

FAQ from SCA Webinar: Challenges for the Cardiovascular and Cardiothoracic Anesthesiologist. April 4, 2020

General FAQs

What precautions are needed while providing anesthesia for patients who are not diagnosed to have COVID-19? Notable concerns varying prevalence of COVID-19 in local population, >4-5-day incubation time for virus while asymptomatic but contagious, and high false negative rate of tests.

- For this, I would defer to institutional protocols. The false negative rates are dependent on the type of test used. A consult with ID folks will help. Either way, if the COVID test is negative and the patient was asymptomatic and not with high risk factors (such as from a cluster facility), droplet contact precautions may be appropriate. However, local protocols would need to be followed.

What steps do you recommend to reduce the risk of exposure during anesthesia with lung isolation in potential asymptomatic carriers? Bronchial blocker vs DLT safer? Would you vent the non-ventilated lung, perhaps through a HEPA filter? What if the ORs do not have negative pressure capabilities?

- Institutional practice varies. One protocol in use is to ensure we have a HEPA/HME filter at the patient end of the ETT, including DLT lumens. Disconnection will be at the connection between the circuit and the filter, not filter and ETT. You may choose to intubate and assess airway with FOB in an unventilated state. The other option is to use some newer DLTs that have a camera within the DLT – VivaSight (no financial relationship) which we have used often and recommend avoiding using an FOB scope. ORs do not always have negative pressure capability. By design, they are supposed to be positive pressure rooms to prevent outside contamination from entering a sterile room. This is in contrast to critical care rooms which have airborne isolation capacity, which are negative pressure to prevent in-room infection from going outside (other than through HVAC systems). There are rooms which can be purposed flexibly to be negative or positive, but we do not have those in most institutions since they are more unreliable for total air exchanges per hour needed to eliminate airborne particles. The infected patient in the OR is a unique issue where there is airborne infection in what is supposed to be a sterile environment. Most ORs are positive pressure, so those guidelines have to be followed. Most will have about 12 air exchanges per hour with about 35 minutes needed for 99.99% airborne particle elimination (<https://www.cdc.gov/infectioncontrol/guidelines/environmental/appendix/air.html#tableb1>).



How are teams managing STEMI patients for urgent PCI? How are you managing patients who deteriorate while in the Cath lab?

- We treat ED patients (STEMI) or shock patients needing IABP or Impella as COVID PUI. We recommend these patients getting rapid testing in the ED if possible. We will proceed with the procedure with PPE according to current policy (in our institution N95 or equivalent, face shield, gown, gloves, does not need negative pressure room). The rapid nasal swab results (RT-PCR) result in about 2hrs and we can place these patients to AAU/ICU appropriately.

Is it ethical and responsible to involve medical students, respiratory therapy students, nursing students, etc. to hand-ventilate patients, on shifts, in order to avoid split ventilation or other ventilator shortages?

- COVID-19 has brought many medical and ethical challenges to all of us. I don't think that there is any right or wrong answer to this question, but medical trainees have long been exposed to patients that have various communicable diseases. Coronavirus is in some respects and no different than some of these other illnesses, particularly when you remove the emotion from the equation. Furthermore, with the proper use of personal protective equipment, there is no reason why the safety of these in-training practitioners cannot be assured. Indeed, it was in the polio epidemic in the 1950's that similar techniques were used in Scandinavia where medical and nursing trainees sat shifts, hand-ventilating patients suffering from respiratory failure from the polio virus. Thus, there is precedent for taking this arguably extreme measure. That said, there are two sides to this equation. One being the ethics of asking the trainees to get involved, and the other is the ethics of having to deal with their potential refusal to be involved. Both of these will require careful consideration.

Should we avoid using the TEE probe (unless critically important) in order to minimize the risk of COVID transmission?

- The simple answer to this is "yes". That's what the "essential" in the algorithm refers to. Alternatives like preop TTE or intraop epicardial or epiaortic may also be better alternatives depending on the situation.

Should the TEE probe be inserted at same time as ETT to reduce risks of contamination?

- This is an interesting question. The benefits of inserting the TEE probe at the same time as ETT placement are that it is under the ideal controlled setting and can be done with jaw manipulation or laryngoscope assistance without interference of surgical drapes. The disadvantage is that intubation is an AGP and aerosols persist for a while following intubation. If one can wait until there are enough air exchanges in the OR to ensure that maximum aerosols have been expelled from the OR, it would be safe to insert the TEE probe then with adequate PPE precautions.

For urgent surgeries what should we be using to test for asymptomatic carriers? COVID PCR? Chest CT?

- Nasopharyngeal swabs that are subsequently tested using RT-PCR is the current gold standard for determining whether a patient is positive for coronavirus. Although chest CT scans have been used in a number of different settings, and have characteristic findings of ground glass opacities, particularly in the subpleural regions, one can clearly be positive for the virus and not have these overt pulmonary manifestations. Thus, as a screening tool per se, CT scan is probably insensitive for diagnosing COVID-19. Furthermore, there are wide reports of patients testing positive for coronavirus who have no symptoms at all, so even the screening for the presence of symptoms is not an adequate test to determine COVID-19 positivity.

How much time do you recommend reading about COVID19 every day?

- How much time one spends reading about COVID-19 is very much an individual decision. Personally, I spend no more than 60 minutes, and usually divide it to 2-4 sessions to try to limit the constant barrage of information that comes in about the disease. There is clearly an unending amount of information, and one needs to limit one's exposure to this lest the risk burnout increases. It is particularly important that one tries to stick to reputable sources, only follows the facts, and tries to avoid excessive focus on the unending number of stories of "disaster".

Do you obtain unique consent from the POA when using an off-label use of ventilation?

