Coronavirus disease 2019 (COVID-19)

Revised: April 03, 2020

WARNING!

Because of the rapid and evolving situation with coronavirus disease 2019, always refer to the Centers for Disease Control and Prevention (CDC) website for the most up-to-date information and guidance: https://www.cdc.gov/coronavirus/2019-ncov/index.html

Overview

- Viral respiratory infection caused by a distinct coronavirus (see Coronaviruses)
- Believed to be more infectious than other coronaviruses
- Outbreak origin: Hubei Province of the People's Republic of China in December 2019
- Incubation period: 2 to 14 days (average, 5 days)
- Can be mild, moderate, or severe
- Potentially life-threatening
- Also known as *COVID-19* and *2019-nCoV*
- Information is limited on the effects of COVID-19 on pregnant women and the fetus; it's also not yet known whether infectious virus is present in human milk

Coronaviruses

The virus that causes COVID-19 is one of a group of viruses named for their distinctive structure and shared characteristics.

- Coronaviruses are single-stranded RNA viruses that infect animals and humans; they were first described in 1966.
- Virions are spherical and have club-shaped projections on their surface, giving them the appearance of a solar corona.
- Particles contain four main structural proteins.
- There are four common human coronaviruses and three coronaviruses that infect animals that have evolved to infect humans.
- Common human coronaviruses usually cause illnesses like the common cold and last for a short period of time; uncommon coronaviruses that evolved from animals cause more severe illness leading to pneumonia, with pandemic potential.
- The incubation period is 2 to 14 days.

Pathophysiology

- The virus primarily infects alveolar epithelial cells within the lung.
- Theories suggest that tolerance to genetic variability allowed COVID-19 to mutate and cross the species barrier from bats to humans.
- Mucous membranes come in direct contact with infectious respiratory droplets or fomites.
- The virus attaches itself to human receptor cells, initiating a nonspecific acute lung injury.
- The result is diffuse, severe alveolar damage.

Causes

- Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)

Risk Factors

- Recent travel to Hubei Province of mainland China, Iran, or an area of sustained widespread transmission
- Caring for or living with a person with COVID-19
- Weakened immune system
- Cardiopulmonary disease
- Chronic illness
- Living in close quarters with many people
- Exposure to health care worker not taking proper precautions

Incidence

- Coronavirus affects all age-groups, with a peak incidence between ages 30 and 79.
- All races are affected.

Complications

- Pneumonia
- Bronchitis
- Acute respiratory distress syndrome

Assessment

History

- Recent exposure (within the past 2 weeks) to a person diagnosed with COVID-19
- Recent travel to China or other endemic area within the past 2 weeks
- Fever
- Cough
- Dyspnea
- Myalgias
- Fatigue

Physical Findings

- Dry cough
- Tachycardia
- Warm, hot skin
- Clear nasal discharge
- Sore throat
- Respiratory distress

Diagnostic Test Results

Laboratory

- Follow recommendations from the CDC or your local or state health department when collecting specimens for diagnostic testing for COVID-19. Testing recommendations continue to evolve.
- Complete blood count (CBC) with differential may show leukopenia, leukocytosis, and lymphopenia.
- Alanine aminotransferase level test and aspartate aminotransferase level test may be elevated.

Imaging

- Chest radiography may be normal or may reveal diffuse interstitial infiltrates or bilateral peripheral infiltrates; widespread opacification may be evident as the disease progresses.
- Computed tomography scanning (thorax) may reveal infiltrates that resemble ground glass or may reveal obvious consolidation; long-term follow-up scanning may demonstrate persistent abnormalities with reticulation and interlobular thickening replacing ground-glass opacities.

Treatment

General

- Early recognition and source control
- Supportive care
- Symptom management
- Fluid and electrolyte replacement
- Oxygen and assisted ventilation, if indicated
- Quarantine of exposed people to prevent the spread of the virus
- Global surveillance and reporting of suspected cases to national health authorities

WARNING!

Until information is available regarding viral shedding after clinical improvement, discontinuation of isolation precautions should be determined on a case-by-case basis, in conjunction with local, state, and federal health authorities. Interim guidance for discontinuation of transmission-based precautions and discharge of hospitalized patients has been developed. See the CDC website for additional information.

WARNING!

Clinical signs and symptoms may worsen with progression to lower respiratory tract disease in the second week of illness; be sure to monitor the patient closely.

Diet

- As tolerated
- Increased fluid intake

Activity

- As tolerated
- Rest periods, as needed
- Limited interactions outside of the home for the duration specified by the practitioner or health department

Medications

- Antipyretics, such as acetaminophen, or nonsteroidal anti-inflammatory drugs, such as ibuprofen, to decrease fever
- Guaifenesin or expectorant to liquefy and reduce the viscosity of respiratory secretions
- IV fluid supplementation
- Oxygen therapy

WARNING!

The CDC recommends against the use of corticosteroids unless indicated for other reasons (chronic obstructive pulmonary disease exacerbation or septic shock per

Surviving Sepsis guidelines) because of the potential for prolonging viral replication.

