonary infection. Both ventilator assistance and supine position following surgery lead to prolonged postoperative pulmonary function recovery time. At present, minimally invasive surgical approaches, such as laparoscopy and hysteroscopy, are widely used. During laparoscopic surgery, pneumoperitoneum can lead to decreased lung volume, increased airway pressure, CO<sub>2</sub> retention and decreased lung compliance, which is not conducive to timely postoperative lung function recovery. Gynecological emergency patients also frequently demonstrate multiple complications. Emergency surgery requires the joint participation of multiple departments - gynecology, anesthesiology, operating room, infectious disease, internal medicine, surgery department and medical affairs - when undertaking decision-making and establishing the multidisciplinary treatment (MDT) team.<sup>12</sup>

#### 4.2. Preparation of gynecologist before reception

Medical service should be carried out in accordance with the requirements of “Covid-19 Prevention and Control Plan (Seventh Edition)<sup>10</sup>”, and “Covid-19 Diagnosis and treatment plan for COVID-19 (trial version 8)<sup>9</sup>”, alongside the workflow of the emergency department. It is recommended that gynecologists adopt appropriate levels of protection according to the patient’s risk of developing COVID-19; consideration should be given to the different emergency areas visited by the patient. Primary protection should be adopted when receiving low-risk patients in pre-examination and triage. For patients in which COVID-19 has not been excluded, secondary or tertiary protection is recommended during gynecological examinations or invasive procedures such as retrovaginal fornix puncture or abdominal puncture. Hand hygiene should be practiced in accordance with the “Specification of hand hygiene for health-care worker WS/T 313–2019<sup>13</sup>”; this includes hand washing with running water before and after wearing gloves or removing isolation clothing.<sup>14</sup>

#### 4.3. Reception and consultation

At reception and consultation, the patient’s temperature should be reassessed. A patient history should be taken to check for symptoms related to COVID-19; in particular, history of headache, changes in smell, diarrhea, cough and expectoration should be investigated. A patient history for contact with known/suspected COVID-19 cases or recent travel within high-risk regions should also be taken. Patients should also be asked in detail about their sexual history, marital and child history, menstrual history, gynecological complications, and other relevant medical history. Fever accompanied by respiratory symptoms is the typical manifestation of COVID-19 patients, but some COVID-19 patients display nausea, diarrhea, abdominal pain and other symptoms as the first indication of infection, and may lack typical respiratory manifestations. Such patients are prone to missed diagnosis or misdiagnosis; receiving physicians should be vigilant.<sup>12</sup>

#### 4.4. Establishing a “green passage”

Within the current setting of regular COVID-19 epidemic prevention and control, the green channel is of great significance to reduce the mortality rate of patients with acute and critical diseases. Where there is

a gynecological emergency and fever clinics are not staffed with gynecologists or house rescue equipment, critically ill patients in moderate/high-risk groups should be transferred to an isolation emergency room or isolation wards according to the isolation prevention and control standard of COVID-19 via the green channel. The specification of patient transport in-hospital can refer to the above guidelines in section 2.2. Medical personnel in isolated emergency rooms should be equipped with secondary or tertiary protection. The department of gynecology should set up an isolation ward with rescue equipment and trained doctors. The department should prepare in advance for the transfer, preoperative examination, and postoperative monitoring of gynecological emergency patients. SARS-CoV-2 nucleic acid and antibody sampling should also be performed as soon as possible to exclude possible COVID-19. Patients testing negative for COVID-19 should be admitted into an isolation room.

#### 4.5. Diagnosis and treatment workflow of gynecological emergency

The diagnosis and treatment workflow of gynecological emergency patients can be seen in Fig. 1.

