COVID-19 - Emergency Department (4.0)

Order Set Details

Type: **Order Set**

Version: **4.0**

Topic: **Corona virus infection**

Venue: **Inpatient**

Population: **Adult**

Owner: **OrderSet Department**

Keywords: **covid-19, corona virus, coronavirus**

Clinical Overview Synopsis

ClinicalKey Clinical Overviews provide additional specific guidance for:
Coronavirus: novel coronavirus (COVID-19) infection

Guidance

Coronavirus (COVID-19), Clinical Overview Synopsis ~

KEY POINTS

- COVID-19 (coronavirus disease 2019) is respiratory tract infection due to a novel coronavirus, SARS-CoV-2 (initially called 2019-nCoV); as of March 11, 2020, extent of infection was declared pandemic by the WHO
- Virus is thought to be zoonotic in origin, but the animal reservoir is not yet known, and human-to-human transmission is widespread
- Infection ranges from asymptomatic to severe; symptoms include fever, cough, and (in moderate to severe cases) dyspnea; disease may evolve over the course of a week or more from mild to severe. Upper respiratory tract symptoms (eg, rhinorrhea, sore throat) are uncommon
- A significant proportion of clinically evident cases are severe; the mortality rate among diagnosed cases is generally about 2% to 3% but varies by country
- Infection should be suspected based on presentation with a clinically compatible history and known or likely exposure (eg, residence in or travel to an affected area within the past 14 days, exposure to a known or suspected case, exposure to a health care setting in which patients with severe respiratory tract infections are managed)
- Chest imaging in symptomatic patients almost always shows abnormal findings, usually including bilateral infiltrates; laboratory findings are variable but typically include lymphopenia and elevated lactate dehydrogenase and transaminase levels
- Diagnosis is confirmed by detection of viral RNA on polymerase chain reaction test of upper or lower respiratory tract specimens or serum specimens

- There is no specific antiviral therapy, although compassionate use and trial protocols for several agents are underway; treatment is largely supportive, consisting of supplemental oxygen and conservative fluid administration
- Most common complications are acute respiratory distress syndrome and septic shock; myocardial, renal, and multiorgan failure have been reported
- There is no vaccine available to prevent this infection; infection control measures are the mainstay of prevention (ie, hand and cough hygiene; physical distancing; standard, contact, and airborne precautions in health care)

URGENT ACTION

- Triage screening is recommended at registration for medical care to identify patients with symptoms and exposure history that suggest the possibility of COVID-19, and to promptly institute isolation measures
- Patients with respiratory distress require prompt administration of supplemental oxygen; patients with respiratory failure require intubation
- Patients in shock require urgent fluid resuscitation and administration of empiric antimicrobial therapy to cover possible bacterial pathogens and/or influenza

PITFALLS

- It is probable that persons with prodromal or asymptomatic infection may spread infection, making effective prevention more challenging; regardless, physical distancing is vital to slowing transmission enough to avoid overwhelming health systems
- Knowledge of this disease is incomplete and evolving; moreover, coronaviruses are known to mutate and recombine often, presenting an ongoing challenge to our understanding and to clinical management

ClinicalKey. (2020). *Coronavirus: novel coronavirus (COVID-19) infection*. Source

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Assessment Scales

Admission Criteria - Coronavirus

Guidance

Admission Criteria, COVID-19 ~

Nonsevere pneumonia

- Radiographic evidence of pneumonia; progressive clinical illness with indications for supplemental oxygen and hydration; inadequate care at home
    - CDC provides guidance for determining whether the home is a suitable venue and patient and/or caregiver is capable of adhering to medical care recommendations and infection control measures

Criteria for ICU admission

- WHO provides criteria for severe pneumonia

    - Severe pneumonia characterized by tachypnea (respiratory rate greater than 30 breaths per minute), severe respiratory distress, inadequate oxygenation (eg, SpO_2 less than 90%)
- Pediatric criteria include central cyanosis or SpO_2 less than 90%; signs of severe respiratory distress (eg, grunting, chest retractions); inability to drink or breastfeed; lethargy, altered level of consciousness, seizures; severe tachypnea defined by age:
    - Younger than 2 months: 60 or more breaths per minute
    - Aged 2 to 11 months: 50 or more breaths per minute
    - Aged 1 to 5 years: 40 or more breaths per minute
- Presence of severe complications (eg, septic shock, acute respiratory distress syndrome)

ClinicalKey. (2020). *Coronavirus: novel coronavirus (COVID-19) infection*. Source

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Resuscitation Status

Resuscitation Status: Do not resuscitate

Nursing

Weight Once
Cardiac monitor
Fingerstick Glucose, Once
Diet: Nothing by mouth
Assess: Travel and at risk contact history

Precautions

Guidance

Transmission-Based Precautions, COVID-19 ~

Standard, contact, and airborne precautions should be implemented as soon as the diagnosis is suspected

