



COVID-19 pandemic: Time for the anesthesiologist to be in action

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ABSTRACT

Covid-19 pandemic has taken over the world in a storm. Starting from the Chinese city of Wuhan, it has engulfed almost every country, and every nation of the world. The rapid pace of emerging statistics has baffled the healthcare community, and hospitals have been fighting day and night to treat the known patients. The cities have been locked down and international medical academic authorities have been quick to offer updated guidelines and protocols. The electronic media has been pivotal in rapid dissemination of the new knowledge about dealing with this catastrophe.

This editorial offers an overview of the development of the pandemic and the ways and means to tackle it. It mainly stresses upon the most vital role of care in intensive care units, which needs exercise of utmost dedication, and professional expertise by the anesthesiologists, the intensivists and supporting staff.

Key words: COVID-19; Viral disease; Pandemic; Intensive care; Intensive care unit; ICU; Mortality; Healthcare services

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The world is presently in grip of the dreaded Corona virus infection and we as humans and doctors are probably witnessing the most severe pandemic of our lifetimes. Within a short span of three months of reporting of its first case, this virus has played havoc. The health systems of most advanced European countries stand at the verge of crashing, while the health systems in developing countries are facing serious crisis and awaiting collapse. The culprit for this universal chaos, the novel corona virus (2019-nCoV or SARS-CoV-2), is an enveloped RNA virus of Coronaviridae family, that belongs to the subgenus Sarbecovirus and most closely resembles a bat coronavirus, with which it shares 96.2% genetic sequence homology.^{1,2}

The first case of spread of this viral infection was reported from animal market in Wuhan, China as a cluster of pneumonia of unknown origin on 01-Dec-2019. By 7th Jan 2020 the isolation of 2019-nCoV was done by China CDC.² The first fatality with this viral infection was reported on 11-Jan-2020 in China and by 13-Jan-2020 the case of Covid-19 infection outside China was reported in Thailand. By the end of March, more than 600,000 confirmed cases are expected worldwide in more than 202 countries or areas.

Approximately, 130,000 patients have completely recovered, more than 29,000 have succumbed to death, while another 24,000 patients are in critical condition worldwide.³ With every morning, new cases are being added to the list worldwide at an exponential rate of approximately 65,000 per day. While the number of newly infected cases being reported from China are on a declining slope, an uprising trend is being observed in European and South East Asian countries. Presently, the count of clinically confirmed cases of COVID-19 is approximately 105,000 in USA, 87,000 in Italy, 75,000 in Spain, 54,000 in Germany, 36,000 in Iran, 12,500 in Turkey, 1500 in Pakistan, 940 in India, 1300 in Saudi Arabia and Qatar, 550 in Iraq with as low as 110 cases in Afghanistan.³ The present risk of Corona virus spread and exact number of cases may be difficult to quantify owing to under-reporting in many countries. The possibility of developing acquired immunity following Covid-19 infection and the risk of getting re-infected is also unknown till date.

On 30th Jan 2020, the World Health Organization (WHO) declared Covid-19 as outbreak of public health emergency of international concern (PHIEC), but due to rising cases and deaths worldwide, WHO

on 11th March 2020 declared Covid-19 as a pandemic. The last pandemic declared by WHO was the swine flu (H1N1) infection in 2009.

The Covid-19 virus is capable of animal to human and human to human spread via respiratory secretions or contaminated surfaces, leading to infection through contact transmission. Newer reports suggest the possibility of transmission via feco-oral route. The average incubation period following infection is five days with a range of one to fourteen days. Patients may remain asymptomatic but highly infective during this stage, transmitting the infection to nearby healthy contacts.⁴

The common symptoms of Covid-19 infection include fever, fatigue and dry cough. Rarely (in 5% cases) symptoms may include sore throat, sneezing, and stuff nose. In 80% of the cases symptoms are mild while 13.8% cases may present with severe symptoms that include pneumonia and shortness of breath. In 4.7% cases, critical symptoms may appear that include respiratory failure, septic shock and multi-organ failure requiring ventilatory support. The changes of hyaline membrane and pneumocyte degeneration have been observed in autopsies of lung tissue of the affected patients dying of Covid-19 infection.⁴ The case fatality rate has been reported to be approximately 3.8%-8% as per present statistics. Currently, no specific treatment or antiviral therapy is available. Research into medical treatment and vaccine development are yet under trial, with a report of vaccine being developed in Israel soon.

