A Global Threat COVID-19: Understanding and its Management

Puvaneswari Kanagaraj¹, Anbueswari Kanagaraj², Albin Joseph Yesuwilson³

ABSTRACT

COVID-19 disease is a highly infectious disease caused by a newly (novel) identified corona virus. COVID-19 infected patients may have mild to moderate respiratory symptoms and can recover without any specific medical management. But few experience severe symptoms and lead to mortality. COVID-19 is announced by WHO as a global pandemic. It is very critical to take appropriate decisions and timely management and prevention of the infection.

Keywords: COVID-19, Diagnostic test, Management of COVID19, Pandemic, Pathophysiology, Signs, Symptoms.

Pondicherry Journal of Nursing (2020): 10.5005/jp-journals-10084-12143

INTRODUCTION

Corona viruses can affect birds, mammals, and also human beings (identified in 1960).¹ The term "Corona virus" is obtained from a word "Corona" from Latin meaning "crown" or "wreath."² Some of the corona infections identified were SARS-CoV (2003), HCoV NL63 (2004), and MERS-CoV (2012).³ On February 11, 2020, the WHO has announced unexplained low respiratory infections detected in Wuhan city, China, i.e., named as "Coronavirus disease 2019," an acronym of COVID-19, which is caused by a novel CoV.⁴

DEFINITION

COVID-19 is a pandemic disease caused by COVID-19 or SARS-CoV-2, which is genetically similar to the severe acute respiratory syndrome (SARS) coronavirus.⁵

TRANSMISSION, INCUBATION PERIOD, AND VULNERABLE GROUPS

COVID-19 primarily spreads through the respiratory tract by droplets (cough and sneeze), respiratory secretions, and direct contact.⁶ People become infected with COVID-19 by touching the contaminated objects or surfaces with COVID 19, then touching their eyes, nose, or mouth.⁷ COVID-19 infection has an incubation period of 1–14 days, mostly 3–7 days.⁸ It is highly transmissible in humans. People who are older or who have existing chronic medical conditions, such as hypertension, compromised lung function, chronic obstructive pulmonary disease or diabetes, cancer, or who have compromised immune systems may be at higher risk of serious illness.^{9–11}

PATHOPHYSIOLOGY^{4,12–14}

A pathophysiology and virulence mechanism of COVID-19 has a link to the function of structural and nonstructural proteins. The pathophysiology is explained in Flowchart 1.

CLINICAL MANIFESTATIONS/SYNDROMES IN ADULTS^{15,16}

The clinical features of coronavirus disease-19 can vary from asymptomatic to severe clinical conditions. Clinical syndromes are explained in Figure 1.

¹Department of Medical and Surgical Nursing, Narayana Hrudayalaya College of Nursing, Bengaluru, Karnataka, India

²Department of Nursing, Government Mohan Kumaramangalam Medical College and Hospital, Salem, Tamil Nadu, India

³Department of Nursing, Aliaa Specialist Hospital, Omdurman, Khartoum, Sudan

Corresponding Author: Puvaneswari Kanagaraj, Department of Medical and Surgical Nursing, Narayana Hrudayalaya College of Nursing, Bengaluru, Karnataka, India, Phone: +91 9448126938, e-mail: puvaneswariramesh@gmail.com

How to cite this article: Kanagaraj P, Kanagaraj A, Yesuwilson AJ. A Global Threat COVID-19: Understanding and its Management. *Pon J Nurs* 2020;13(1):18–21.

Source of support: Nil

Conflict of interest: None

DIAGNOSTIC TESTS^{17,18}

Use appropriate personal protective equipment (PPE) while taking specimens like blood, upper, and lower respiratory samples. Follow droplet, contact, and airborne precautions. It is explained in Figure 2.

MANAGEMENT^{15,16}

Clinical Management^{15,16}

Infection Prevention and Control Measures

- Infection prevention and control (IPC) measures need to be initiated along with the screening and give a mask to the suspected COVID-19 and direct to separate area with 1-m distance between patient to patient.
- Healthcare workers should follow the standard precautions (hand hygiene, appropriate PPE, biomedical waste management, prevention of needle-stick injury, cleaning and disinfection of equipment and environment when in contact with body fluids, blood, secretions (respiratory), and nonintact skin both directly or indirectly.

Flowchart 1: Pathophysiology of COVID-19

Uncomplicated illness	Fever, cough, sore throat, nasal congestion, malaise, headache.
Mild pneumonia	Cough, difficulty in breathing/ fast breathing along with uncomplicated illness features
Severe pneumonia	Fever or suspected respiratory infection, plus one of the following; respiratory rate >30 breaths/min, severe respiratory distress (e.g. grunting, chest in-drawing), SpO ₂ <90% on room air. The diagnosis is clinical; chest imaging can exclude complications
Acute respiratory distress syndrome	New or worsening respiratory symptoms within one week of known clinical insult. Chest imaging (radiograph, CT scan, or lung ultrasound): Bilateral opacities, not fully explained by effusions, lobar or lung collapse, or nodules. Origin of edema: Respiratory failure not fully explained by cardiac failure or fluid overload. Need objective assessment (e.g. echocardiography) to exclude hydrostatic cause of edema if no risk factor present
Sepsis	Signs of organ dysfunction include: Altered mental status, difficult or fast breathing, low oxygen saturation, reduced urine output, fast heart rate, weak pulse, cold extremities or low blood pressure, skin mottling, or laboratory evidence of coagulopathy, thrombocytopenia, acidosis, high lactate or hyperbilirubinemia
Septic shock	Persisting hypotension despite volume resuscitation, requiring vasopressors to maintain MAP = 65 mm Hg and serum lactate level <2 mmol/L