### 5. Related examinations for gynecological emergency patients

During the current climate of regular COVID-19 epidemic prevention and control, optimization of the clinical laboratory workflow is of great importance. When collecting, testing and transporting specimens from emergency patients, personnel should refer to the “Manual for New Coronavirus Nucleic Acid detection in Medical Institutions (Trial)<sup>15</sup>”. The collection and transportation of specimens from suspected COVID-19 patients must be performed by professionally trained medical staff.<sup>16</sup>

Results of SARS-CoV-2 nucleic acid testing for emergency patients should be reported within 4–6 h, in line with requirements of the “Notice of the General Office of the National Health Commission on the Prevention and Control of Covid-19 Epidemics in Autumn and Winter in Maternal and Child Health Institutions<sup>17</sup>”. Patients with a positive nucleic acid test should be reported online within 2 h via the Chinese Disease Control and Prevention Information System.

In addition to SARS-CoV-2 nucleic acid and antibody tests, lung CT, routine blood tests, coagulation function, liver and kidney functions, electrolytes, HCG tests, pre-transfusion tests, blood group tests, and gynecological B-ultrasound tests are often required for gynecological emergency patients. Gynecological B-ultrasound is useful when

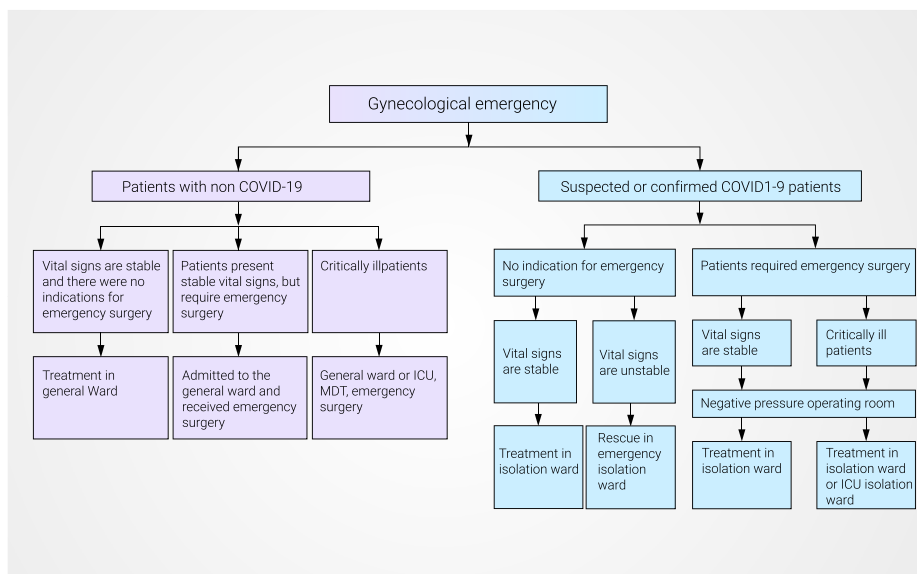


Fig. 1. Flow chart of diagnosis and treatment for emergency gynecological patients. MDT: Multidisciplinary team; ICU: Intensive Care Unit.

evaluating the patient for potential intraperitoneal hemorrhaging, pelvic mass and ectopic pregnancy, among other applications. It is recommended that the ultrasound and CT/DR examination rooms are set up within the emergency department, where possible. The department should establish a dedicated examination channel separate from the normal channel for staff and patients; where possible, all of these routes should operate a one-way system. Thorough disinfection of the ultrasonic probe and CT/DR inspection table should be performed. Equipment, surfaces, floors and air should be disinfected, and protective equipment should be placed in a designated location.

## 6. Strategies for emergency gynecological surgery

### 6.1. Preoperative preparation

Pre-operative reporting to the general-on-duty, medical affairs department, hospital infection-control department and other management departments should be undertaken. Appropriate surgical routes should be taken. Prior to surgery, fully communicate and discuss with the relevant personnel in the operating room and the anesthesiology departments, confirming the surgical position and anesthesia method. MDT team discussion of possible intraoperative or postoperative complications and a detailed treatment plan should be undertaken, including the following departments as appropriate: gynecology, anesthesiology, operating room, infection, internal medicine, surgery. The surgeon should be contacted in advance. Minimize the number of personnel involved in surgery. If a surgical condition is found during the operation, further surgical personnel can be invited to join in the procedure. Communicate with the blood transfusion department to ensure adequate blood supply as needed. Doctors and nurses involved in the operation should have received protective training and be familiar with the three-level protective operation measures.

