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COVID-19 UPDATE: ASK EMERGENCY AND CRITICAL CARE SPECIALISTS—PART 3

Webinar recording: **April 14, 2020**
URL: **https://ubccpd.ca/covid-19-update-ask-emergency-and-critical-care-specialists**

Disclaimer: Information on COVID-19 is changing rapidly and much of the research is preliminary. The protocols are suggestions only; they do not take the place of clinical judgement. Please check with your own health authorities and local medical health officers as direction, policies, and prevalence vary between regions.

These answers were topical and up-to-date as of the session**,** but recommendations are changing frequently. This summary was prepared by Dr. Simon Moore and the speakers have endorsed the release of this document.

Other helpful sources of information include EM-RAP, CAEP, CMAJ and providers can call the ROSe intensivists for assistance 24/7 at 1-888-918-0626, or visit rosetelehealth.com.

Webinar Summary

Brief Summary of Clinical Pearls

- **BC Rates of Sensitivity/Specificity of testing**: In BC, the false negative rate is close to 30%.
- **Unlike previous recommendations to intubate early**, now a gradual stepwise approach for dyspnea is used (move to next step if patient is still hypoxic): Nasal cannula 2L, 3L, 4L, to maximum 6L, non-rebreather mask, prone awake positioning, high-flow nasal cannula, CPAP, intubation
- **Earlier intubation is indicated** if the patient has signs of respiratory collapse or having markers of end-organ hypoxia
- **Prone positioning** for awake patients (pillow under hips / chest) has resulted in surprisingly dramatic improvements in oxygenation for patients

- Supportive care continues to be the mainstay of management; despite ongoing research, **no medications have proven to be effective**
- Have a **high index of suspicion for venous thromboembolism** and pulmonary embolism even if the patient is on standard prophylaxis. Patients are being discharged on Apixaban for 3 months based on anecdotal evidence.
- **Family members of admitted patients should be updated regularly** as they may feel scared and isolated if they cannot communicate with their loved one. They may also be worried that they will become ill from contact with their loved ones both prior to and after admission.
- For COVID-19 patients who require oxygen, **home oxygen therapy is not recommended** due to risk of rapid decompensation especially in light of the excellent current hospital bed availability for COVID-positive patients in BC.
- **CPR has extremely low success rates for COVID-19 patients** (in one study, 1 in 138 patients had a favourable neurologic outcome). Palliative consultation & comfort measures are commonly required for critically-ill patients

Question & Answers

Q: Could you share your experience with aerosol-generating medical procedures without negative pressure rooms?

A: Most of the evidence points to the high-flow setup making droplets heavier and less likely to aerosolize than using nasal prongs. This has been discussed at length at the Provincial Critical Care working group and there is no consensus or great evidence on either side. To be conservative it is considered aerosol-generating. If no negative pressure rooms are available, a single room may be used. Contact the hospital maintenance / engineering department to determine how long it takes for the air in the room to be cleared (some are actually positive pressure rooms and aerosols take longer to clear from those rooms). If this is the case airborne precautions are required. Cohorted units may make this safer as all providers wear full airborne PPE and all patients are COVID positive so the risk of spread to negative patients is lower

Q: What is the rationale for re-swabbing outpatients?

A: With sensitivity as low as 59% in some studies if you have high concern for COVID-19 infection you want to re-swab to ensure you are not dealing with a false negative. As seen with the patient's case discussed above, a negative test can be followed by a positive test. The test is very much determined by how the samples are taken and it requires fairly vigorous scrubbing of the oropharynx. For ICU patients with negative swabs we look at tracheal aspirates to get a better yield.

Q: Please comment on helping mildly hypoxic patients at home with nasal prong oxygen if they do not require intubation?

A: Patients at home require close follow-up, observation by someone else, and oxygen saturation monitoring at home. Patients can transition rapidly from Type L to Type H. It makes me nervous to send someone home who is on oxygen as they can desaturate very quickly. The 'happy hypoxemic' may look well but have a low PaO2. Especially now with hospitals in BC at 60-80% capacity admission is reasonable. If there is an oxygen requirement it is probably safest to admit. Home oxygen can ignore the cardiac complications of severe pulmonary hypertension in "L-type" patients – patients have had significant arrests on a few litres of oxygen via nasal prongs.

Q: How many dying patients need palliative sedation?

A: Everyone at Mt. Sinai who has been designated comfort care has required morphine or lorazepam for air hunger. Palliative specialists have made themselves available 24 hours a day, and are present in ER and all of the ICUs. They have added off-service residents to the palliative teams.

Q: How are you approaching CPR at your sites?