Nursing Considerations

Nursing Interventions

- Administer prescribed drugs.
- Administer antipyretics, as indicated.
- Encourage adequate nutritional intake; gradually increase fluids and provide small, frequent meals and snacks.
- Maintain standard and transmission-based precautions (use a respirator or face mask, gown, gloves, and eye protection). Place a patient with suspected or confirmed COVID-19 in a private room (with a private bathroom, if possible) with the door closed. Prioritize airborne infection isolation rooms for those patients who require aerosol-generating procedures.
- Perform meticulous hand hygiene.
- Auscultate breath sounds; administer oxygen, as ordered, based on oxygen saturation levels and arterial blood gas results.
- Elevate the head of bed to maximize lung expansion; encourage coughing and diaphragmatic breathing exercises at least every 2 hours.
- Assist with endotracheal (ET) intubation, as indicated; implement mechanical ventilation; provide ET tube care according to facility guidelines.
- Obtain specimens for laboratory testing, as ordered.
- Encourage the patient and family members to verbalize their feelings and concerns; provide clear explanations of treatments and care measures and provide emotional support; encourage the use of positive coping strategies.
- Allow for rest periods; cluster activities to minimize oxygen demand; encourage the use of energy-conservation techniques.
- Apply antiembolism stockings or sequential compression stockings to prevent venous thromboembolism.
- Ensure that health care personnel use personal protective equipment correctly.
- Contact your facility's infectious disease department for current recommendations from the CDC.
- Be aware that COVID-19 is a nationally notifiable disease. Ensure that appropriate reports are made to local, state, and federal public health authorities.

Monitoring

- Pain level and effectiveness of interventions
- Vital signs
- Temperature
- Signs and symptoms of dehydration
- Signs and symptoms of pneumonia
- Respiratory status
- Response to treatment
- Adherence to infection-control precautions
- Complications
- Coping status

Associated Nursing Procedures

- Airborne precautions
- Antiembolism stocking application, knee-length
- Antiembolism stocking application, thigh-length
- Contact precautions
- Coughing and diaphragmatic breathing exercises
- Endotracheal tube removal
- Endotracheal tube repositioning
- Humidifier therapy, bedside

- Intubation with direct visualization
- IV bolus injection
- IV pump use
- IV secondary line drug infusion
- Mechanical ventilation, positive pressure
- Nutritional screening
- Oral care
- Oral care for an intubated patient
- Oral drug administration
- Oxygen administration
- Pain assessment
- Pain management
- Personal protective equipment (PPE), putting on
- Personal protective equipment (PPE), removal
- Reportable diseases
- Respiratory hygiene and cough etiquette, ambulatory care
- Safe medication administration practices, general
- Sequential compression therapy
- Sputum collection by expectoration
- Standard precautions
- Throat specimen collection
- Weaning a patient from a ventilator

Patient Teaching

General

Include the patient's family or caregiver in your teaching, when appropriate. Be sure to cover:

- disorder, diagnostic testing, and treatment, including the fact that no treatment has been proven effective
- importance of frequent hand hygiene
- respiratory hygiene and cough etiquette measures, including the importance of covering the mouth and nose when coughing or sneezing
- avoiding close personal contact with friends and family
- importance of not going to work, school, or other public places for the duration of time specified by the practitioner or health department
- wearing a surgical mask when around other people; if this can't be done, a mask should be worn by all those who have contact with the patient
- importance of not sharing silverware, towels, or bedding until they have been washed in soap and hot water
- using disposable gloves and household disinfectant to clean any surface that might have been exposed to the patient's body fluids
- energy-conservation measures
- need to report the condition to local, state, and federal health agencies
- importance of adhering to recommendations for infection control and follow-up care to ensure resolution of the infection.

Discharge Planning

- Participate as part of a multidisciplinary team to coordinate discharge planning efforts. The team may include a bedside nurse, care manager, nutritionist, physical therapist, infectious diseases practitioner, and primary care practitioner.
- Assess the patient's and family's understanding of the diagnosis, treatment, follow-up, and warning signs for which to seek medical attention.
- Assess the patient's level of independence before admission.
- Evaluate how the current illness will impact the patient's independence.
- Identify the patient's formal and informal support systems.
- Identify the patient's and family's goals, preferences, comprehension, and concerns about discharge.
- Confirm arrangements for transportation to initial follow-up appointments.

- Provide a list of prescribed drugs, including the dosage, prescribed time schedule, and adverse reactions to report to the practitioner. Provide the patient (and family or caregiver, as needed) with written information on the medications that the patient should take after discharge.
- Assess the patient's and family's understanding of the prescribed medication, including dosage, administration, expected results, duration, and possible adverse effects.
- Assess the patient's ability to obtain medications; identify the party responsible for obtaining medications.
- Instruct the patient to provide a list of medications to the practitioner who will be caring for the patient after discharge; to update the information when the practitioner discontinues medications, changes doses, or adds new medications (including over-the-counter products); and to carry a medication list that contains all of this information at all times in the event of an emergency.
- Assist with arranging home health care, if needed.
- Ensure that the patient and caregivers have been given medical contact information.
- Ensure that the patient (and family or caregiver, as needed) receives a copy of the discharge instructions and that a copy is placed in the patient's medical record.
- Assess the patient's and family's understanding of teaching by using the teach-back method when possible.
- Document the discharge planning evaluation in the patient's clinical record, including who was involved in discharge planning and teaching, their understanding of teaching provided, and any need for follow-up teaching.

