

SARB recommendations for the anesthetic management of patients suspected of being infected or infected by the new coronavirus initially named 2019-nCoV

These recommendations are based on documents initially emitted by the French Society of Anesthesia and Resuscitation (SFAR) and on a paper recently published by Peng et al. in the British Journal of Anaesthesia ¹. Due to the rapid evolution of information on the disease, recommendations may be revised accordingly in the near future. Local infrastructures and equipment may not permit to follow all of them, and teams are advised to do their best within the available environment.

1. Semantic precisions

- The disease caused by this new virus is named Coronavirus disease 2019 (COVID-19).
- The acute respiratory distress syndrome related to the infection by the virus is named Severe Acute Respiratory Syndrome-related coronavirus 2 (SARS-CoV-2).
- A confirmed case of infection is defined by a positive PCR on a nasopharyngeal sample. A suspect case of infection is defined by the presence of fever (higher than 38° C), cough, dyspnea (respiratory rate higher than 22/min), symptoms of upper or lower respiratory tract infection, criteria for hospitalization such as pulmonary insufficiency, or aggravating respiratory symptoms in a patient suffering from chronic respiratory insufficiency.

2. Generalities

- Type of virus: enveloped RNA virus belonging to the Coronaviridae family.
- Origin of human infection: unidentified transmission from an intermediary animal is postulated, followed by human-to-human transmission.
- Virulence and clinical manifestations: the majority of infections are not severe. The rate of asymptomatic holders is estimated to be 34% or higher². Symptoms vary and may encompass mild upper respiratory tract infection, fever (not always present), cough, and gastro-intestinal manifestations (10% of cases³). In the last case, the virus is present in the diarrheic stools and necessitates contact protections that are similar to those applied for patients that carry multi-resistant enterobacteriaceae. Severe forms evolve towards an acute respiratory distress syndrome, acute kidney insufficiency, cardiac dysfunction, liver dysfunction, or multiple organ failure. Additional sepsis in patients with severe forms is common, and worsens the clinical picture (13%)³. The case fatality rate is estimated to be 2%, but is probably lower because sub-clinical infections are underreported. Mortality in the elderly may be as high as 20-30%. The median duration between the onset of symptoms and ICU admission is 9 to 10 days³.
- Populations at risk of severe forms: elderly patients and patients with underlying chronic diseases, including respiratory insufficiency, cardiac pathologies, renal pathologies, diabetes, and immunodeficiency.
- Transmission: the human-to-human risk of transmission is high. Transmission occurs mainly via the airway by droplets. Droplets may contaminate directly or indirectly through contaminated hands the mouth and nose mucosae, as well as the conjunctiva. Micro-droplets may also be responsible for contamination when produced during medical care manoeuvres generating aerosolization of secretions. FFP2 masks are necessary during those manoeuvres in patients suspected or diagnosed with COVID-19 to prevent contamination by micro-droplets.

- Incubation delay is estimated to be 14 days maximum. Contagiousness remains during 14 days as well. Contagiousness of asymptomatic holders is not known. The virus present in the environment remains contagious during approximately 4 hours.

- Nasopharynx sampling is currently indicated in all suspect patients necessitating a hospitalization, and in all health care providers that meet the criteria of suspect case with fever. Indications for sampling are currently being enlarged, due to a progressive increase in the availability of testing.

- There is no firm evidence that NSAID's are harmful but, whenever possible, they should be avoided because potentially worsening the clinical picture. Updated information on that topic can be found at <https://www.ema.europa.eu/en/news/ema-gives-advice-use-non-steroidal-anti-inflammatories-covid-19>.

- More information can be found at the following links: <https://epidmio.wiv-isp.be/ID/Pages/2019-nCoV.aspx>, <http://www.ce-mir.fr/fr/accueil.html>, <https://www.cdc.gov/coronavirus/2019-ncov/healthcare-facilities/guidance-hcf.html>, and <http://www.siz.be/covid-19-links/>.

- Intense research is currently undertaken to evaluate the interest of some treatments of the disease and the development of vaccines. More information can be found here: <https://www.lifescienceleader.com/doc/an-update-on-drugs-in-development-for-covid-0001>.

- There is currently no argument to support an eventual deleterious effect of ACE inhibitors and angiotensin receptor blockers on the evolution of COVID-19. Anti-hypertension treatment of patients should be continued. More information at [https://www.escardio.org/Councils/Council-on-Hypertension-\(CHT\)/News/position-statement-of-the-esc-council-on-hypertension-on-ace-inhibitors-and-ang](https://www.escardio.org/Councils/Council-on-Hypertension-(CHT)/News/position-statement-of-the-esc-council-on-hypertension-on-ace-inhibitors-and-ang).