The pressure on the global healthcare services has escalated enormously with rising rates of corona positive cases each day. This potentially overwhelming burden of community illness may stress and exceed the capacity of healthcare system and its work-force as the mankind is not adequately prepared for this global scale war against Covid-19. Worldwide, the supplies of face masks, N95 masks, personal protective equipment (gowns, goggles, shoe covers, etc), hand sanitizers (especially those with 70% isopropyl alcohol), and medications including oseltamivir, hydroxy-chloroquine, lopinavir and ritonavir are in severe shortage, that has worsened the crisis for healthcare teams. To meet the current global demand, these wearables and medicines are being manufactured 24x7 in industries, and are being marketed at an exorbitant rate of 10-20 times their standard prices. This supply shortage has put the health workers at even more potential risk of hospital-acquired Covid-19 infection. In many countries, the routine outpatient department visits have been curtailed or completely shut down, while the elective operative lists been cancelled till further notices. These steps have been taken to avoid unnecessary clustering of patients that would not only prevent spread of cross-infection in the community, but also

conserve the hospital resources such as masks, gloves and sanitizers for further usage during crucial times.

Major precautions have been advised via various advisories for prevention and control of infection that include placement of facemask in the symptomatic patients, promoting cough etiquette, and provision for hand hygiene and surface decontamination. Avoidance of crowded places and unnecessary travel is also advised to limit the spread. The suspected, symptomatic patients should be rapidly triaged and separated from the general population in a well-ventilated space with a distance of at least 6 feet from others until they can be shifted to an isolation room. Hopefully, the novel idea of social distancing and mass quarantine either willingly or imposed by governments, seems to be the only ray of light in the present chaotic scenario.

Currently, the role of anesthesiologist in the management of Covid-19 infected patients is not only limited to emergency airway management, but also in the ICU's and surgical interventions in operation theatre. The increased risk of Covid-19 infection in healthcare workers, highlights the need for comprehensive and robust infection control workflow. Guidelines have been issued by various agencies including ESICM, ISA, SCCM, AAGBI, American society of anesthesiology, RCOA for prevention of infection and management of these patients.^{5,6}

Stringent protective personal equipment (PPE) should be worn by the anesthesiologists or healthcare professional involved in aerosol-generating medical procedures. PPE recommended for contact with critically ill patients with suspected or confirmed 2019-nCoV infection include fluid-resistant gown, gloves, full face shield, eye protection, and fit-tested N95 respirators. Shoes should be impermeable to fluids and decontamination should be possible. Staff should wear operating room scrub suits or full coveralls under the PPE. However, the choice of product should be assessed for ease of removal to avoid self-contamination during removal. Providers and organizations should review and be fully aware protocols for donning and doffing PPE.

A suspected or confirmed 2019-nCoV infected patient requiring emergency intervention should not be kept in the holding or PACU areas. They should be managed in a designated operating theater, with signs posted on the doors to minimize staff exposure. Disposable mask, goggles, footwear, gown and gloves should be available in OT. Staff should be provided sufficient time to apply PPE and barrier precautions and double glove technique should be strictly adhered to. Standard ASA monitoring should be applied before the induction of anesthesia. Though PAPR devices are preferable, but N95 mask at minimum should be utilized while manipulating the

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airway. Intubation should be performed by the most experienced anesthesia professionals to minimize the number of attempts and risk of infection.^{5,6}

Use of PPE causes difficulty in communication hence an intubation checklist should be used with closed loop communication. Preoxygenation should be done for five minutes with 100% FiO₂, ensuring a tight mask seal. Guidelines suggest avoiding use of high frequency nasal oxygenation (HFNO) for pre-oxygenation or apnoeic oxygenation. Rapid sequence induction (RSI) may be done to avoid manual ventilation of patient's lungs and potential aerosolization of virus from airways. Do not ventilate until endotracheal tube (ETT) cuff inflation is confirmed, to avoid contact with aerosols in expired air. In case of difficult intubation, plan B is to use a 2nd generation supraglottic airway, plan C is to use FONA scalpel-bougie-tube. Disposable equipment should be used as far as possible. Video laryngoscope should be preferred, while awake fiberoptic intubation should be avoided. The anesthetist performing intubation is likely to get respiratory secretions on their gloves. Laryngoscope should be immediately re-sheathed post intubation, using double glove technique.⁶ All airway equipment should be sealed in a double zip-locked plastic bag and then removed for decontamination and disinfection. The outer pair of glove can be removed once the ETT is secured. ETT position should be determined without using auscultation – chest wall expansion and/or End Tidal CO₂. Avoid coughing during extubation, a high -risk procedure for aerosol generation. Personnel exiting the OR should discard their PPE as per guidelines. After removing the protective equipment, touching of hair or face should be avoided before washing hands. Patient should be kept in OR till recovery or transferred to ICU in a negative pressure room. Placement of adequate hydrophobic filter should be ensured between the ETT and reservoir bag during transfers to avoid contaminating the atmosphere. Hospital security should ensure clearing of the route from the isolation ward or intensive care unit (ICU) to the OR, including the elevators. The transfer will be done by the ward nurses in full personal protective equipment (PPE) and vice versa on completion of the procedure.^{5,6,7}

For aerosol generating medical procedures performed outside the operating theatre, a negative pressure/airborne isolation room with minimum 12-air changes per hour is preferred. Early intubation should be considered to avoid the risk of a crash intubation when PPE cannot be applied safely. Avoid usage of non-invasive ventilation outside operating room, if possible, to prevent aerosol of virus in the room.⁵