For hospitals without negative pressure operating rooms, surgery can be arranged independently in the positive pressure operating room with air purification equipment; an ordinary operating room can be used in an emergency, but the location of the operating room should be as distanced as possible from other areas. When operating in a positive pressure operating room, it is necessary to turn off the air conditioning system or increase the ventilation of the operating room. For surgery in a negative pressure room, the air purification and negative pressure system should be turned on 30 min before surgery. Confirm that the operating room is in a state of negative pressure (the absolute value of minimum static pressure difference should be  $\geq 5$ Pa). If laparoscopic surgery is required, a closed air suction device should be prepared in advance and aerosol dissemination should be tightly protected.<sup>18</sup> Prepare all surgical instruments and equipment in advance, including sutures, hemostatic materials and other consumable items; avoid multiple collections and deliveries to reduce exposure risk. Test and maintain a clear line of communication between the operating room and external personnel; ensure lines of communication are ready for emergency use.

### 6.2. Selection of surgical routes

Operative approaches can vary and should be selected on a case-by-case basis. The majority of gynecological emergency operations are pelvic surgery or perineal surgery, including open surgery (to avoid adverse effects on lung function), laparoscopic surgery (following assessment of lung function and likely duration of the procedure), diagnostic curettage, induced abortion and vulvovaginal trauma repair surgery. Medical personnel should seek to "fight and win battles of quick decision". Cold knife surgery is recommended; ultrasonic scalpels and electrocoagulation under laparoscopy will lead to aerosol production. However, compared with open surgery, laparoscopy reduces operation time attributed to incision and suture. Use of electrosurgical instruments

in open surgery is associated with risk of aerosol production. It is also important to consider the impact of tertiary protective equipment on the visual, auditory, and tactile sensory capacity of medical personnel. The surgeon needs to consider the above factors and choose open or laparoscopic surgery according to the individualized surgical site or scope.

### 6.3. Intraoperative precautions

- (1) Tertiary protection should be used by medical personnel. Surgical patients not undergoing general anesthesia should wear surgical face masks.
- (2) During comprehensive exploration, operation times should be minimized where possible. Medical personnel should operate gently and avoid contamination from the patient's blood and other bodily fluids. Care should be taken to avoid needle stick injuries.
- (3) Attention should be paid to the potential risk of generated aerosols. Special care should be taken during tracheal intubation, sputum suction and other operations that may generate aerosols.
- (4) Where possible, use of surgical equipment such as electrosurgical knives and ultrasonic knives should be avoided; where the use of these instruments is required, they should be used with the minimum power. When using an electric knife, use a smoking device as much as possible, or use a sealed suction device to minimize the spread of aerosols.
- (5) Lengthy operation time should be avoided; the surgery should address the primary emergent problem. The scope of surgical intervention should be small rather than large, to minimize trauma.
- (6) In the absence of additional safety protection facilities in the pathology department, intraoperative frozen section examination should not be performed; safer alternative examination methods should be used. Further treatment after the emergency operation may be performed following the reporting of pathology results through the routine pathology pipeline.
- (7) All equipment, instruments and medicines should be used by a single person only. Anesthesia appliances that contact the patient's respiratory tract, such as visual laryngoscope lenses, breathing masks, breathing balloons, filters, etc., should all be disposable.
- (8) Throughout the duration of the operation, personnel should not be permitted to leave the operating room. Persons wishing to enter must don protective equipment prior to entering the operating room.
- (9) Following completion of the operation, infection control and the disinfection of the operating room should be implemented in accordance with the recommendations of the operating room protection.
- (10) Surgical specimens should be packaged in double-sealed bags for transportation.
- (11) At the end of the operation, protective equipment should be removed before leaving the isolated operating room. All medical waste generated during the operation should be packaged in a double-layer medical waste bag and disposed of as infectious medical waste.
- (12) After surgery, the operating room and equipment should be thoroughly disinfected. Continuous surgery should be avoided.<sup>12,19</sup>