Fig. 1: Clinical syndromes associated with COVID-19

Mild COVID-19 Management: Monitoring and Symptomatic Treatment

- COVID-19 patients with mild symptoms need isolation and can be managed without hospitalization.
- Treat symptomatically with antipyretics for fever. Patients should be counseled about the clinical features of the complicated illness and advised to seek the medical help.

Severe COVID-19 Management: Monitoring and Oxygen Therapy

- Observe the signs of clinical deterioration of progressive respiratory failure, sepsis closely, and treat immediately. Patients with SARI along with no evidence of shock, conservative fluid management should be used cautiously.
- Administer supplemental oxygen therapy (5 L/min) immediately for patients identified with hypoxemia, respiratory distress, SARI, or shock

- ✓ **Epidemiological history**
- ✓ **Real-time reverse transcription - polymerase chain reaction (r RT-PCR)** (SARS-CoV-2 nucleic acid positive)- Nasopharyngeal or sputum sample, Throat swabs (reliable in the 1st week), ample from deep airways by the suction catheter or coughing up material (2nd week of the disease)
- ✓ **Blood cultures, stool tests**
- ✓ **Peripheral blood leukocytes and lymphocytes** are not significantly reduced (normal or slightly lower) at early phase later peripheral blood lymphocytes decrease significantly, involving both T and B lymphocytes.
- ✓ **D-dimer-based coagulation factors** may appear abnormal along with prolonged prothrombin time (PT) and gradual decrease of fibrinogen (FBG) and platelets.
- ✓ **Chest CT scans** - Lobular and sub segmental areas of consolidation as the most typical findings. Ground-glass opacities and consolidation also can be noted
- ✓ **CBC, LFT, RFT, CK and Myoglobin, CRP** can be checked on the 3rd, 5th and 7th days after admission and on discharge according to the disease status

Fig. 2: Diagnostic tests related to COVID-19

Severe COVID-19 Management: Treatment of Coinfections

- Administer antimicrobials/antibiotics to treat pathogens causing SARI and sepsis within one hour of initial assessment of patients with sepsis.

ARDS and Hypoxemic Respiratory Failure Management

- High flow nasal cannula oxygenation (HFNC) or noninvasive mechanical ventilation need to be started. And if the symptoms do not improve, endotracheal intubation and invasive mechanical ventilation need to be initiated.
- Implement mechanical ventilation (prone ventilation for >12 hours per day) using lower tidal volumes (4–8 mL/kg predicted body weight) and lower inspiratory pressures (plateau pressure <30 cm H₂O). Deep sedation may be needed. For patients with ARDS (moderate/severe), higher positive end expiratory pressure (PEEP) is recommended instead of lower PEEP.
- Extracorporeal life support (ECLS) or (ECMO) can be performed if needed.

Septic Shock Management

- Standard care includes early recognition of symptoms and start treating within one hour with antimicrobial therapy and fluid loading for hypotension.
- To maintain the mean arterial pressure ≥ 65 mm Hg and lactate less than 2 mmol/L, in the absence of hypovolemia, vasopressors are recommended. Administer isotonic crystalloid 30 mL/kg in adults in the first three hours as a rapid bolus and up to 40–60 mL/kg in first 1 hour. Do not use hypotonic crystalloids, starches, or gelatins for resuscitation.

Other Therapeutic Measures

- For patients with progressive deterioration of oxygenation indicators, rapid worsening on imaging and excessive activation of the body's inflammatory response, and glucocorticoids (methylprednisolone 1–2 mg/kg/day) can be used for a short period (3–5 days).

- Oseltamivir 75 mg (BD $\times$ 5d), azithromycin 500 mg (OD $\times$ 5d), HCQ 400 mg OD on first day, 200 mg BD $\times$ 4d are the recommendation in India, unless it is contraindicated for the patients.