- Immediately provide the patient with a face mask (or, if supplies are critically low, at least a cloth face cover) to reduce droplet spread and place the patient in a closed room pending further evaluation and disposition decisions. The closed room will ideally be one with structural and engineering safeguards against airborne transmission (eg, negative pressure, frequent air exchange), *but* in the high-prevalence stages of the pandemic (with crowded hospitals), reserve negative pressure isolation rooms for the greatest needs (ie, aerosol-generating procedures; tuberculosis, measles, and varicella)

ClinicalKey. (2020). *Coronavirus: novel coronavirus (COVID-19) infection*. Source

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Screening, COVID-19 ~

At-risk populations

- In health care settings
    - Patients presenting for care
        - Triage screening is recommended at points of medical care to identify patients with symptoms and exposure history that suggest the possibility of COVID-19, so that prompt isolation measures can be instituted
            - At least during high-prevalence phases of the pandemic, the following principles apply to the isolation areas:
                - Set up separate, well-ventilated triage areas; place patients with suspected or confirmed COVID-19 in private rooms with the door closed and with private bathrooms (as possible); many hospitals designate building wings to be dedicated to probable COVID-19
                - Reserve airborne infection isolation rooms for patients with COVID-19 undergoing aerosol-generating procedures and for care of patients with pathogens transmitted by airborne route (eg, tuberculosis, measles, varicella)
    - Health care workers
        - Many hospitals are instituting frequent screening of health care workers (eg, at beginning of each shift)
- In public places
    - Screening of travelers is being done under the guidance of public health authorities at many airports to assure that persons who are ill are referred for medical evaluation, and to educate those who are not ill but at risk for infection about self-monitoring; as the list of affected areas has grown to include almost all countries, such screening has increased, as have travel restrictions

Screening tests

- In health care settings
    - Screening and triage to isolation and testing with polymerase chain reaction are based on clinical presentation and exposure history:
        - Presence of respiratory symptoms (cough, dyspnea) and fever (CDC, WHO)
        - Recent (within 14 days) travel to or residence in any geographic areas with widespread COVID-19 (WHO, CDC)
        - Close contact with a person with known or suspected COVID-19 while that person was ill (WHO, CDC)
        - Work in a health care setting in which patients with severe respiratory illnesses are managed, without regard to place of residence or history of travel (WHO)
        - Unusual or unexpected deterioration of an acute illness despite appropriate treatment, without regard to place of residence or history of travel, even if another cause has been identified that fully explains the clinical presentation (WHO)
- In public places
    - Screening in public places with infrared thermometers (to detect fever) is used in some regions but has limited sensitivity as a screening tool for infection
    - Wider use of screening with polymerase chain reaction tests (to detect current infection) and antibody tests (to detect history of infection) is expected to evolve once testing capacities improve

ClinicalKey. (2020). *Coronavirus: novel coronavirus (COVID-19) infection*. Source

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Precaution: Airborne
Precaution: Contact
Precaution: Droplet
Precaution: Standard

Patient Education

Patient education: Infection Education

Guidance

At Home Monitoring, COVID-19 ~

Patients who do not require admission should self-monitor temperature and symptoms, and they should return for reevaluation if symptoms worsen; deterioration may occur a week or more into the course of illness

ClinicalKey. (2020). *Coronavirus: novel coronavirus (COVID-19) infection*. Source

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Household Members and Caregivers, COVID-19 ~

Household members/caregivers should:

- Ideally, wear face mask, gown, and gloves when caring for patient, and remove and discard all when leaving the room (do not reuse); however, if some of these supplies are absent, wear cloth face cover and scrupulously wash hands and laundry
    - Dispose of disposable items in a container lined with a trash bag that can be removed and tied off or sealed before disposal in household trash
- Wash hands for at least 20 seconds after all contact; an alcohol-based hand sanitizer is acceptable if soap and water are not available
- Not share personal items such as towels, dishes, or utensils before proper cleaning
- Wash laundry and high-touch surfaces frequently
    - Wear disposable gloves to handle dirty laundry and use highest possible temperatures for washing and drying, based on washing instructions on the items
    - Clean surfaces with diluted bleach solution or an EPA-approved disinfectant
- Restrict contact to minimum number of caregivers and, in particular, ensure that persons with underlying medical conditions are not exposed to the patient

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Patient education: Airborne Precautions
Patient education: Responsibilities of provider concerning notification, including parent, guardian, public health authorities

