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EMERGENCY DEPARTMENT MANAGEMENT OF COVID-19

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ABSTRACT

The novel coronavirus, causes a clinical disease known as COVID-19. Since being declared a global pandemic, a significant amount of literature has been produced and guidelines are rapidly changing. Decisions regarding management must be made with attention to comorbidities. Multiple comorbidities portend a worse prognosis. Many clinical decision tools have been postulated; however, as of now, none have been validated. Laboratory testing available to the emergency physician is nonspecific but does show promise in helping prognosticate and risk stratify. Radiographic testing can also aid in the process. Escalating oxygen therapy seems to be a safe and effective therapy; delaying intubation for only the most severe. Despite thrombotic concerns in COVID-19, the benefit of anticoagulation in the emergency department (ED) seems to be minimal.

Data regarding adjunctive therapies such as steroids and nonsteroidal anti-inflammatories are variable with no concrete recommendations, although steroids may decrease mortality in those patients developing acute respiratory distress syndrome. With current guidelines in mind, we propose a succinct flow sheet for both the escalation of oxygen therapy as well as ED management and disposition of these patients.

KEYWORDS :

INTRODUCTION

It took just over two months for the novel coronavirus, SARs-CoV-2 to be declared a global pandemic by the World Health Organization (WHO). In the immediate week following this announcement, more than 400 papers were published pertaining to COVID-19. Just two months later, this number had increased to over 2000 releases per week in the literature.[1] Keeping up with ever-changing information can be quite difficult. The purpose of this clinical review is to provide the emergency physician (EP) with a summary of current literature and supporting societal guidelines relevant to the management of the COVID-19 patient in the emergency department (ED). Finally, we propose an ED-based algorithm for the work-up and initial management of patients with suspected COVID-19 infections.

METHODS

We systematically searched the PubMed, Ovid, Cochrane Library, MEDLINE, Google Scholar, and Embase for literature related to "COVID-19," "SARS-CoV-1," and "SARS-CoV-2." We included relevant literature if it contained data on epidemiological characteristics, biomarkers, imaging, oxygenation and ventilation management, procedural aerosolization, pathology reports, hematologic abnormalities, and treatment outcomes related to care commonly seen in the ED).

As our prestigious institute is COVID dedicated hospital. And along with COVID, Mucor mycosis is also emerging as pandemic disease. On average monthly admission of 227 patient seen. Out of which 46 asymptomatic COVID patient send for home isolation, 153 COVID patient and 28 Mucor mycosis patients admitted. **(Figure 1)** Now there is increase number of Mucor mycosis cases than COVID cases

DISCUSSION

Risk Stratification

Risk stratification in the ED can be difficult for a novel virus such as SARS-CoV-2 as we do not have the luxury of years of research and understanding that we are offered with most disease processes. Decompensation of the otherwise well appearing COVID-19 patient can occur rather rapidly as many patients develop early lung injury and hypoxia before clinical deterioration is appreciated.[2] The ability of the EP to identify features that recognize those patients most at risk for clinical deterioration would be ideal. While many risk-stratification models have been proposed in response to COVID-19, most lack COVID-19-specific data, mainly focus on in-hospital mortality. and lack validation in the literature.[3-6]

National Institutes of Health (NIH) Definition of Disease Severity[7]

Currently, evidence-based practices support using epidemiological, laboratory, radiographic, and clinical features to help us determine who is at risk for decompensation. The NIH describes a mild clinical course as those with various symptoms (e.g., fever, fatigue, cough, myalgias, headache) but without dyspnoea and with normal imaging. There is insufficient data for the NIH panel to recommend specific lab evaluation or treatment modalities in patients fitting this profile. Based on current evidence, considerations should include discharge home with recommendations of antipyretics, hydration, and rest with self-isolation until afebrile for 72 hours without the need for antipyretics and improving symptoms. Patients with moderate disease are defined as those with evidence of lower respiratory tract pathology based on imaging or clinical assessment, but still have pulse oximetry readings greater than 93%. These patients should be admitted for close

observation. Empiric antibiotics for community-acquired pneumonia should be considered if a bacterial pneumonia or sepsis is suspected.

