ECRONICON OPEN ACCESS

EC GYNAECOLOGY
Review Article

Management of Critical Cases of COVID-19 Infection

Khaled Mohamed Elsharkawy[1]*, Ziyad Naser AlGhamdi[2], Naif Matar Alotaibi[3], Jamal Sharaf Alzahrani[4], Bashayer Mousa Aseeri[5], Uthman Abdullah Alghamdi[3], Khalid A ALNouri[6], Raghad Adel Alrowithi[7], Rawan Asim Zagzoog[8], Sultan Sameer Alhunbusi[9] and Lujain Hani Natto[8]

[1]*Critical Care Specialist, King Abdulaziz Hospital, Jeddah, Saudi Arabia*

[2]*King Abdulaziz Hospital, Jeddah, Saudi Arabia*

[3]*Prince Sultan Military Medical City, Riyadh, Saudi Arabia*

[4]*King Abdulaziz Hospital, Mecca, Saudi Arabia*

[5]*King Saud bin Abdulaziz for Health Sciences, Riyadh, Saudi Arabia*

[6]*King Abdulaziz University Hospital, Jeddah, Saudi Arabia*

[7]*Ibn Sina National College for Medical Studies, Jeddah, Saudi Arabia*

[8]*Alnoor Specialist Hospital, Mecca, Saudi Arabia*

[9]*King Abdulaziz Specialist Hospital, Taif, Saudi Arabia*

***Corresponding Author:** Khaled Mohamed Elsharkawy, Critical Care Specialist, King Abdulaziz Hospital, Jeddah, Saudi Arabia.

Received: October 02, 2020; **Published:** October 19, 2020

Abstract

Background: Coronavirus disease 2019 (COVID-19) is the third coronavirus infection in two decades that was eventually described in Asia, after severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS).

Aim: In this review, we will look into the epidemiology, clinical manifestation of severe cases, and management of critical cases of COVID-19 infection.

Conclusion: More research should be conducted in area of critical management of COVID-19 cases to decrease mortality rate as the virus continues to spread. Up-to-date, evidence-based recommendations for acute treatment of COVID-19 are important to steer clinicians in a rapidly emerging pandemic. When fresh research arises, it is important those existing and future therapeutic choices are constantly re-evaluated in order to ensure the best available service in such extraordinary circumstances.

Keywords: *COVID-19 Viral Infection; Management Severe Cases of COVID-19; Symptoms of Severe Cases of COVID-19; Corona Virus Management*

Introduction

Coronavirus disease 2019 (COVID-19) is the third coronavirus infection in two decades that was eventually described in Asia, after severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS) [1]. In February 2020, the World Health Organization designated the disease COVID-19, which stands for coronavirus disease 2019. In more than 200 countries, territories or areas worldwide over 3,750,000 confirmed persons and over 250,000 deaths have been recorded [2]. Around 14% of confirmed cases of serious disease developed Coronaviruses are enveloped single-stranded RNA viruses. The Coronavirus Study Group of the International

Committee on Taxonomy of Viruses has suggested that this virus be designated severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) [3].

Common signs of infection include respiratory symptoms, fever, cough, shortness of breath and breathing difficulties. In more severe cases, infection can cause pneumonia, severe acute respiratory syndrome, kidney failure and even death [4]. Infected persons with primary health conditions seem to be the most defenseless to acceding to COVID-19, based on data out of China and Italy. Mortality rates also increase with age, as noted in data from the United States [5].

In this review, we will look into the epidemiology, clinical manifestation of severe cases, and management of critical cases of COVID-19 infection.

Epidemiology

A study in China found that; 87% of positive severe cases aged 30 to 79 years and 3% were aged 80 years or older [6]. Another study reported that approximately 51% of patients were male [7]. Zhou., *et al*. confirmed that increased age of patients with COVID-19 was associated with death [8]. In Italy, the median age and prevalence of comorbidities was higher compared with China [9].

In the UK, the average age of patients was 73 years and males accounted for 60% of admissions in a prospective observational cohort study of more than 20,000 hospital patients [10]. In the US, elderly patients (aged ≥ 65 years) contributed for 31% of all cases, 45 per cent of hospitalizations, 53% of intensive care unit admissions and 80% of deaths, with the greatest rate of serious outcomes in patients ≥ 85 years of age [11].