Respiratory

Guidance

Oxygenation and Ventilation, COVID-19 ~

WHO provides specific guidance for oxygenation, and ventilation

- Begin supplemental oxygen when O_2 saturation falls below 90% to 92%
- Nasal cannula at 5 L/minute or face mask with reservoir bag at 10 to 15 L/minute
    - Titrate to reach SpO_2 of 94% or more initially
    - Once stable, target SpO_2 of 90% or higher in nonpregnant adults; 92% or higher in pregnant patients
    - In most children the target SpO_2 is 90% or greater; for those who require urgent resuscitation (eg, those with apnea or obstructed breathing, severe respiratory distress, central cyanosis, shock, seizures, or coma), a target SpO_2 of 94% or higher is recommended
- High-flow nasal oxygen or noninvasive ventilation has been used to achieve adequate oxygenation in some patients
    - High-flow nasal oxygen is recommended by Surviving Sepsis Campaign and NIH for COVID-19 patients who develop hypoxemic respiratory failure despite conventional oxygen therapy; there is some evidence that it averts the need for intubation and mechanical ventilation. Noninvasive positive pressure ventilation may be used if high-flow nasal oxygen is not available
    - However, there is concern that these techniques may result in higher risk of aerosolization of the virus. Additionally, sudden deterioration may require emergent intubation, which is associated with more risk to both patient and provider. Therefore, some authorities reserve these options for settings in which airborne precautions can be taken and close monitoring provided
- Mechanical ventilation may become necessary for patients in whom oxygenation targets cannot be met with less invasive measures or who cannot maintain the work of breathing
    - Recommended settings are tidal volume of 4 to 8 mL/kg (predicted body weight) and inspiratory pressures less than 30 cm H_2O
    - In children, tidal volumes of 5 to 8 mL/kg (predicted body weight) for preserved lung compliance and 3 to 6 mL/kg for poor compliance; inspiratory pressures should be less than 28 cm H_2O
    - Use of PEEP may be necessary in patients with acute respiratory distress syndrome. Optimal regimen is not clearly defined, although guidelines suggest higher pressures (eg, more than 10 cm H_2O) rather than lower pressures. A protocol is available from ARDSnet
    - For patients with moderate to severe acute respiratory distress syndrome, prone positioning for 12 to 16 hours/day is recommended
        - Lateral decubitus position for pregnant women
- Extracorporeal membrane oxygenation has been used in severely ill patients, and it can be considered if resources and expertise are available

ClinicalKey. (2020). *Coronavirus: novel coronavirus (COVID-19) infection*. Source

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Oxygen Administration

Oxygen Nasal cannula 5 L/Minute ; titrate to oxygen saturation 94% or greater ; Step 1

Oxygen Nasal cannula 5 L/Minute ; titrate to oxygen saturation 90% or greater ; When stable, Step 2 for Non-pregnant adults
Oxygen Nasal cannula 5 L/Minute ; titrate to oxygen saturation 92% or greater ; When stable, Step 2 for Pregnant adults
Oxygen Nonrebreather mask 15 L/Minute ; titrate to oxygen saturation 94-96% ; Step 1
Oxygen Nonrebreather mask 15 L/Minute ; titrate to oxygen saturation 90% or greater ; When stable, Step 2 for Non-pregnant adults
Oxygen Nonrebreather mask 15 L/Minute ; titrate to oxygen saturation 92% or greater ; When stable, Step 2 for Pregnant adults
Oxygen High flow nasal cannula 20 L/Minute ; titrate to oxygen saturation 90% or greater ; 100 %FiO2; with heated/humidified oxygen
Oxygen BiPAP (Inspiratory Pressure 15 cmH2O, Expiratory Pressure 5 cmH2O) 100 %FiO2 ; titrate to oxygen saturation 94-96%

Guidance

COVID-specific Noninvasive Ventilation, COVID-19 ~

High-flow nasal oxygen or noninvasive ventilation has been used to achieve adequate oxygenation in some patients

- High-flow nasal oxygen is recommended by Surviving Sepsis Campaign and NIH for COVID-19 patients who develop hypoxemic respiratory failure despite conventional oxygen therapy; there is some evidence that it averts the need for intubation and mechanical ventilation. Noninvasive positive pressure ventilation may be used if high-flow nasal oxygen is not available
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O2 saturation monitor

Ventilator Orders

Guidance

COVID-specific Ventilator Settings, COVID-19 ~

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- Recommended settings are tidal volume of 4 to 8 mL/kg (predicted body weight) and inspiratory pressures less than 30 cm H_2O
- In children, tidal volumes of 5 to 8 mL/kg (predicted body weight) for preserved lung compliance and 3 to 6 mL/kg for poor compliance; inspiratory pressures should be less than 28 cm H_2O
- Use of PEEP may be necessary in patients with acute respiratory distress syndrome. Optimal regimen is not clearly defined, although guidelines suggest higher pressures (eg, more than 10 cm H_2O) rather than lower pressures. A protocol is available from ARDSnet
- For patients with moderate to severe acute respiratory distress syndrome, prone positioning for 12 to 16 hours/day is recommended
    - Lateral decubitus position for pregnant women

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Elevate head of bed 30-45 degrees