The NIH classification of severe disease includes those with a respiratory rate greater than 30; blood oxygen saturation level equal to or less than 93% on room air, a ratio of arterial oxygen partial pressure to fractional inspired oxygen < 300 or > 50% of lung involvement on imaging. These patients will require supportive oxygen therapy and hospital admission.

Lab Values as Predictors of Disease Severity (Figure 2)

Many serum biomarkers have been studied with COVID-19 infections. Alanine transaminase (ALT) and aspartate aminotransferase (AST) tend to be elevated and albumin low. Elevations in lactate dehydrogenase (LDH), CRP, procalcitonin, and abnormalities in coagulation parameters such as ferritin, D-dimer, fibrinogen, activated partial thromboplastin time and prothrombin time all tend to be elevated in patients with poor progression of disease. Measurements of these values should be considered in any patient with moderate to severe disease for their prognostic value. It is important to note that while guidelines recommend consideration in obtaining these markers, they are not considered part of standard care.[7] While many of these lab values are non-specific to COVID-19, they may serve as a tool for the EP until more robust prediction models are further studied and validated in the future.

Absolute Lymphocyte Count (ALC)

An ALC less than 0.8x109 per litre (L) has been consistently shown to correlate with disease severity, ICU admission, and death.19 Those with values greater than 1 x109/L tend to have a milder disease process, and values below this could perhaps help identify those at risk for disease progression.

D-dimer

An elevated D-dimer has been shown to be an independent marker of unfavourable disease progression in multiple studies.24-31 In the retrospective study from Zhou et al 81% of patients who died had a D-dimer greater than 1 microgram per millilitre (□g /mL) on admission. In a retrospective study of 343 hospitalized patients in Wuhan, China, the optimum cut-off value for D-dimer to predict all-cause death was 2.0 □g/mL using receiver operating characteristic curve with a sensitivity and specificity of 92.3% and 83.3%, respectively.

Lactate Dehydrogenase (LDH)

In the previously discussed study by Zhou and colleagues, an LDH greater than 245 was seen in 98% of all patients who did not survive, with an odds ratio for in-hospital mortality of 45.43.24 However, this elevation was also seen in 54% of those who survived. While an elevated LDH has shown an increased association with those requiring ICU admission and predicting in-hospital mortality in multiple studies, a normal value has also been shown to predict those who ultimately had a mild to moderate disease process.

C-reactive Protein (CRP)

CRP is non-specific and frequently elevated in patients with mild disease. However, the degree of increase has been associated with worse outcomes and in-hospital mortality as levels increase greater than 100 milligrams (mg)/L. Less significant elevations (50-75 mg/L) were seen in patients ultimately discharged home.

Ferritin

Ferritin is another nonspecific marker with elevations seen in up to 63-80% of COVID-19 patients admitted to the hospital.24,45 Ferritin levels greater than 300 nanograms (ng)/ mL have been associated with in-hospital mortality at an odds ratio of 9.10. A recent retrospective, multicentre study of 150 COVID-19 cases in Wuhan showed a mean elevation of 1297.6 ng/mL in non-survivors versus 614.0 in survivors.

Imaging as a Marker of Disease Severity

There is a lack of evidence in published literature to suggest that laterality of infiltrates on imaging accurately correlates with disease severity. In a retrospective cohort study out of Wuhan, bilateral infiltrates were seen in 72% of survivors and 83% of non-survivors.[8] However, multiple studies have shown bilateral involvement in as high as 91- 100% of all patients admitted to various hospitals across China, regardless of disease severity.