According to findings of previous study; it appears that children generally don't spread the virus to household contacts [12]. Unlike adults, children do not seem to be at higher risk for severe illness based on age or sex [13,14].

Currently, COVID-19 has spread all over the world giving us a huge pandemic crisis by reaching 25,851,001 cases, deaths: 859,136 and recovered cases 18,077,921 [15].

Symptoms of severe cases

COVID-19 clinical manifestations range from mild to acute respiratory distress syndrome, and multi-organ dysfunction [16]. Following fever, the most common symptoms remain respiratory manifestations such as cough, sputum development and shortness of breath [17]. Common Symptoms, according to Chinese reaches that was most hospitalized cases have were fever 99%, fatigue 70%, dry cough 59%, loss of appetite 40%, body aches 35%, tininess of breath 31% and mucus or phlegm 27% [18].

In a subset of patients, the disease will advance to pneumonia, respiratory failure and death by the end of the first week [16]. This development is related to severe increases in inflammatory cytokines like IL2, IL7, IL10, GCSF, IP10, MCP1, MIP1A, and TNFα [19] signs occur after 2 to 14 day incubation with average 5.2 day incubation [20]. Patients may develop breathing problems after 5 days of the onset of illness and 8 days after acute respiratory distress syndrome (ARDS). If the condition of the patient did not get better, they may suffer intestinal problems and pneumonia, with other clinical problems depending on their immune and health status [21].

SARS-COV-2, SARS-COV, and MERS-COV viruses have very related clinical symptoms like fever, cough, myalgia, and dyspnea. However, patients with SARS and MERS have more gastrointestinal activity than patients with COVID-19 [22]. MERS has a high incidence of renal failure, which is a typical distinctive not often found in other human coronavirus infections [23,24].

Symptoms usually begin 2 to 14 days after contact with the infected person. Sever symptoms, which patient should delay to intensive care include trouble breathing, persistent pain or pressure in chest, bluish lips or face and sudden confusion. In this situation patient should be delivered to hospital to be rescued [25,26].

COVID-19 causes development of micro-thrombi which can travel to the lung and impede blood flow to the lung causing pulmonary embolism, or travel to brain circulation and cause ischemic stroke [27]. Strokes have also been reported in some COVID-19 cases.

Evidence is growing that the longer-term severe problems associated with the inflammatory response may be considerable in those who experience critical and life-threatening symptoms [29]. Neurological and psychological conditions that can also exist in patients without respiratory symptoms include stroke, encephalopathy, anxiety, meningoencephalitis, delirium, depression, and poor sleep. Serious patients or ICU patients have significantly higher death rates [30]. In addition, one case of meningoencephalitis associated with SARS-CoV-2 infection was reported in a patient with an initial neurological presentation of convulsions and unconsciousness in Japan [31]. Damage to the nervous system associated with COVID-19 can also result from direct infection, hypoxic injury or immunological reaction [32]. SARS-CoV-2 also affects the gastrointestinal organs, as ACE2 is extensively expressed in gastric, duodenal and rectal epithelial glandular cells. Severe COVID-19 cases were more likely to have gastrointestinal symptoms than non-severe cases (17.1% vs. 11.8%) [33].

Management of severe cases of COVID-19

Oxygen therapy: Reports indicate that non-invasive ventilation (NIV) and high-flow nasal cannula (HFNC) have been used in from one-third to two-thirds of severely ill COVID-19 cases [34]. Insinuating from SARS, intubation of COVID-19 patients often poses a significant risk of viral spread to healthcare workers [35].

Bag-mask ventilation, which produces aerosols, can be reduced by the extended pre-oxygenation of the viral philter between the exhalation valve and the mask [36]. Rapid sequence administration of muscle relaxants decreases coughing. End-tide carbon dioxide measurement and chest raise examination can be used to validate endotracheal tube positioning.