Guidance

Head of Bed Elevation

Head of Bed Elevation

- Ventilator -Associated Pneumonia is associated with nursing the patient in a supine position
    - While elevating the bed to 45 has been shown to reduce VAP, practically this does not appear to be achievable
    - The exact degree of elevation needed to prevent VAP is unclear but aiming to avoid the supine position and raising the bed to at least 30 is recommended
- Consider keeping patients in a semirecumbent position (30° to 45° angle), rather than in a supine position; to help reduce aspiration, especially during enteral feeding

Kalil AC, Metersky ML, Klompas M, et al.. Management of Adults With Hospital-acquired and Ventilator-associated Pneumonia: 2016 Clinical Practice Guidelines by the Infectious Diseases Society of America and the American Thoracic Society. Clin Infect Dis . 2016;63(5), e61-e111. Source

How-to Guide : Prevent Ventilator- Associated Pneumonia. Cambridge, MA: Institute for Healthcare Improvement; 2012.Source

Wang L, Li X, Yang Z, et al. Semi-recumbent position versus supine position for the prevention of ventilator-associated pneumonia in adults requiring mechanical ventilation. Cochrane Database Syst Rev. 2016; (1)Source

Hellyer T, Ewan V, Wilson P, et al. The Intensive Care Society recommended bundle of interventions for the prevention of ventilator-associated pneumonia. Journal of the Intensive Care Society. 2016;17(3), 238-243. Source

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Ventilation: AC tidal volume 6 mL/kg at 20 breaths/min , FiO2: 100 % , PEEP: 8 cmH2O ; titrate to oxygen saturation 94-96% ; Keep peak inspiratory pressure less than 30 cmH2O
Ventilation: SIMV tidal volume 6 mL/kg at 20 breaths/min , FiO2: 100 % , PEEP: 8 cmH2O ; titrate to oxygen saturation 94-96% ; Keep peak inspiratory pressure less than 30 cmH2O; Pressure Support 10cmH20

Intravenous Fluids

Guidance

Intravenous Fluids, COVID-19 ~

WHO provides specific guidance for fluid management

Fluid management

- Overhydration should be avoided, because it may precipitate or exacerbate acute respiratory distress syndrome
- In patients with shock:
    - Administration of crystalloids is recommended (preferably buffered/balanced; eg, lactated Ringer solution); solutions such as hydroxyethyl starches, gelatins, dextrans, and albumin are not recommended according to Surviving Sepsis Campaign guideline on managing critically ill adults with COVID-19. WHO provides the following guidance:
        - Adults: administer 250 to 500 mL over the first 15 to 30 minutes; goal is mean arterial pressure of 60 to 65 mm Hg (if invasive pressure monitoring is available)
        - Children: 10 to 20 mL/kg bolus over the first 30 to 60 minutes
        - If there is no response to fluid bolus or if signs of fluid overload exist, discontinue or reduce fluid administration
        - For patients who respond to initial bolus and are without evidence of fluid overload, titrate continued fluid to achieve improvement in clinical signs (capillary refill, heart rate, tactile temperature of extremities, palpable pulses), urine output (0.5 mL/kg/hour in adults, 1 mL/kg/hour in children), and hemodynamic parameters (mean arterial pressure more than 65 mm Hg in adults)

ClinicalKey. (2020). *Coronavirus: novel coronavirus (COVID-19) infection*. Source

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Saline Lock

Saline Lock

Intravenous Bolus

IV Bolus: Sodium Chloride 0.9%; 500 mL
IV Bolus: Sodium Chloride 0.9%; 1000 mL
IV Bolus: Sodium Chloride 0.9%; 2000 mL
IV Bolus: Lactated Ringer's Solution; 500 mL
IV Bolus: Lactated Ringer's Solution; 1000 mL
IV Bolus: Lactated Ringer's Solution; 2000 mL

Intravenous Infusion

IV infusion: Sodium Chloride 0.9% at 100 mL/hr
IV infusion: Lactated Ringer's Solution at 100 mL/hr
IV infusion: Dextrose 5% and Sodium Chloride 0.45% at 100 mL/hr

Medications

Guidance

COVID-19 Medication Guidance, COVID-19 ~

At present, no specific antiviral agent is approved for treatment of this infection. Several existing antiviral agents are being used under clinical trial and compassionate use protocols based on in vitro activity (against this or related viruses) and on limited clinical experience