A: We are not being aggressive in New York in terms of resuscitation as the number needed to treat is very discouraging. CPR does not fix the reason for the arrest so some intensivists are not offering CPR if it is not indicated. In an article that is in press in Resuscitation journal, of 136 hospitalized patients in Wuhan who had CPR attempted within 1 minute of arrest, CPR was initially 'successful' in 18 patients; 4 survived at least 30 days and 1 had a favourable neurological outcome. Regarding practice in New York, if there is complete hypoxic respiratory failure there is little that can be done. In some ICUs, if a patient is on a ventilator with high PEEP and arrests, they will attempt bilateral finger thoracostomies to treat a suspected tension pneumothorax but are not aggressively treating beyond that. The use of ultrasound may be helpful; if the patient is in VF/VT they could be defibrillated immediately and then the ultrasound probe used. If there is cardiac standstill there is not much that can be done, but ultrasound may point to a pneumothorax or pericardial effusion that can be treated.

Q: Why are patients 'happy hypoxemics'?

A: It comes down to a balance of hypoxic ventilator drive vs. hypoxic pulmonary vasoconstriction. When alveoli are not oxygenated our lungs are not 'smart' and cut off blood supply to those alveoli and shunt it to aerated alveoli. For some reason, because those alveoli are filled with COVID and are not oxygenated and have lost surfactant, that inflammation may increase NO and cause pulmonary capillary vasodilation to the alveoli that cannot aerate. This worsens the pulmonic shunt. Some patients have strong hypoxic ventilatory drives; others have weak hypoxic ventilatory drives. As well recall that for hypoxic patients there is a differential diagnosis and it is not just COVID.

Q: Is everyone presumed COVID-positive when they arrive?

A: Unlike New York where nearly every patient in ER has COVID, the prevalence in BC is very low. On Vancouver Island, many patients have been harmed by being called "COVID" when they are not.

Q: How does your front-line experience compare to what is portrayed in the media?

A: In New York it is indeed fairly dire and dramatic and frightening. Patients are passing and resources are stretched. Every service is doing what they can and things they are not used to doing e.g. at Columbia there is an ortho-run ICU. It is physically and emotionally draining wearing PPE all day and having end of life conversations all day. In the media there is a lot of hype but it has not been overplayed at all; in New York it is at a level we could never imagined and hard to grasp the magnitude of what is going on and may not be possible until we look back in a few years. In BC, on the other hands, we spent months preparing; at the end of the day the numbers are extremely low. We are happy and joking that the virus is a bit of a dud here. Now we focus on the second phase: do we return to normal life or continue with social distancing.

Q: Focus on POCUS: what is the value of POCUS in the assessment and management of COVID-19?

A: It is the same as with non-COVID. It does not diagnose COVID. It is used to prioritized a differential, to confirm or help risk stratify a patient for presence of other respiratory or cardiovascular complications that present the same way e.g. volume assessment, LV/RV/chamber size, valvular competence, cardiomyopathy, complications of central line placement.

Q: Americans such as Dr. Scott Weingart are suggesting holding off on intubating; how do we do that if we are transferring a patient from a rural area?

A: In a tertiary centre we try to avoid intubation as much as we can; very different for our rural colleagues where we may not have 24-hour in-house coverage, RT or NP colleagues, readily-available transfer. The province is looking at having community COVID centres closer to a regional site where patients can be observed and transferred quickly if they deteriorate, rather than anticipating a 6-hour transfer.

Presentation Notes

Current Epidemiology

- There are currently 1.9 million total confirmed cases and 125,678 confirmed deaths. There are 8,000 deaths in New York City alone
- In Canada, there are low numbers in central Canada and eastern Canada. The highest numbers are in Ontario and Quebec. This may be due to cases imported from travelers returning from March Break trips.
- Vancouver Coastal and Fraser Health have the highest numbers in BC at 658 and 601 respectively.
- Median age in BC of patients who tested positive is 54 though we are seeing cases in younger patients as well. In BC, the male:female ratio is 46:54 despite a much higher rate of infections in males in other geographic regions.