Closed suction systems usage during intubation eliminates aerosolization [36]. A major focus of mechanical ventilation for COVID-19 is the prevention of ventilator-induced lung injury while facilitating gas exchange through pulmonary-protective ventilation. Rapid release from invasive mechanical ventilation to decrease the prevalence of ventilator-associated pneumonia and to create ICU capacity must be balanced against the risks of preterm estuation and subsequent re-intubation [37].

The ability of SARS-CoV-2 to impact the peripheral and dorsal areas of the lungs provides optimum environment for a strong oxygenation response to prone positioning. Veno-venous extracorporeal membrane oxygenation (ECMO) is intended for the most serious ARDS patients, given evidence that it may improve survival, like MERS [38]. However, the recommendation to offer very advanced treatment to fewer patients should be weighed against the obligation to provide very advanced care to more patients [39,40]. In one study, 14 of the 28 patients who received ECMO died, 9 were still on ECMO and only 5 were successfully weaned [41].

Fluid therapy: Patients with COVID-19 may experience hypovolemia attributable to anorexia, diarrhea and vomiting [42]. Fluids should be administered carefully and preferably with pre-load tolerance tests such as the passive leg elevation measure, considering the high occurrence of myocardial dysfunction in COVID-19 [43].

Antiviral treatment: The effectiveness of antiviral medications also needs to be evaluated by more clinical trials. Many of the current trials are single-arm or small sample trials. Data demonstrate that there is no significant disparity in 28-day mortality and viral clearance between lopinavir and ritonavir in severe cases of COVID-19 [44].

Remdesivir is a broad spectrum antiviral agent-an adenosine analogue able of interrupting the immature viral RNA chains to induce premature chain termination and has previously been studied for Ebola. The antiviral prevents the virus successfully when remdesivir is inserted into Vero E6 cells infected with COVID-19 [45]. Recently published study on Remdesivir found that 68 per cent of 53 patients had remission of symptoms after treatment with Remdesivir and that the mortality rate was around 18 per cent lower than in previous studies, but the research had defects such as single arm configuration, poor follow-up time, and lack of quantitative evidence on viral load [46].

Hydroxychloroquine sulfate or chloroquine phosphate: The mechanism of action of chloroquine raises the endosomal pH above that needed for virus and cell fusion while also interrupting cellular receptor glycosylation in related viruses such as SARS-CoV. When chloroquine is administered to Vero E6 cells contaminated with COVID-19, it tends to cure the infection at both the entry and post-infection levels [47]. Chloroquine can also improve cell immune regulation, possibly enhancing the effectiveness of the drug *in vivo*. Chloroquine is usually inexpensive and safe to use and is easily spread to all organ systems, including the lungs, when consumed orally [48].

Glucocorticoids: The role of glucocorticoids is to inhibit the inadequate immune response. The immune response to the virus is effective in most moderate cases. The use of glucocorticoids can enhance the clearance of the virus; whereas the use of glucocorticoids is too late for serious or critically ill patients who have already undergone a "cytokine storm" to prevent this excessive inflammatory response [49].

Finally, transfer of patients out of the ICU for investigations such as CT scans risks spreading SARS-CoV-2 and can be minimized with alternatives such as point-of-care ultrasound [50]. Although the benefits of immunosuppression are unproven and the role of corticosteroids in COVID-19 remains unclear, a systematic review of observational studies of corticosteroids for SARS found no impact on mortality but possible harms, including avascular necrosis, psychosis, diabetes, and delayed viral clearance [51].

Conclusion

More research should be conducted in area of critical management of COVID-19 cases to decrease mortality rate as the virus continues to spread. Up-to-date, evidence-based recommendations for acute treatment of COVID-19 are important to steer clinicians in a rapidly emerging pandemic. When fresh research arises, it is important those existing and future therapeutic choices are constantly re-evaluated in order to ensure the best available service in such extraordinary circumstances.

Bibliography

1. Morens David M., *et al.* "Escaping Pandora's Box - Another Novel Coronaviru". *New England Journal of Medicine* (2020): 1293-1295.

2. World Health Organization. Director-General's remarks at the media briefing on 2019-nCoV (2020).

3. Gorbalenya AE., *et al.* "Severe acute respiratory syndrome-related coronavirus: The species and its viruses – a statement of the Coronavirus Study Group". *Bio Rxiv* (2020).