- Chloroquine and hydroxychloroquine have been used in China and South Korea, reportedly with favorable results, although details are lacking and follow-up studies have been less encouraging. Further trials are underway in Europe and the United States. Both are associated with QT prolongation and risk of cardiac arrhythmias
    - Azithromycin has been used in combination with hydroxychloroquine in some protocols; however, azithromycin is also associated with cardiac arrhythmias, and the possible increased risk posed by the combination must be considered
    - In the United States, emergency use authorization for chloroquine and hydroxychloroquine has been issued by FDA to permit use in hospitalized adult and adolescent patients for whom a clinical trial is not available or feasible
    - Surviving Sepsis Campaign guideline on managing critically ill adults with COVID-19 states that data are insufficient to make a recommendation on the use of these agents
    - In patients admitted to hospital with COVID-19, Infectious Diseases Society of America recommends hydroxychloroquine or chloroquine in the context of a clinical trial, and in combination with azithromycin only in the context of a clinical trial, based on evidence of very low certainty
    - NIH guidelines do not recommend for or against chloroquine or hydroxychloroquine because of insufficient data; they recommend against the addition of azithromycin to hydroxychloroquine. The guidelines note that when chloroquine or hydroxychloroquine is used, patients must be monitored for adverse effects, particularly prolonged QTc interval
- Remdesivir is an experimental antiviral agent with significant in vitro activity against coronaviruses and some evidence of efficacy in an animal model of MERS
    - Although not FDA-approved, remdesivir is in use for the indication; FDA has issued an emergency use authorization for use of IV remdesivir to treat hospitalized patients with COVID-19 who have severe disease, defined as SpO_2 of 94% or less on room air, requiring supplemental oxygen, mechanical ventilation, or extracorporeal membrane oxygenation

        - Preliminary results of the Adaptive COVID-19 Treatment Trial, a placebo-controlled randomized trial in 1063 patients, showed a statistically significant improvement in time to recovery and a nonsignificant trend in lower mortality; several other trials remain active, as well
- Lopinavir-ritonavir is FDA-approved for treatment of HIV infection. It has been used for other coronavirus infections; it was used empirically for SARS and is being studied in the treatment of MERS
    - In China this combination is used in conjunction with interferon alfa for treatment of some patients with COVID-19
        - Surviving Sepsis Campaign guideline on managing critically ill adults with COVID-19 recommends against use of recombinant interferons, based on lack of data in COVID-19 and on data from studies on MERS showing lack of efficacy
        - NIH COVID-19 treatment guideline recommends against use of interferon except in clinical trials
    - A trial in 199 patients with COVID-19 comparing lopinavir-ritonavir with standard care did not show a significant difference in time to improvement or in mortality at 28 days, nor were there differences in duration of viral RNA in oropharyngeal specimens
    - NIH COVID-19 treatment guideline and Surviving Sepsis Campaign guideline on managing critically ill adults with COVID-19 recommend against use of lopinavir-ritonavir
    - In patients admitted to hospital with COVID-19, Infectious Diseases Society of America recommends lopinavir-ritonavir only in the context of a clinical trial
- Immunomodulators are also being investigated for mitigation of cytokine release syndrome believed to be a factor in severe acute respiratory distress syndrome and shock in COVID-19
  (eg, tocilizumab and sarilumab are both monoclonal antibodies against interleukin-6 receptor)
    - Surviving Sepsis Campaign guideline on managing critically ill adults with COVID-19 states that data are insufficient to make a recommendation on the use tocilizumab; the guideline did not evaluate other monoclonal antibodies
    - In patients admitted to hospital with COVID-19, Infectious Diseases Society of America recommends tocilizumab only in the context of a clinical trial, based on evidence of very low certainty
    - NIH COVID-19 treatment guideline states that data are insufficient to recommend for or against use of these agents
- Studies on the therapeutic efficacy of convalescent plasma are underway in various countries. In the United States, authorization must be obtained through FDA
    - Surviving Sepsis Campaign guideline on managing critically ill adults with COVID-19 suggests that convalescent plasma not be used on the basis of data in other viral infections, lack of data in COVID-19, and uncertainties about safety
    - In patients admitted to hospital with COVID-19, Infectious Diseases Society of America recommends convalescent plasma in the context of a clinical trial, based on evidence of very low certainty
    - NIH COVID-19 treatment guideline states that data are insufficient to recommend for or against use of convalescent plasma or hyperimmune immunoglobulin
- Information on therapeutic trials and expanded access is available at ClinicalTrials.gov
- Corticosteroid therapy is not recommended for viral pneumonia but is suggested by some authorities for COVID-19 patients with refractory shock or acute respiratory distress syndrome
    - Surviving Sepsis Campaign guideline on managing critically ill adults with COVID-19 supports using corticosteroids in mechanically ventilated patients with COVID-19 and acute respiratory distress syndrome (but not those with respiratory failure in the absence of that syndrome) and in patients with COVID-19 and refractory shock; short-course, low-dose regimens are preferred
    - Similarly, Infectious Diseases Society of America suggests against the use of corticosteroids in hospitalized patients with COVID-19 and pneumonia, but it recommends their use in the context of a clinical trial for patients with COVID-19 and acute respiratory distress syndrome
    - NIH COVID-19 treatment guideline recommends against routine use in mechanically ventilated patients without acute respiratory distress syndrome, notes insufficient data to recommend for or

against it in mechanically ventilated patients with that syndrome, and recommends low-dose corticosteroids in patients with refractory shock