- In our experience so far, we have obtained informed consent for all patients. If the situation is to change, and ventilator scarcity becomes an even more pressing issue, we may move toward a "notification"-based approach.

Are sternotomy, IMA harvest, lung surgery, vein harvest, CO2 insufflation considered aerosol generating procedures?

- Similar to the SARS epidemic in 2003, there has not been a known transmission of the coronavirus during surgery via a blood-borne source. As a result, many of these cardiac surgical procedures do not, per se, add risk to transmitting disease. Although a number of them can generate aerosols, it is really the aerosols of the respiratory tract that are particularly at risk. Thus, sternotomy, IMA harvest and vein harvest, per se, even if one is using cautery, does not necessarily generate infectious aerosols (i.e., generate aerosols of respiratory tract material). That said, thoracic surgery where you have exposure of lung tissue, and where ventilation can cause an active air leak, could theoretically produce some aerosols. Although this has not been shown to transmit infection in any recently reported cases, this absence of evidence should not necessarily be considered absence for evidence. Certainly, in theory, respiratory aerosols could be generated if one cuts the visceral pleura and exposes lung tissue, particularly when the



patient is being ventilated. CO₂ insufflation itself, once again, is not going to aerosolize respiratory secretions, but may enhance dispersion, but at this time any decision to avoid insufflation must be based on clinical and situational judgement as there is no evidence available. Although it could cause some bubbling of blood that collects in the pericardium, this would be blood that would produce some low levels of droplets but would unlikely be the fine droplet nuclei (less than 5-10 microns) that are typically associated with aerosol spread of viruses.

Do we need a negative pressure room for all COVID patients or PUI cases in the OR?

- Whereas a negative pressure room would ideally reduce the risk of transmission of aerosols in the air, there simply will not be enough negative pressure rooms to manage all patients. That said, one can safely manage patients in a positive pressure environment, as long as one wears the proper personal protective equipment and allows time for the air exchanges in the room to reduce the risk of aerosol transmission. Typically, a 20-30 minute “settling time” is sufficient. During this time, the movement in the room is limited following an aerosol generating medical procedure and allows for the air exchanges of 15-20 per minute to clear the room of the aerosols that could have been generated.

ECMO Q&A

Should we consider HRCT a must before referral for ECMO to try to exclude non-reversible lung-damage?

- Good question, any CT thorax scan would be useful. But logistics of doing this in a COVID-19 patient are challenging. A CXR with three - four quadrant infiltration is good enough for my practice.

Considering the reported low level of AT3 and heparin resistance and many reports of thromboembolic events would you consider direct thrombin inhibitors after ECMO?

- We have used argatroban in cases of heparin resistance.

Has early VV ECMO decreased the incidence of associated myocardial disease? Have you had to convert VV to VA ECMO?

- VV ECMO has not seemed to decrease incidence of myocardial disease. We have converted VV to VV-A Configuration, also have a case where a COVID 19 presented with AMI. Had pVA ECMO which was then converted to an Impella.



Immune suppressive disorder was mentioned as exclusionary for ECMO. Does that include an otherwise healthy, young, non-detectable HIV with normal CD4 counts?

- Difficult question. But I would not exclude a healthy young non-detectable HIV. History is the key. If the virus has progressively gone resistant, non-compliant with medication, co infections etc would be key. We know COVID-19 patients with cardiovascular risk do badly and HIV does increase incidence of premature CVD so that too needs to be taken into consideration. We would offer VV for PCP pneumonia with some success.

Given that ECMO machines are a relatively scarce resource compared to ventilators do you have any triage guidelines? Should its use be limited to single system patient pathology? Given that severe Covid 19 is associated with such high mortality, is VA ECMO justified?

- We follow the National guidance issued by NICE (UK). True - VA has a high mortality and resource intensive, but it has to be a local decision based on resources, expertise and case load.

Chinese and Italian Experience

What did you do when a patient was admitted to a non-COVID hospital, and later found to be COVID positive?

- In Hubei province, the patients will be sent to a buffer ward for testing COVID-19 nucleic acid and antibodies first when confirmed negative then triaged to different departments. If found positive, they will be sent to designated hospitals. For urgent situations, patients will received treatments or operations under third grade PPE. (Even to some companies, staff are required to show nucleic acid and IgM negative, then can to work normally).
- In Pisa, we transferred these patients to the designated COVID hospital. This happened a few times.

How important is it to have full body coverage with PPE? Current US standards are less than this (neck, upper chest exposed)?

- According to our experience, though we had no enough negative pressure rooms, we used full body coverage with PPE and did all the procedures of high risk-generating aerosol, none of our staff get infected.
- We wear both full body coverage or gown; we think the most important thing is wearing ffp3 and eye protection.

Anyone doing patient awake prone with CPAP?

- (Dr Guarracino) Yes, we often did. Very helpful in patients with low elastance.



Are hospitals in Wuhan doing screening chest CT?

- In early stage of the pandemic, we screen chest CT as well with nucleic acid for all patients, including for elective surgery. but now chest CT was not mandatory but nucleic acid was.

Has early VV ECMO decreased the incidence of associated myocardial disease? Have you had to convert VV to VA ECMO?

- We think VV ECMO can decrease the incidence of ARDS associated acute cor pulmonale but we didn't investigate the relationship between VV ECMO and myocardial diseases.

Any experience with plasmapheresis, convalescent plasma, targocid/teicoplanin, hydrochloroquine or chloroquine phosphate?

- (Dr Guarracino, 4/2020). We routinely use hydrochloroquine, teicoplanine. We have the first three doses of convalescent plasma ready.

When to decide to intubate?

- When the patient shows increased WOB based on clinical evaluation of distress and diaphragm US. P/F ratio does not correlate with distress in COVID-19 in our experience.