- According to data from the Provincial COVID 19 Critical Care Working Group, the actual numbers of ICU and non-ICU hospitalized patients are much lower than the projected figures. The projections were based on data from Hubei, China. In Hubei the surge of patients began to peak and subsequently regressed after day 38. In BC, numbers of ICU patients are starting to decline which is very reassuring and suggests our social distancing has been very effective. The idea of flattening the curve is that people will get infected over time but by flattening the curve we can decrease the impact and demand on supplies on resources on our hospitals so we do not get the surge seen in China and Italy, where some patients were declined ventilators. At some time we will get a secondary surge when we lighten up on the social distancing. In the interim we hope to get a vaccine which could be 1.5 years away.
- Thanks to the community members who have stayed home to help flatten the curve; prevention is much better than treatment
- In New York the orthopedic surgery team has volunteered to act as the 'proning team' as they help to turn awake or intubated patients into prone position
- In New York there are 106,000 cases, 27% of whom were admitted to hospital. Over age 65, almost half are admitted. Over 8,000 patients in New York have died of COVID-19.
- 38% of positive patients are between age 18-44, 36% are 45-64, 13% are 65-74, and 11% over 75. Evenly split between male: female.
- Hospitalizations in New York: for patients who are between age 18-14 and positive for COVID-19, 11% are hospitalized. The hospitalization rate is 28% for ages 45-64, 49% for ages 65-74, and 63% over age 75.
- In New York Mt Sinai hospital there are 720 confirmed cases admitted, 124 patients on mechanical ventilation, 86 patients who have been in hospital > 10 days, 46 have been in ICU on ventilation over 10 days, 204 patients have died in hospital and only 88 died in an ICU.

Diagnosis

- Sensitivity/Specificity of test: In BC, the false negative rate is close to 30%. As well, there is a selection bias and not all patients receive testing. For these reasons, hospitalization and death rates are more accurate to track the outbreak rather than the number of infected patients.

Patient Story

- A patient was invited to present during the webinar. He provided the account of his illness which began as a dry cough, and subsequent ribcage pain. He reports initially thinking he had a cold, as many friends told him they had had similar symptoms. He improved and went back to work and felt well then progressively worsened with increasing cough.
- He went to a walk in clinic on March 20, not expecting that it was COVID because he had only been at work or home since March 13. He was examined in his car, was sent for an x-ray, given a Ventolin inhaler, and was not tested for COVID. He was advised to go to hospital if he worsened. He then got a phone call that a work colleague tested positive for COVID and was asked to go to

the Surrey Urgent Care clinic for testing. The next week, he had a telephone appointment and reported that he had a fever and minimal improvement from the Ventolin.

- He went to Peace Arch hospital on March 24 as he was shaking despite two blankets and struggling to breathe. His wife dropped him off and was told to sit in the parking lot and wait for a phone call. She waited for some time, went home where she was called and told that he was very sick and they were lucky that he had been brought in. He was intubated and transferred to Abbotsford hospital where he was sedated for 3-4 days. He does not recall the transfer from Peace Arch to Abbotsford. He recalls meeting doctors in Abbotsford but did not know where he was.
- After he was extubated, he suffered pain and profuse coughing all day. Due to dehydration he developed a gout flare from his knees to his ankles; he had significant difficulty ambulating.
- Finally he no longer required oxygen and was discharged home.
- During his admission his wife felt she did not know anything that was going on and had to call several times a day to get updates. She felt isolated and scared and was unsure if he would survive, which was stressful as she knew he hates hospitals. Eventually she was able to get a cell phone to him to communicate with him. She was also scared because she had been in close contact with him but was not wearing PPE at home. After he was discharged she still did not know if she could catch the disease from him. She has to quarantine for 14 days because he had a positive test 5 days ago.
- He was swabbed 5 times, twice with nasal & throat swabs, and three nasopharyngeal. One throat swab was positive, one nasal swab was positive, one was negative, two were inconclusive, and one is pending. His symptoms and appetite have now normalized.
- The social consequences of COVID-19 have changed dramatically (how we interact with patients, family members, faces hidden by use of PPE etc.) and in some ways undone the work we have done over the last several years on patient-centred care.
- Many questions are being discussed regarding 'What treatment / medication is best?' We should also be asking, 'How do we know the things we know are good for patients' families are continued?'

Decision to Intubate

- Early on in the COVID pandemic in BC and New York, intubation was done fairly early due to worries of decompensation during intubation. We have now transitioned to tolerating oxygen by other non-positive-pressure means more readily given the increasing evidence suggesting they are very likely not aerosol-generating procedures. The optimal timing is still unanswered.
- Upon review of the evidence, when to intubate is a decision made based on how the patient looks clinically, similar to how this decision was made before COVID.
- Patients who are peri-collapse or having significant markers of end-organ hypoxia are intubated early e.g. a patient on 3L nasal cannula dyspneic in distress and unable to oxygenate tissues or with rapidly progressing chest x-ray findings.