Current guidelines from the American College of Radiology (ACR) recommends considering portable chest radiographs (CXR) to avoid bringing patients into radiography rooms and recommends against computed tomography (CT) unless clinically indicated for another reason.[9]

Bedside lung ultrasound (LUS) may offer some advantages in the ED for patients with suspected COVID-19.50 A recently published article of 391 patients showed that LUS had a higher sensitivity when compared to CXR in patients diagnosed with COVID-19 pneumonia.51 Considering COVID-19 reverse transcription polymerase chain reaction (RT-PCR) has a sensitivity as low as 60-70% and CT findings can be delayed, LUS findings may add increased sensitivity to diagnosis.[10] Further, ultrasound has safety advantages including absence of radiation, low cost, and rapid bedside availability.[11]

Focal B-lines in the posterior and inferior lung fields appear to be the primary finding.[11] As disease progresses, the pleura becomes thickened and irregular with multifocal or confluent B-lines.54,55 In a study of 20 patients with moderate to critical severity COVID-19 pneumonia, pleural line abnormalities and B-lines were present in 100% of study participants.56 LUS findings have been shown to highly correlate with findings on CT.[12]

Management of The Critically ILL Adult

Current guidelines for the management of the critically ill adult with COVID-19 have been issued by the SCCM, the SSC, the NIH, and the ESICM. These guidelines are quite similar, if not identical, in regard to most recommendations and will be summarized here.[13]

Hemodynamic Support

Current guidelines favour a conservative approach to fluids in these patients.

Oxygen and Ventilation

Early discussion of hypoxic patients with COVID-19 prioritized intubation based on the hypothetical risk of patient self-induced lung injury resulting from excessive intrathoracic negative pressure from strong respirator effort and aggressive positive pressure ventilation strategies.65-70 Further, data suggest that ARDS patients with severe hypoxemic respiratory failure who received non-invasive ventilation (NIV) had a higher ICU mortality.[14] Limited data from the severe acute respiratory syndrome and Middle East respiratory syndrome outbreaks show a high failure rate of NIV coupled with concern of virus aerosolization made early intubation for all who were hypoxic seem more veracious. Currently there is a lack of evidence identifying the ideal time of intubation, and this area would benefit from additional research.

The FLORALI trial randomly assigned patients who had acute hypoxemic respiratory failure to either high - flow oxygen therapy or standard oxygen therapy delivered through a face mask, or non-invasive positive-pressure ventilation.[15] There was no significant difference in the intubation rates between

groups; however, there was a significant difference in favour of high-flow oxygen in 90-day mortality. An unblinded, retrospective study of hospitalized COVID-19 patients concluded that high flow nasal oxygen (HFNO) therapy provided more patient comfort and was non-inferior to NIV for intubation rate. HFNO and prone positioning may help redistribute pulmonary perfusion and improve the V/Q mismatch. In patients who are alert, allowing them to self-prone has been shown to improve oxygenation and is a reasonable approach for those not otherwise requiring intubation. This phenotype model is untested and there is a paucity of societal guidelines for patients with preserved compliance requiring mechanical ventilation. We believe a blanket ARDS ventilatory strategy for all patients could have detrimental consequences. Given the variable differences in observed lung compliance in clinical presentations of COVID-19, it is reasonable to consider a targeted ventilatory strategy unique to the observed lung mechanics and not simply the degree of hypoxia.