4. Shuaiyao Lu., *et al.* "Comparison of nonhuman primates identified the suitable model for COVID-19". *Signal Transduction and Targeted Therapy* 5 (2020): 1.

5. WHO found (2019).

6. Chen N., *et al.* "Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study". *Lancet* 395.10223 (2020): 507-513.

7. Epidemiology Working Group for NCIP Epidemic Response, Chinese Center for Disease Control and Prevention. [The epidemiological characteristics of an outbreak of 2019 novel coronavirus diseases (COVID-19) in China]". *Zhonghua Liu Xing Bing Xue Za Zhi* 41.2 (2020): 145-151.

8. Zhou F., *et al.* "Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study". *Lancet* 395.10229 (2020): 1038.

9. Colaneri M., *et al.* "Clinical characteristics of coronavirus disease (COVID-19) early findings from a teaching hospital in Pavia, North Italy 21 to 28 February 2020". *Eurosurveillance* 25.16 (2020).

10. Docherty AB., *et al.* "Features of 20 133 UK patients in hospital with COVID-19 using the ISARIC WHO clinical characterisation protocol: prospective observational cohort study". *British Medical Journal* (2020).

11. CDC COVID-19 Response Team. Severe outcomes among patients with coronavirus disease 2019 (COVID-19): United States, February 12 - March 16, 2020". *Morbidity and Mortality Weekly Report* (2020).

12. Mehta NS., *et al.* "SARS-CoV-2 (COVID-19): what do we know about children? A systematic review". *Clinical Infectious Diseases* (2020).

13. Posfay-Barbe KM., *et al.* "COVID-19 in children and the dynamics of infection in families". *Pediatrics* 146.2 (2020): e20201576.

14. Castagnoli R., *et al.* "Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection in children and adolescents: a systematic review". *JAMA Pediatrics* (2020).

15. https://www.worldometers.info/corona

16. Mark Honigsbaum and Pierre-Olivier Méthot. "Introduction: microbes, networks, knowledge-disease ecology and emerging infectious diseases in time of COVID-19". *History and Philosophy of the Life Sciences* 42 (2020): 3.

17. Clinical findings in a group of patients infected with the 2019 novel coronavirus (SARS-Cov-2) outside of Wuhan, China: retrospective case series". *British Medical Journal* 368 (2020): m792.

18. Guan WJ., *et al.* "Clinical characteristics of 2019 novel coronavirus infection in China". *Med Rxiv* (2020).

19. Zhang JJ., *et al.* "Clinical characteristics of 140 patients infected by SARS-CoV-2 in Wuhan, China". *Allergy* (2020): 1730-1741.

20. Wang D., *et al.* "Clinical characteristics of 138 hospitalized patients with 2019 novel coronavirus-infected pneumonia in Wuhan, China". *The Journal of the American Medical Association* (2020).

21. De Wit E., *et al*. "SARS and MERS: recent insights into emerging coronaviruses". *Nature Reviews Microbiology* 14.8 (2016): 523-534.

22. Zumla A., *et al.* "Middle East respiratory syndrome". *Lancet* 386 (2015): 995-1007.

23. Al-Omari A., *et al.* "MERS coronavirus outbreak: Implications for emerging viral infections". *Diagnostic Microbiology and Infectious Disease* 93.3 (2019): 265-285.

24. Yeung ML., *et al.* "MERS coronavirus induces apoptosis in kidney and lung by upregulating Smad7 and FGF2". *Yuen KYNat Microbiology* 1 (2016):16004.

25. Aleksandar Milenkovic., *et al.* "Extensions and adaptations of existing medical information system in order to reduce social contacts during COVID-19 pandemic". *International Journal of Medical Informatics* 141 (2020): 104224.

26. Zhongliang Wang., *et al.* "Household transmission of SARS-CoV-2". *Journal of Infection* 81.1 (2020): 179-182.

27. David M Morens and Anthony S Fauci. "Emerging Pandemic Diseases: How We Got to COVID-19". *Cell* (2020).

28. Loma Linda University, Loma Linda, CA.

29. Valentin Navel., *et al.* "COVID -19, sweat, tears… and myopia?". *Clinical and Experimental Optometry* 103.4 (2020): 555-555.