- FDA is investigating a controversy that has arisen regarding the use of NSAIDs in patients with COVID-19; however, there is no published evidence connecting the use of NSAIDs with worsening COVID-19 symptoms
    - NIH COVID-19 treatment guideline recommends that use of acetaminophen and NSAIDs in patients with COVID-19 should not differ from that in patients without COVID-19
- Until a diagnosis of COVID-19 is confirmed by polymerase chain reaction test, appropriate antiviral or antimicrobial therapy for other viral pathogens (eg, influenza virus) or bacterial pathogens should be administered in accordance with the site of acquisition (hospital or community) and epidemiologic risk factors
    - Additionally, Surviving Sepsis Campaign guideline on managing critically ill adults with COVID-19 supports use of empiric antimicrobial therapy in mechanically ventilated patients with COVID-19 and respiratory failure, with daily consideration for de-escalation

- Otherwise, treatment is largely supportive and includes oxygen supplementation and conservative fluid support

    - Role of low-molecular-weight heparin (beyond standard prophylaxis indications) is being studied, and some authorities recommend use of prophylactic regimens in any patient with COVID-19 and blood markers indicating coagulopathy (eg, marked elevation of D-dimer level, prolonged prothrombin time, platelet count of 100,000 cells/mm^3 or lower, fibrinogen level less than 2 g/L)
- Management of septic shock includes use of vasopressors if fluid administration does not restore adequate perfusion. Surviving Sepsis Campaign, NIH COVID-19 treatment guideline, and WHO provide guidance specific to the treatment of shock in patients with COVID-19
    - In adults, begin with norepinephrine; epinephrine or vasopressin are preferred as second line over dopamine if norepinephrine is unavailable
        - Hemodynamic goal: mean arterial pressure of 60 to 65 mm Hg
    - In patients who do not respond adequately to usual doses of norepinephrine, Surviving Sepsis Campaign guideline on managing critically ill adults with COVID-19 recommends adding vasopressin rather than further titrating norepinephrine
    - For patients with COVID-19, refractory shock despite fluid and norepinephrine, and evidence of cardiac dysfunction, Surviving Sepsis Campaign guideline on managing critically ill adults with COVID-19 recommends adding dobutamine rather than further titrating norepinephrine
    - In children, epinephrine is considered the first line agent, and norepinephrine may be added if necessary

- Drug therapy

    - Antimalarial agents
        - Chloroquine
            - Infants, Children, and Adolescents weighing less than 50 kg : Efficacy and optimal dosing not established; however, based on extrapolation from pediatric dosing for other indications and comparative doses to the adult dosing regimen suggested for COVID-19, 8.3 mg (5 mg base)/kg/dose PO twice daily [Max: 500 mg/dose (300 mg base/dose)] is being used in limited pediatric dosing protocols; a 10-day course is being used in adult patients.
            - Adolescents weighing 50 kg or more : Data are limited; efficacy has not been established. 1000 mg PO on day 1 then 500 mg PO daily for 4 to 7 days suggested by FDA EUA statement. Based on extrapolation from pediatric dosing for other indications and comparative doses to the adult dosing regimen suggested for COVID-19, 8.3 mg (5 mg base)/kg/dose PO twice daily [Max: 500 mg/dose (300 mg base/dose)] is being used in limited pediatric dosing protocols; a 10-day course is being used in adult patients.

        - Adults weighing less than 50 kg : Data are limited; efficacy has not been established. 500 mg PO twice daily for 10 days is being evaluated alone and in combination.
        - Adults weighing 50 kg or more : Data are limited; efficacy has not been established. 1000 mg PO on day 1 then 500 mg PO daily for 4 to 7 days suggested by FDA EUA statement. 500 mg PO twice daily for 10 days is also being evaluated alone and in combination.
    - Hydroxychloroquine
        - Infants, Children, and Adolescents weighing less than 50 kg : Efficacy and optimal dosing not established; however, based on extrapolation from pediatric dosing for other indications and comparative doses to adult dosing regimens suggested for COVID-19, doses of 6.5 mg (5 mg base)/kg/dose PO every 12 hours [Max: 400 mg/dose (310 mg base/dose)] for 2 doses, then 3.25 mg (2.5 mg base)/kg/dose every 12 hours [Max: 200 mg/dose (155 mg base/dose)] are being used in limited pediatric dosing protocols; a 5- to 20-day course is being used in adult patients.
        - Adolescents weighing 50 kg or more : Data are limited; efficacy has not been established. 800 mg PO on day 1 then 400 mg PO daily for 4 to 7 days suggested by FDA EUA statement. Based on extrapolation from pediatric dosing for other indications and comparative doses to adult dosing regimens suggested for COVID-19, doses of 6.5 mg (5 mg base)/kg/dose PO every 12 hours [Max: 400 mg/dose (310 mg base/dose)] for 2 doses, then 3.25 mg (2.5 mg base)/kg/dose every 12 hours [Max: 200 mg/dose (155 mg base/dose)] are being used in limited pediatric dosing protocols; a 5- to 20-day course is being used in adult patients.
        - Adults weighing less than 50 kg : Data are limited; efficacy has not been established. Dosing regimens, alone and in combination, are being evaluated, including 400 mg PO twice daily on day 1 then 200 mg PO twice daily for 4 days; 200 mg PO twice daily for 5 to 20 days; and 200 mg PO three times daily for 10 days. Additional clinical evaluation is needed.
        - Adults weighing 50 kg or more : Data are limited; efficacy has not been established. 800 mg PO on day 1 then 400 mg PO daily for 4 to 7 days suggested by FDA EUA statement. Other dosing regimens, alone and in combination, are being evaluated, including 400 mg PO twice daily on day 1 then 200 mg PO twice daily for 4 days; 200 mg PO twice daily for 5 to 20 days; and 200 mg PO three times daily for 10 days. Additional clinical evaluation is needed.
- Monoclonal antibodies
    - Tocilizumab
        - Tocilizumab Solution for injection; Adults: Available data are limited, and efficacy has not been established. Due to a lack of clinical data, the NIH COVID-19 treatment guidelines do not recommend for or against the use of IL-6 receptor inhibitors, such as tocilizumab. 4 to 8 mg/kg/dose (Usual dose: 400 mg; Max dose: 800 mg) IV once is being evaluated in combination with antiviral therapy. A second dose 8 to 12 hours after the first infusion may be considered. One protocol suggests a possible third dose 16 to 24 hours after the first dose.
    - Sarilumab
        - Sarilumab Solution for injection; Adults: Efficacy has not been established. 200 mg IV or subcutaneously once or 400 mg IV once is being evaluated in combination with antiviral therapy.