The unedited accepted proof of surviving sepsis guidelines for management of critically ill COVID-19

patients, available on internet, too highlights the usage of PPE by healthcare personnel and the general guidelines for intubation of Covid-19 suspected/confirmed cases.⁸ Other recommendations of the ESICM and SICCM are as follows:

1. In case of patients presenting with Covid-19 and shock, the guidelines suggest using dynamic parameters to assess fluid responsiveness and a conservative fluid strategy using balanced crystalloids for acute resuscitation. Norepinephrine is recommended as the first-line vasoactive agent, to target a MAP of 60-65 mmHg followed by Vasopressin. Dobutamine should be used, if there is evidence of cardiac dysfunction and persistent hypoperfusion despite fluid resuscitation and norepinephrine. In refractory cases, a low dose corticosteroid therapy is advocated.
2. Ventilation strategies in management of Covid-19 cases include starting supplemental oxygen if the peripheral oxygen saturation (SpO₂) is < 92%, and in cases with acute hypoxemic respiratory failure on oxygen, SpO₂ is to be maintained no higher than 96% preferably using HFNC rather than NIPPV. A trial of NIPPV with close monitoring and short-interval assessment for worsening of respiratory failure can be given, only if HFNC not available. Early intubation should be considered if there is worsening of respiratory failure. A low tidal volume (Vt) ventilation (Vt 4-8 mL/kg of predicted body weight) with a target plateau pressures (P_{plat}) of < 30 cm H₂O is recommended in mechanically ventilated COVID-19 patients with ARDS. Apart from this, a higher PEEP strategy, prone ventilation for 12 to 16 h and using intermittent boluses of neuromuscular blocking agents (NMBA) when needed, over continuous NMBA infusion, to facilitate protective lung ventilation are the suggested recommendations in patients with severe to moderate ARDS. Nonetheless, if there is persistent ventilator dyssynchrony, the need for ongoing deep sedation, prone ventilation, or persistently high plateau pressures, a continuous NMBA infusion for up to 48 hours can be used. Routine use of inhaled nitric oxide is not recommended. However, a trial of inhaled pulmonary vasodilator as a rescue therapy can be given in mechanically ventilated adults with Covid-19 and severe ARDS in whom hypoxemia persists despite optimizing ventilation and other rescue strategies; but if no rapid improvement in oxygenation is observed, the treatment should be tapered off. When hypoxemia persists despite optimized ventilation strategies, recruitment maneuvers can be used, however, staircase (incremental PEEP) recruitment maneuvers are to be avoided. In case of refractory hypoxemia despite all measures, in carefully selected

patients, veno-venous (VV) ECMO may be used, if available, or patient may be referred to an ECMO equipped center.

3. In mechanically ventilated adults with Covid-19 and ARDS, use of systemic corticosteroids is recommended in the sickest patients. Empiric antimicrobials/antibacterial agents are recommended in these patients with daily assessment for de-escalation, review of duration of therapy and coverage. Acetaminophen/paracetamol is to be used for temperature control in patients presenting with fever. However, routine use of standard intravenous immunoglobulins (IVIG), convalescent plasma or lopinavir/ritonavir is not recommended. No recommendations have been made regarding the use of other antiviral agents, recombinant IFNs, alone or in combination with antivirals, chloroquine or hydroxychloroquine or tocilizumab, in critically ill adults with Covid-19, due to insufficient evidence.

The RCOA has advocated use of labor analgesia in Covid -19 suspected/confirmed obstetric patients to minimize need for general anesthesia if urgent delivery is needed. If entonox is used the breathing system must contain a hydrophobic filter to prevent its contamination with the virus. Consider transfer arrangements in different scenarios for parturient who may need emergency caesarean delivery. Regional anesthesia is preferred. Avoidance of general anesthesia unless absolutely necessary. Donning PPE is mandatory and time consuming. This will impact on decision to delivery time for Category 1

caesarean delivery, whatever may be the anesthetic technique used. parturient and their families should be informed about this delay. General guidelines for Induction of general anesthesia and extubation in Covid-19 patients should be stringently followed.

During resuscitation of the critically ill patients, chest compressions should be avoided during intubation to avoid exposing the face of the intubating clinician to aerosols, and consider neuromuscular blockers before intubation, if possible.

Presently, the need of hour is to act beyond our professional duties, supporting government initiatives of mass lockdown, supporting professional colleagues in providing man-power support or resources wherever required, performing social duties towards educating the society for practicing proper sanitization practices, avoiding forwarding of misleading information or spreading hoax on social media, and standing unified as a fraternity in fighting this dreadful pandemic, before it further cannibalizes our community.

The will come phase of review of the episode as a whole, assess the shortcomings and pitfalls in our healthcare and other systems, and work on a short term and a long term plan to remove the weaknesses and strengthen our systems to enable them any similar catastrophes in the future.

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