Resources

- Centers for Disease Control and Prevention: https://www.cdc.gov/coronavirus/2019-ncov/
- Occupational Safety and Health Administration: https://www.osha.gov/SLTC/covid-19/
- World Health Organization: https://www.who.int/

Selected References

(Rating System for the Hierarchy of Evidence for Intervention/Treatment Questions)

1. American College of Obstetricians and Gynecologists. (2020). "Practice advisory: Novel coronavirus 2019 (COVID-19)" [Online]. Accessed March 2020 via the Web at https://www.acog.org/Clinical-Guidance-and-Publications/Practice-Advisories/Practice-Advisory-Novel-Coronavirus2019 (Level VII)
2. Centers for Disease Control and Prevention. (2020). "Interim infection prevention and control recommendations for patients with confirmed 2019 novel coronavirus (2019-nCoV) or persons under investigation for 2019-nCoV in healthcare settings" [Online]. Accessed March 2020 via the Web at https://www.cdc.gov/coronavirus/2019-ncov/hcp/infection-control.html (Level VII)
3. Chen, N., et al. (2020). "Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: A descriptive study" [Online]. Accessed March 2020 via the Web at https://www.cdc.gov/coronavirus/2019-ncov/downloads/characterstics-of-nCoV-patients-Wuhan-Lancet-1-29-2020.pdf (Level VI)
4. Fehr, A., & Perlman, S. (2015). Coronaviruses: An overview of their replication and pathogenesis. *Coronaviruses. Methods in Molecular Biology, 1282*, 1–23. Accessed March 2020 via the Web at https://link.springer.com/protocol/10.1007/978-1-4939-2438-7_1
5. Huang, C., et al. (2020). "Clinical features of patients infected with 2019 novel coronavirus n Wuhan, China" [Online]. Accessed March 2020 via the Web at https://www.sciencedirect.com/science/article/pii/S0140673620301835
6. Pearlman, S. (2020). "Another decade, another coronavirus" [Online]. Accessed March 2020 via the Web at https://www.nejm.org/doi/full/10.1056/NEJMe2001126
7. Velavan, T. P., & Meyer, C. G. (2020). The COVID-19 epidemic. *Tropical Medicine & International Health, 25*(3), 278–280. Accessed March 2020 via the Web at https://onlinelibrary.wiley.com/doi/full/10.1111/tmi.13383 Abstract | Complete Reference | Full Text | Ovid Full Text
8. World Health Organization. (2020). "Coronavirus disease 2019 (COVID-19) situation report–63" [Online]. Accessed March 2020 via the Web at https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200323-sitrep-63-covid-19.pdf?sfvrsn=b617302d_2

9. World Health Organization. (2020). "Infection prevention and control during health care when novel coronavirus (nCoV) infection is suspected" [Online]. Accessed March 2020 via the Web at https://www.who.int/publications-detail/infection-prevention-and-control-during-health-care-when-novel-coronavirus-(ncov)-infection-is-suspected-20200125 (Level VII)
10. World Health Organization. (2020). "Surveillance case definitions for human infection with novel coronavirus (nCoV)" [Online]. Accessed March 2020 via the Web at https://apps.who.int/iris/bitstream/handle/10665/330376/WHO-2019-nCoV-Surveillance-v2020.1-eng.pdf (Level VII)

Rating System for the Hierarchy of Evidence for Intervention/Treatment Questions

The following leveling system is from *Evidence-Based Practice in Nursing and Healthcare: A Guide to Best Practice* (2nd ed.) by Bernadette Mazurek Melnyk and Ellen Fineout-Overholt.

Level I:	Evidence from a systematic review or meta-analysis of all relevant randomized controlled trials (RCTs)
Level II:	Evidence obtained from well-designed RCTs
Level III:	Evidence obtained from well-designed controlled trials without randomization
Level IV:	Evidence from well-designed case-control and cohort studies
Level V:	Evidence from systematic reviews of descriptive and qualitative studies
Level VI:	Evidence from single descriptive or qualitative studies
Level VII:	Evidence from the opinion of authorities and/or reports of expert committees

Modified from Guyatt, G. & Rennie, D. (2002). Users' Guides to the Medical Literature. Chicago, IL: American Medical Association; Harris, R.P., Hefland, M., Woolf, S.H., Lohr, K.N., Mulrow, C.D., Teutsch, S.M., et al. (2001). Current Methods of the U.S. Preventive Services Task Force: A Review of the Process. American Journal of Preventive Medicine, 20, 21-35.