ClinicalKey. (2020). *Coronavirus: novel coronavirus (COVID-19) infection*. Source

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Analgesics

Acetaminophen Oral Tablet; 650 mg Once

Ibuprofen Oral Tablet; 800 mg Once

Guidance

NSAIDs in Older Adults

Oral NSAIDs:

- **Increased risk** of gastrointestinal bleeding or peptic ulcer disease in high-risk groups, including those >75 years or taking oral or parenteral corticosteroids, anticoagulants, or antiplatelet agents (Quality of evidence: moderate; Strength of recommendation: Strong)
    - May exacerbate existing ulcers or cause new/additional ulcers
    - Avoid unless other alternatives are not effective and patient can take gastroprotective agent
- **Avoid** ketorolac in older adults due to the increased risk of gastrointestinal bleeding/peptic ulcer disease and acute kidney injury in older adults (Quality of evidence: moderate; Strength of recommendation: Strong)
    - Compared to patients younger than 65 years of age, the mean elimination half-life of ketorolac in the elderly is prolonged (7 hours after an IM dose and 6.1 hours after an oral dose)
- Use with **caution** in patients with heart failure who are asymptomatic and **avoid** in patients with symptomatic heart failure due to the potential to promote fluid retention and/or exacerbate heart failure (Quality of evidence: moderate; Strength of recommendation: Strong)
- **Avoid** in patients with chronic kidney disease stage 4 or higher (creatinine clearance <30 mL/min) as they may increase risk of acute kidney injury and further decline of renal function (Quality of evidence: moderate; Strength of recommendation: Strong)
    - This includes patients at risk for renal failure due to hypovolemia (dehydration)

By the 2019 American Geriatrics Society Beers Criteria® Update Expert Panel. American Geriatrics Society 2019 Updated AGS Beers Criteria® for Potentially Inappropriate Medication Use in Older Adults. J Am Geriatr Soc. 2019;67(4), 674–694. Source

Ketorolac Drug Monograph. ClinicalKey.

Published By: Elsevier

Ketorolac Intravenous Injectable Solution; 30 mg Once

Guidance

Ketorolac

- Compared to patients younger than 65 years of age, the mean elimination half-life of ketorolac in the elderly is prolonged (7 hours after an IM dose and 6.1 hours after an oral dose)
- Systemic ketorolac is contraindicated for use by patients with *advanced renal impairment* and in patients at risk for renal failure due to *hypovolemia* (dehydration); cautious use is recommended in patients with milder forms of renal disease or renal impairment, especially the elderly
- According to the Beers Criteria, ketorolac is a potentially inappropriate medication (PIM) in geriatric patients
    - Avoidance is recommended in those with or without a history of gastrointestinal (GI) ulcers due to an increased risk of gastrointestinal bleeding, peptic ulcer disease, and acute kidney injury in older adults

By the 2019 American Geriatrics Society Beers Criteria® Update Expert Panel. American Geriatrics Society 2019 Updated AGS Beers Criteria® for Potentially Inappropriate Medication Use in Older Adults. J Am Geriatr Soc. 2019;67(4), 674–694. Source

Ketorolac Drug Monograph. ClinicalKey.