30. Yang X., *et al.* "Clinical course and outcomes of critically ill patients with SARS-CoV-2 pneumonia in Wuhan, China: a single-centered, retrospective, observational study". *The Lancet Respiratory Medicine* (2020).

31. Moriguchi T., *et al.* "A first case of meningitis/encephalitis associated with SARS-coronavirus-2". *International Journal of Infectious Diseases* 94 (2020): 55-58.

32. Wu Y., *et al.* "Nervous system involvement after infection with COVID-19 and other coronaviruses". *Brain, Behavior, and Immunity* 87 (2020): 18-22.

33. Gu J., *et al.* "COVID-19: gastrointestinal manifestations and potential fecal–oral transmission". *Gastroenterology* 158 (2020): 1518-1519.

34. Wei jie guan Clinical characteristics of coronavirus disease 2019 in China". *The New England Journal of Medicine* (2020).

35. Khai Tran., *et al.* "Aerosol generating procedures and risk of transmission of acute respiratory infections to healthcare workers: a systematic review". *PLoS One* 7.4 (2012): e35797.

36. Practical recommendations for critical care and anesthesiology teams caring for novel coronavirus (2019-nCoV) patients". *The Canadian Journal of Anesthesia* (2020).

37. Michael A Matthay., *et al.* "Treatment for severe acute respiratory distress syndrome from COVID-19". *The Lancet Respiratory Medicine* 8.5 (2020): 433-434.

38. Kollengode Ramanathan., *et al.* "Planning and provision of ECMO services for severe ARDS during the COVID-19 pandemic and other outbreaks of emerging infectious diseases". *The Lancet Respiratory Medicine* (2020).

39. Xiaochun Ma., *et al.* "Extracorporeal membrane oxygenation for severe Middle East respiratory syndrome coronavirus. Preparing for the most critically ill patients with COVID-19: the potential role of extracorporeal membrane oxygenation". *The Journal of the American Medical Association* (2020): e925364-1–e925364-10.

40. Prof Chaolin Huang., *et al.* "Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China". *Lancet* 395 (2020): 497-506.

41. Jianfeng Xie., *et al.* "Critical care crisis and some recommendations during the COVID-19 epidemic in China". *Intensive Care Medicine* (2020): 1-4.

42. Prof Nanshan Chen., *et al.* "Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study". *Lancet* 395 (2020): 507-513.

43. Qiurong Ruan., *et al.* "Clinical predictors of mortality due to COVID-19 based on an analysis of data of 150 patients from Wuhan, China". *Intensive Care Medicine* 46.5 (2020): 846-848.

44. Xia S., *et al.* "Inhibition of SARS-CoV-2 (previously 2019-nCoV) infection by a highly potent pan-coronavirus fusion inhibitor targeting its spike protein that harbors a high capacity to mediate membrane fusion". *Cell Research* 30.4 (2020): 343-355.

45. CDC. Coronavirus disease 2019 (COVID-19) Centers for Disease Control and Prevention (2020).

46. Grein J., *et al.* "Compassionate Use of Remdesivir for Patients with Severe Covid-19". *The New England Journal of Medicine* 382.24 (2020): 2327-2336.

47. Wang M., *et al.* "Remdesivir and chloroquine effectively inhibit the recently emerged novel coronavirus (2019-nCoV) *In vitro*". *Cell Research* 30.3 (2020): 269-271.

48. Gautret P., *et al.* "Hydroxychloroquine and azithromycin as a treatment of COVID-19: results of an open-label non-randomized clinical trial". *The International Journal of Antimicrobial Agents* 56.1 (2020): 105949.

49. Marchand-Senécal X., *et al.* "Diagnosis and management of first case of COVID-19 in Canada: lessons applied from SARS". *Clinical Infectious Diseases* (2020): ciaa227.

50. Starting, reviewing and stopping critical care treatment | COVID-19 rapid guideline: critical care in adults | Guidance | NICE (2020).

51. Chris R Triggle., *et al.* "COVID-19: Learning from Lessons To Guide Treatment and Prevention Interventions". *M Sphere* 5 (2020): 3.

Volume 9 Issue 11 November 2020