- For others they may benefit from a gradual stepwise approach for dyspnea, increasing if still hypoxic, e.g. nasal cannula 2L, 3L, 4L, to maximum 6L, non-rebreather mask, prone awake positioning, high-flow nasal cannula e.g. Optiflow at 60-70% oxygen, CPAP, intubation
- In the resource-limited setting in New York, intubation is considered if the patient is on a non-rebreather on a high-flow nasal cannula and saturation is 88%. This has dropped to a scary and unheard-of threshold. However beyond the numbers, the patient's work of breathing and clinical presentation are also taken into account.
- Prior to intubation, ensure patient is euvolemic, well pre-oxygenated, the team is in appropriate PPE
- Prone positioning: Place a pillow under hips / chest and put the patient in reverse Trendelenburg laying on their abdomen. This, plus asking patients to periodically move from side to side, has resulted in surprisingly dramatic improvements in oxygenation for patients who have the cognitive and physical capacity to maintain this position.
- Increasingly CPAP is being used as currently the goal at Mt. Sinai is to avoid intubation as much as possible.
- Despite being hypoxic patients can be alert and cooperative i.e. "Happy hypoxic" and communicating with their families using their phones, FaceTime, WhatsApp
- The O2 saturation monitor is placed where the patients can see it and patients are encouraged to oxygenate and 'beat their high score' and increase their oxygen saturation
- To reduce exposure to the intubation team, the patient will sometimes be contacted and assessed by video chat on their phone e.g. checking Mallampati and thyromental distance
- There is a difference between hypoxemia (low arterial oxygen content / saturation) vs. hypoxia (organs have inadequate oxygen). If there is truly cellular hypoxia the patients need to be intubated. However, patients with low saturation but no hypoxia may benefit from other means of oxygen administration.

Initial Ventilator Settings

- There are 2 predominant phenotypes of disease: Type L & Type H
- Type L: early stages of disease, good lung compliance e.g. they do not collapse easily
- Type H: later in the disease, more of an inflammatory disease, higher collapsibility, more propensity to look like classic ARDS
- For Type L: PEEP 5-8, FiO2 approx. 60% then titrated on assist control ventilation. At that time determine how compliant the lungs are and adjust accordingly.
- Patients with obesity, decreased lung compliance, lung disease on chest x-ray, more 'waterlogged' lungs require higher PEEP

Medications

- Supportive care continues to be the mainstay of management as no medications are proven to be effective.

- Other medications e.g. Kaletra will no longer be used outside of RCTs
- Hydroxychloroquine and chloroquine - found to be ineffective regarding patient-oriented outcomes and have complications from prolonged QTc. The journal that published the first open-label single-arm trial has retracted the paper
- Remdesivir - no evidence of benefit
- Ivermectin, colchicine - being explored for reduction of viral replication but are at the hypothesis stage only
- Steroids – unless they are indicated for other indications (shock, asthma, COPD exacerbation, adrenal insufficiency) they are not indicated for COVID
- Tocilizumab (IL-6 blockade) - Individual patients are receiving immunosuppressants dependent upon clinical course with consultation from infectious diseases, hematology, critical care. More RCTs are pending as this is bleeding edge.
- IL-1 inhibition or JAK-2 inhibition are new areas of study and more data is pending.

Hypercoagulability

- Have a high index of suspicion for venous thromboembolism and pulmonary embolism even if the patient is on standard prophylaxis such as heparin.
- 30% of patients in the Netherlands have had clinically-significant VTEs despite prophylaxis
- Initially BCCDC recommended 30 mg of enoxaparin BID (higher than usual prophylaxis dose) - with growing evidence, if D-dimers are climbing patients are placed on full anticoagulation if there are no other contraindications
- When there is rising D-dimer or rising inflammatory markers, patients are being placed on anticoagulation
- Patients are discharged on anticoagulation i.e. apixaban for 3 months if renal function permits

Convalescent serum

- RCTs are rolling out in New York, BC, and elsewhere
- There is growing but not rock-solid evidence
- If the patient improves after getting convalescent serum it is unclear if they improved despite or due to the convalescent serum
- Extubation Decision & Process
- Recall that extubation is an aerosol-generating medical procedure. Ensure staff are protected and aerosol generation is minimized.
- Extubation should be considered when patients are examined and found to have a trajectory towards recovery, looking for signs of ongoing sepsis, SIRS, inflammatory cascade, or complications of ventilation
- Look for pneumothorax, level of cough, ability to generate tidal volumes

- Use usual tests to predict success off the ventilator e.g. f/VT, spontaneous breathing trial, fluid status optimized.
- Some patients will pass these tests with flying colours and start to experience respiratory failure and require rescue therapy such as BiPAP, or reintubation.

Thanks to the speakers on the video:

- **Dr. Omar Ahmad**, Critical Care, Emergency Medicine – Victoria, BC
- **Dr. Adam Thomas**, Emergency Medicine, Critical Care Fellow – Vancouver, BC
- **Dr. Mario Francispragasam**, Critical Care, Emergency Medicine – Vancouver, BC
- **Dr. Danish Ahmad**, Internal Medicine, Emergency Medicine and Critical Care Medicine - New York, NY