Prevention of Complications

Invasive mechanical ventilation–reduction	<ul style="list-style-type: none"> Use weaning protocols Minimize continuous or intermittent sedation
Ventilator-associated pneumonia	<ul style="list-style-type: none"> Prefer oral intubation and keep patient in semirecumbent position (head of bed elevation 30–45°) Use a closed suctioning system periodically drain and discard condensate in tubing, use a new ventilator circuit for each patient and change heat moisture exchanger when it malfunctions or soiled.
Venous thromboembolism	<ul style="list-style-type: none"> Use low molecular-weight heparin/heparin 5,000 units SC twice daily Use intermittent pneumatic compression devices.
Catheter-related bloodstream infection	<ul style="list-style-type: none"> Use a checklist with completion verified by a real-time observer. Remove catheter if no longer needed.
Stress ulcers and GI bleeding	<ul style="list-style-type: none"> Give early enteral nutrition (24–48 hours of admission) Administer proton-pump inhibitors/histamine-2 receptor blockers
ICU-related weakness	<ul style="list-style-type: none"> Actively mobilize the patient early in the course of illness when safe to do so

DISCHARGE CRITERIA FROM THE HOSPITAL^{15,16}

- Patient clinically stable
- Radiologically clear
- Two negative samples taken 24 hours apart

COMPLICATIONS^{16,19}

Respiratory distress syndrome, septic shock, acute liver injury, metabolic acidosis, acute cardiac injury, coagulation dysfunction, and multiorgan failure.

PREVENTIVE MEASURES^{5,13}

- Vaccines are under trial as of now.
- Hygiene (hand, respiratory, and toilet), social distancing, and limiting contact with symptomatic people are the preventive measures to be followed by individuals.
- Appropriate use of PPE and addition of airborne precautions (N95/FFP2/3 if AGP) while performing aerosol-generating procedures need to be followed by the healthcare workers.

REFERENCES

1. https://en.wikipedia.org/wiki/Coronavirus#cite_note-10.
2. Definition of Coronavirus by Merriam-Webster, Merriam-Webster, archived from the original on 2020-03-23, retrieved 2020-03-24.
3. Zhu N, Zhang D, Wang W, Li X, Yang B, Song J, et al. A novel coronavirus from patients with pneumonia in China, 2019. *N Engl J Med* 2020;382(8):727–733. DOI: 10.1056/NEJMoa2001017.
4. Cascella M, Rajnik M, Cuomo A, Dulebohn SC, Di Napoli R. Features, Evaluation and Treatment Coronavirus (COVID-19). <https://www.ncbi.nlm.nih.gov/books/NBK554776/>.
5. Clinical Care for Severe Acute Respiratory Infection Toolkit COVID -19, WHO https://apps.who.int/iris/bitstream/handle/10665/331736/WHO-2019-nCoV-SARI_toolkit-2020.1-eng.pdf?sequence=1&isAllowed=y.
6. Li Q, Guan X, Wu P, Wang X, Zhou L, Tong Y, et al. Early transmission dynamics in Wuhan, China, of novel coronavirus-infected pneumonia. *N Engl J Med* 2020. DOI: 10.1056/NEJMoa2001316.
7. Coronavirus disease 2019 (COVID-19). Situation Report –66 WHO https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200326-sitrep-66-covid-19.pdf?sfvrsn=81b94e61_2.
8. Guo Y-R, Cao Q-D, Hong Z-S, Tan Y-Y, Chen S-D, Jin H-J, et al. The origin, transmission and clinical therapies on coronavirus disease 2019 (COVID-19) outbreak – an update on the status. *Mil Med Res* 2020;7(1):11. DOI: 10.1186/s40779-020-00240-0.
9. <https://www.mayoclinic.org/diseases-conditions/coronavirus/symptoms-causes/syc-20479963>.
10. https://www.who.int/health-topics/coronavirus#tab=tab_1.
11. <https://www.drugabuse.gov/about-nida/noras-blog/2020/04/covid-19-potential-implications-individuals-substance-use-disorders>.
12. Li T, Lu H, Zhang W. Clinical observation and management of COVID-19 patients. *Emerg Microbes Infect* 2020;9(1):687–690. DOI: 10.1080/22221751.2020.1741327.
13. Rothana HA, Byrareddy SN. The epidemiology and pathogenesis of coronavirus disease (COVID-19) outbreak. *J Autoimmun* 2020;109:102433. DOI: 10.1016/j.jaut.2020.102433.
14. <https://www.cdc.gov/coronavirus/2019-ncov/hcp/clinical-guidance-management-patients.html>.
15. Guidelines on Clinical Management of COVID – 19, Government of India Ministry of Health & Family Welfare Directorate General of Health Services. <https://www.mohfw.gov.in/pdf/RevisedNationalClinicalManagementGuidelineforCOVID1931032020.pdf>.
16. Clinical management of severe acute respiratory infection (SARI) when COVID-19 disease is suspected: Interim guidance, [https://www.who.int/publications-detail/clinical-management-of-severe-acute-respiratory-infection-when-novel-coronavirus-\(ncov\)-infection-is-suspected](https://www.who.int/publications-detail/clinical-management-of-severe-acute-respiratory-infection-when-novel-coronavirus-(ncov)-infection-is-suspected).
17. Li T, Diagnosis and clinical management of severe acute respiratory syndrome Coronavirus 2 (SARS-CoV-2) infection: an operational recommendation of Peking Union Medical College Hospital (V2.0) <https://www.tandfonline.com/doi/full/10.1080/22221751.2020.1735265>.
18. https://en.wikipedia.org/wiki/COVID-19_testing#cite_note-20200130cdc-9.
19. <https://www.webmd.com/lung/coronavirus-complications#2>.