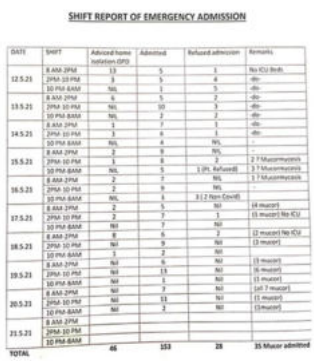

Figure 1

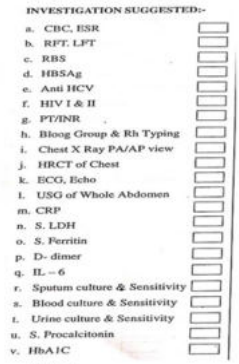

Figure 2

Figure 1: Monthly covid & mucor mycosis admission

Figure 2: Investigation required for moderate and severe cases

Figure 3: Treatment Protocol of COVID

Figure 4: Clinical Details of COVID Patients

Signs and symptoms **(Figure 4)** of COVID may appear two to 14 days after exposure. This time after exposure and before having symptoms is called the incubation period. Common signs and symptoms can include: Fever, Cough, Tiredness, Early symptoms of COVID-19 may include a loss of taste or smell. Other symptoms can include: Shortness of breath or difficulty breathing, Muscle aches, Chills, Sore throat, Runny nose, Headache, Chest pain, Pink eye (conjunctivitis), Nausea, Vomiting, Diarrhoea, Rash

Asymptomatic cases, mild cases home isolation to be done (Figure 3)

The patient having spo2 94% and respiratory rate < 24 per min. are mild cases. They are sent for home isolation with certain precaution and instructions. Use a triple layer medical mask. Take rest and drink a lot of fluids to maintain adequate hydration. Frequent hand washing with soap and water for at least 40 seconds or clean with alcohol-based sanitizer. Don't share personal items with other people in the household. Ensure cleaning of surfaces in the room that are touched often (tabletops, doorknobs, handles, etc.) with 1% hypochlorite solution. Monitor temperature daily. Monitor oxygen saturation with a pulse oximeter daily. Connect with the treating physician promptly if any deterioration of symptoms is noticed. Instructions for care givers: Mask: The caregiver should wear a triple layer medical mask. N95 mask may be considered when in the same room with the ill person. Hand hygiene: Hand hygiene must be ensured following contact with ill person or patient's immediate environment. Exposure to patient/patient's environment: Avoid direct contact with body fluids of the patient, particularly oral or respiratory secretions. Use disposable gloves while handling the patient. Perform hand hygiene before and after removing glove

The **moderate cases** having spo2 90—93 % and respiratory rate 24-30 per min. were admitted in ward. Oxygen support to be given by nasal prong or non-rebreathing face mask (NRBM). Two hourly change of posture to be done. Prone position is better in right or left lateral position. Supine position is avoided. Chest physiotherapy to be done. Target spo2 should be 92-96%. When the spo2 achieved >94% and respiratory rate < 24 per min. reduce the oxygen supply gradually and monitor hourly. If ESR and CRP raised, Anti-inflammatory agents should be started. Inj. methylpred nisolone 0.5 t0 1 mg/kg/IV in 2 divided doses or Inj. dexamethasone - one vial iv bd for 5 to 10 days. In stable patients' oral dexamethasone 6 mg od to be given for 10 days. If D DIMER raised, anticoagulation to be given, Enoxaparin 0.5 mg/kg per day, subcutaneous. Check for bleeding episodes and PT/INR when anticoagulation given.

REGULAR MEDICATIONS

given as fellows: Tab. Azithromycin 500mg BD, Tab. Pantoprazole 40mg OD both for 7 days. Tab. VIT C 500mg PO BD, Tab ZINC 50MG PO OD for 20 days. CAP VIT D 60000 IU PO STAT followed by weekly for 8 weeks. Tab Paracetamol 500mg po SOS for fever > 100'c.

Regular monitor of respiratory rate, pulse, BP, 02 demand to be done.

For severe cases having spo2<90 % and respiratory rate >30 per min. were admitted in ICU and treated accordingly as described earlier.

LIMITATIONS

This paper has a few limitations. With the large volume and rapid publication of literature on this previously unknown subject, most lack validation. Some articles regarding COVID-19 have been retracted after publication, although every effort has been made to be sure each citation was valid at the time of publication of this manuscript.

CONCLUSION

Evidence-based practice in the approach to COVID-19 is mercurial. Current literature focuses on the inpatient evaluation, treatment, and disposition of these patients. Interpretation and adaptation of current recommendations to patients in the emergency department is a crucial target for future literature.

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