3. Organizational requirements for the management of suspect or infected patients in the OR

- The action plan by the OR team should be set up in advance, including the plan for airway management, with a clear task assignment.

- Simulations beforehand are recommended to minimize the risk of errors.

- Material and medications that are necessary to provide safe anesthesia to the patient and protect the care team should be prepared in advance, before accepting the patient in the OR.

- Any patient scheduled for surgery should be checked beforehand regarding the presence of symptoms of COVID-19 for correct orientation, either directly if hospitalized, or indirectly by phone if coming from outside the hospital.

4. Transfer of the patient to and from the OR

- The transfer of the patient to and from the OR should be organized and planned in advance.

- When moving, the patient should always hold a correctly adjusted surgical mask, and should ideally be placed in an impermeable cover. The sides of the bed should be cleaned before transfer.

- Stretcher-bearers and welcoming personal should wear an individual protection equipment (IPE), including at least an adequately adjusted surgical mask (FFP2 masks should be reserved to those who have close contact with the patient during manoeuvres that generated aerosolization of droplets), protecting glasses, a non-sterile single use isolation gown, and non-sterile single-use gloves.

- Training for IPE dressing and undressing should occur in advance (see below) to avoid errors and contamination. Maximum risk of contamination occurs during undressing, which should be done under the supervision of a colleague.
- Strict hands hygiene should occur before IPE dressing and after undressing.
- The OR that will receive the patient should be put in negative pressure.
- During transfer of the patient, the PACU and any bed-hold waiting area should be bypassed.

5. IPE dressing and undressing

- Hydro-alcoholic washing of the hands should occur before IPE dressing.
- Dressing should occur in the following order: isolation gown, mask, glasses, hood over the usual OR cap to protect the glasses temples and the mask laces, gloves.
- Undressing should occur in the following order: gloves, hydro-alcoholic hand washing, hood, hydro-alcoholic hand washing, glasses, isolation gown, hydro-alcoholic hand washing, mask (without touching the outside surface of it), hydro-alcoholic hand washing. Contact between the hands and the face or hair should be avoided before the last hydro-alcoholic hand washing. Undressing should ideally occur outside the room where the patient was managed, to avoid contamination by eventual residual air droplets, but in a secure environment where only involved care givers are present.
- The use of specific shoes, reserved for moving inside the dedicated COVID-19 environment, should be considered. If such shoes exist, they should be carefully cleaned between each managed case.

6. Anesthetic management

- In asymptomatic and non-suspect patients, anesthesiologists should think of taking more protective measures than in the absence of an outbreak, including wearing gloves, glasses, surgical mask, rapid sequence induction, and repeated hydro-alcoholic hand washing.
- Ideally, the management of COVID-19 patients should occur in a specifically dedicated OR.
- The number of people involved in the procedure should be limited to a minimum. Entering or exiting the OR, as well as exchange of persons should be avoided during the entire procedure.
- Reference staff members should be appointed to take care of those procedures, or at least to guide them.
- Hydrophobic filters, with a high filtration capacity, should be used between the facial mask or the tube and the Y piece of the ventilation circuit tubes, as well as between the expiratory tube and the expiratory valve. All filters should be replaced after the procedure.
- The gas sampling line should be connected upstream of the filter connected to the Y piece.
- Soda lime should be changed before the procedure to avoid unnecessary disconnections.
- Closed-circuit aspiration systems should be used, equipped with disposable filters, to avoid contaminating the usual aspiration system.
- All drugs and material should be prepared in advance. A series of clean gloves should be ready, to allow stakeholders changing gloves whenever manipulating new drugs or material extracted from the anesthesia chart.

- Because of the risk of aerosolization during the management of the airway (tracheal intubation and extubation), all present persons that are close to the patient at that time should be equipped with adequate IPE and FFP2 masks. Person at distance from the patient can use a classical surgical mask in their protecting equipment.
- A meticulous evaluation of the airway for the detection of possible difficult intubation should occur before starting the procedure.
- Airway management should be handled by the most experienced anesthesiologist.
- Rapid sequence induction without mask ventilation should be preferred, with a 100% preoxygenation. In case of rocuronium use, a sufficient amount of the antagonist, sugammadex, should be present in the room beforehand. Preoxygenation can be performed after covering the patient's mouth and nose with two pieces of wet gauze. If mask ventilation occurs, the mask should be adjusted with two hands to avoid leaks.
- The lowest fresh gas flows should be used throughout the procedure.
- Awake fiberoptic intubation should be avoided because of the risk of cough and aerosolization.
- The use of a video-laryngoscope, which keeps the operator away from the patient's mouth, should be considered, if available. Alternatives exist if a video-laryngoscope is not available, notably using a plexiglas box. More information on this alternative can be found at the following [link](#). Please download this file to see the video below.