### 6.4. Management strategies for postoperative patients

- (1) Postoperative patients should be transported to the isolation ward along a dedicated transport channel.



- (2) SARS-CoV-2 nucleic acid and antibody test results should be reported in a timely manner. If the patient is positive for COVID-19, the department of Respiratory Infection should take over treatment of the patient after surgery, with gynecology providing assistance as needed. After stabilization of the patient's condition, COVID-19-confirmed patients should be transferred to a designated hospital for treatment. If infection with SARS-CoV-2 is excluded, the patient can be transferred to the general ward for further treatment.
- (3) Monitor the patient's temperature after surgery. If the patient develops fever, this should be investigated for cause, including postoperative complications such as infection and pulmonary embolism.
- (4) For patients with dyspnea, appropriate oxygen therapy should be administered based on their blood oxygen saturation and condition.
- (5) Be alert for signs of multiple organ dysfunction; actively prevent and treat complications such as heart, brain and kidney conditions, and promptly carry out organ support treatment.
- (6) Suspected or confirmed COVID-19 patients are more likely to develop complications such as deep vein thrombosis and pulmonary infection due to their more complex condition and the need for prolonged postoperative bed rest. Physicians should be particularly vigilant.
- (7) Efforts should be made to prevent pulmonary embolism. Pulmonary embolism can cause clinical manifestations similar to those of COVID-19: chest tightness, shortness of breath, decreased blood oxygen saturation. Lung CTA can be used as required.
- (8) Pay attention to patients' needs for psychological interventions and counseling. Patients receiving treatment in isolation ward are prone to panic, anxiety and other negative emotions; medical staff should actively conduct psychological counseling for these cases.

## 7. Environmental layout and disinfection management

Strictly implement the "Management specification of air cleaning technique in hospitals<sup>20</sup>" and "Regulation of disinfection technique in healthcare settings<sup>21</sup>". Formulate disinfection measures, dividing each area into routine disinfection areas, enhanced disinfection areas, key disinfection areas and special disinfection areas.

- (1) The emergency gynecology clinic is a routine disinfection area: *i*. For object surfaces and floors, wipe with 500mg/L chlorine-containing disinfectant every 3h, then wipe with clean water 30min later; *ii*. For air disinfection, open the air disinfection machine every 4h for 1h. When no patients are present, turn on ultraviolet light for 1h every night. Open the window for ventilation once every 12h: the ventilation time should be  $\geq 30$ min.
- (2) The temperature measurement room and emergency triage table used by fever patients in the non-epidemic area are enhanced disinfection areas: *i*. For object surfaces and floors, wipe with 1000mg/L chlorine disinfectant every 2h, and wipe with clean water after 30min; *ii*. For air disinfection, turn on the air disinfectant for 1h every 3h. When no patients are present, turn on the ultraviolet light for 1h every night. Open the window for ventilation once every 8h: the ventilation time should be  $\geq 30$ min.
- (3) The temperature measurement room and the medical waste disposal room of fever patients in medium- or high-risk areas are the key disinfection areas: *i*. For object surfaces and floors, spray 1000mg/L chlorine disinfectant every 2h, wipe with clean water after 30min. *ii*. For air disinfection, turn on the air sterilizer for 1h every 2h. When no patients are present, turn on the ultraviolet light for 1h every night. Open the window for ventilation once every 6h: the ventilation time should be  $\geq 30$ min.
- (4) The isolation and rescue room is a special disinfection area: after the patient leaves, the air, the surface of the items and the floor

should be immediately disinfected using the methods described above for the key disinfection areas.

## 8. Management of healthcare workers exposed to COVID-19

The population is generally susceptible to SARS-CoV-2. The principal source of transmission is thought to be COVID-19 patients; asymptomatic infections are recognized as a source of transmission. Known SARS-CoV-2 transmission routes include respiratory droplets, contact transmission, aerosol and digestive tract, etc.<sup>22</sup> Gynecologists, - being in close contact with respiratory droplets or body fluids when they receive emergency patients, performing gynecological examinations or performing operations such as posterior fornix or abdominal puncture, - have a high risk of exposure. Management procedures for exposure should be formulated according to the exposure risk.<sup>23–25</sup>

### 8.1. Management after exposure of respiratory tract

- (1) Leave the exposure site as soon as possible following respiratory exposure.
- (2) Report exposure to the hospital infection-control department as soon as possible. Wear qualified masks.
- (3) After receiving the report, the hospital infection-control department should immediately evaluate the exposure risk. If the exposure source is a COVID-19 patient or the environment at the time of exposure is an isolation ward, fever clinic, or isolation observation room, the risk of infection is high.
- (4) Exposed individuals should be isolated in a single room at the designated medical observation site. High-risk exposed individuals should be isolated for 14 days in a single room. If there is no abnormality, the isolation can be terminated after 14 days.

### 8.2. Management after exposure to blood and body fluids

- (1) When exposed by direct blood or bodily fluid contamination of the skin, the individual should immediately go to the buffer room for cleaning: wipe the site with 75% ethanol or iodophor and then clean with water.
- (2) When goggles or protective clothing and masks are contaminated, individuals should immediately discard and replace the items within the buffer room.
- (3) When eyes are contaminated, individuals must immediately go to the buffer room and thoroughly wash the affected eye(s) with clean water.
- (4) When a needle stick or sharp injury occurs during inspection or surgery, remove gloves nearby and squeeze blood from the injured area, rinse with running water and disinfect the wound with 75% ethanol or iodophor. Gloves must be discarded and replaced. Carry out emergency measures according to the workflow of blood and bodily fluid exposure.

## 9. Principles of health care waste management

In the current climate of regular epidemic prevention and control of COVID-19, medical staff still need to follow the requirements of the "Regulations for Medical Waste Management<sup>26</sup>" and the "Measures for the medical waste management in medical and health institutions<sup>27</sup>". Medical waste from suspected or confirmed COVID-19 patients must be treated as infectious waste.<sup>28</sup> Use double-layer yellow medical disposal bags for transportation. Sharp objects must be placed in a designated plastic box and sealed. Disposal bags and sharps boxes should be sprayed with 1000mg/L chlorine disinfectant prior to collection and transfer by a trained cleaner. Waste should be transferred to a temporary storage point for medical waste along a specified route at a fixed time. Only authorized personnel should have access to the medical waste storage area. Infectious waste must be collected and disposed by a medical waste disposal

vehicle within 48h; the date and quantity of medical waste should be recorded and signed for upon collection. Non-infectious waste generated by non-COVID-19 patients should be treated as general medical waste and should be stored and treated separately to infectious waste.

## Conclusion

This consensus is based on currently available literature, regulations and expert opinions. Its purpose is to optimize the timely diagnosis and treatment of gynecological emergency patients and reduce the exposure risk of medical personnel working within the COVID-19 epidemic. However, this consensus cannot be used as a legal basis for any medical disputes and litigation. This consensus captures the contemporary concerns surrounding the topic but cannot address emerging and future issues; the changing landscape of the COVID-19 pandemic will necessitate further discussion and updated consensus.

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## Declaration of competing interest

The authors declare that there is no conflict of interest.

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