- Tracheal intubation is preferable to the placement of a laryngeal mask. Mask bagging and non-invasive ventilation should be avoided.
- The tube should be clamped before insertion into the trachea, if possible (this precaution is not possible if the tube contains a stylet, which is often the case when a video-laryngoscope is used, but in that case, the tube can be clamped once the stylet has been removed, before connection to the ventilator). Once in place, the cuff should be inflated and the tube still clamped before connection to the ventilator. One alternative to tube clamping can be to leave the hydrophobic filter inserted on the tube during those manoeuvres.
- The positive pressure ventilation should be started only when the tube cuff is adequately inflated, after removing the tube clamp.
- Disconnection of the ventilation circuit should be avoided. In case of disconnection, the hydrophobic filter should be left in place on the tube, and the tube clamped until reconnected. Any aspiration manoeuvre in mouth or tube should be performed with maximal caution, in a paralyzed patient to avoid cough.
- Adequate muscle relaxation is recommended, to avoid cough and aerosolization.
- After the procedure, if the respiratory status of the patient permits, emergence occurs in the OR with the same protecting measures as during induction of anesthesia. Once extubated and autonomous regarding ventilation, the patient is reequipped with a surgical mask as fast as possible. Thereafter, the patient is directly transferred to his/her initial room on the COVID-19 ward, or to a designated COVID-19 ward if coming initially from the emergency unit, without transiting through the PACU. The same precautions as those applied during admission of the patient to the OR are also of application during this transfer.
- After the procedure, all disposable material is eliminated in sealed containers that are present in the room beforehand. Any other non-disposable material is cleaned with standard disinfectant soap. All non-disposable material present in the room should not be used in another room, including easily movable material such as a stethoscope, syringe pumps, etc. Manipulation of all materials should be done by trained personnel, adequately equipped with IPE and surgical mask.
- In case of loco-regional anesthesia, the patient should always wear a surgical mask, and the medical team should be equipped with adequate IPE and surgical mask. The anesthetic procedure should be performed by the most experienced anesthesiologist.
- Unnecessary transfers of COVID-19 patients should be avoided. For example, the insertion of a central venous line should preferably be performed in the room of the patient, on the COVID-19 ward.

7. Precautions for infection control during the preoperative evaluation of patients⁴

- Preoperative and preanesthetic evaluation should be limited to those patients whose surgery cannot reasonably be delayed.
- Medical staff involved in the preoperative evaluation of patients should ideally wear a disposable isolation gown, a surgical mask, a skull cap and gloves.
- Local organization should insure social distance between patients themselves, and between patients and medical staff. Patients are seen one by one to avoid congestion in the medical office and in the clinic.

- Tympanic temperature (electronic ear thermometer) is routinely checked for each patient stepping into the clinic (electronic ear thermometer), for the detection of suspect patients and correct orientation thereafter, eventually towards a COVID dedicated ward.
- Ear thermometers, blood pressure monitors, pulse oximeters, and stethoscopes should be cleaned with ethanol each time for every use.
- Hydro-alcoholic hand washing should occur after each contact with patients.
- Disinfectant wipes should be used to wipe and disinfect the surfaces of table tops and chairs.

8. Precautions in the context of eventual sedative medication shortage

Currently, the supplying of intravenous sedative medications to intensive care units for the sedation of COVID-19 patients on mechanical ventilation, including propofol, ketamine, alpha2-agonists, and to some certain extent opioids, may become compromised. To avoid shortage, it is recommended to adapt general anesthesia protocols, in order to spare those medications that are of large use in the ICU. Changes to protocols may vary from one institution to the other. Suggestions in that respect, proposed by the CHRU Lille, France, can be found at the following [link](#).

8. Bibliography

1. Peng PWH, Ho P-L, Hota SS. Outbreak of a new coronavirus: what anaesthetists should know. *Br. J. Anaesth.*; 2020; epub ahead of print.
2. Mizumoto K, Chowell G. Estimating Risk for Death from 2019 Novel Coronavirus Disease, China, January-February 2020. *Emerg Infect Dis* United States; 2020; epub ahead of print.
3. Yang X, Yu Y, Xu J, et al. Clinical course and outcomes of critically ill patients with SARS-CoV-2 pneumonia in Wuhan, China: a single-centered, retrospective, observational study. *Lancet Respir Med*; 2020; epub ahead of print.
4. Zhao S, Ling K, Yan H, et al. Anesthetic Management of Patients With Suspected or Confirmed 2019 Novel Coronavirus Infection During Emergency Procedures. *J Cardiothorac Vasc Anesth*; 2020; epub ahead of print.