Published By: Elsevier

Ketorolac Intramuscular Injectable Solution; 60 mg Once

Guidance

Ketorolac

- Compared to patients younger than 65 years of age, the mean elimination half-life of ketorolac in the elderly is prolonged (7 hours after an IM dose and 6.1 hours after an oral dose)
- Systemic ketorolac is contraindicated for use by patients with *advanced renal impairment* and in patients at risk for renal failure due to *hypovolemia* (dehydration); cautious use is recommended in patients with milder forms of renal disease or renal impairment, especially the elderly
- According to the Beers Criteria, ketorolac is a potentially inappropriate medication (PIM) in geriatric patients
    - Avoidance is recommended in those with or without a history of gastrointestinal (GI) ulcers due to an increased risk of gastrointestinal bleeding, peptic ulcer disease, and acute kidney injury in older adults

By the 2019 American Geriatrics Society Beers Criteria® Update Expert Panel. American Geriatrics Society 2019 Updated AGS Beers Criteria® for Potentially Inappropriate Medication Use in Older Adults. J Am Geriatr Soc. 2019;67(4), 674–694. Source

Ketorolac Drug Monograph. ClinicalKey.

Published By: Elsevier

Acetaminophen 325 MG / HYDROcodone Bitartrate 5 MG Oral Tablet; 1 tablet(s) Once
Acetaminophen 325 MG / oxyCODONE Hydrochloride 5 MG Oral Tablet; 1 tablet(s) Once
Morphine Intravenous Injectable Solution; 4 mg Once
HYDROmorphone Intravenous Injectable Solution; 0.5 mg Once

Antacids

Aluminum Hydroxide 40 MG/ML / Magnesium Hydroxide 40 MG/ML / Simethicone 4 MG/ML Oral Suspension; 10 mL Once
Famotidine Oral Tablet; 20 mg Once
Famotidine Intravenous Injectable Solution; 20 mg Once

Antidiarrheals

Loperamide Oral Tablet; 4 mg Once

Antiemetics

Ondansetron Oral Tablet; 4 mg Once
Ondansetron Intravenous Injectable Solution; 4 mg Once

Antihistamines

diphenhydrAMINE Intravenous Injectable Solution; 25 mg Once
diphenhydrAMINE Oral Tablet ; 25 mg Once

Antipyretics

Acetaminophen Oral Tablet; 650 mg Once
Acetaminophen Rectal Suppository; 650 mg Once
Ibuprofen Oral Tablet; 400 mg Once

Anxiolytics, Sedatives, and Hypnotics

Benzodiazepines may increase the risk of falls

Guidance

Benzodiazepine Risks, Elderly

Avoid benzodiazepines in older adults (Quality of evidence: moderate; Strength of recommendation: strong)

- Older adults have increased sensitivity to benzodiazepines and decreased metabolism of long-acting agents
- In general, all benzodiazepines **increase risk** of cognitive impairment, delirium, falls, fractures, and motor vehicle crashes in older adults
- May be appropriate for seizure disorders, rapid eye movement sleep behavior disorder, benzodiazepine withdrawal, ethanol withdrawal, severe generalized anxiety disorder, and periprocedural anesthesia

Nonbenzodiazepine benzodiazepine receptor agonist hypnotics have adverse events similar to those of benzodiazepines in older adults (eg, delirium, falls, fractures) (Quality of evidence: moderate; Strength of recommendation: strong)

By the 2019 American Geriatrics Society Beers Criteria® Update Expert Panel. American Geriatrics Society 2019 Updated AGS Beers Criteria® for Potentially Inappropriate Medication Use in Older Adults. J Am Geriatr Soc. 2019;67(4), 674–694. Source

Published By: Elsevier

LORazepam Oral Tablet; 1 mg Once
LORazepam Intravenous Injectable Solution; 0.5 mg Once

Immunizations

Guidance

Immunization Schedule, Aged 19 Years or Older

Table 1. Recommended Adult Immuni ages 19 years or older, United States, 2

Always make recommendations by determining needed vaccines based on and other indications (Table 2), and reviewing special situations (Notes).

Table 1. By age

Table 2. By indications

Schedule Changes & Guidance

Resources for health care providers

Resources for adults

Download Schedules App

- 8.5"x11" print color [6 pages]
- 8.5"x11" print black and white [6 pages]
- Compliant version of this schedule
- Vaccines in the Adult Immunization Schedule
- Learn how to display current schedules from your website.
- Hard copies of the schedule are available for free using the CDC-info c

Download Schedules App

Legend

Recommended vaccination for adults who meet age requirement, lack documenta

Recommended vaccination for adults with an additional risk factor or another indi

Recommended vaccination based on shared clinical decision-making

Centers for Disease Control and Prevention, National Center for Immunization and Respiratory Diseases (NCIRD). (2020). *Recommended immunization schedule for adults aged 19 years or older, United States*. Source

Published By: Elsevier

acellular pertussis vaccine, inactivated / diphtheria toxoid vaccine, inactivated / tetanus toxoid vaccine, inactivated Intramuscular Injection; 0.5 mL Once

diphtheria toxoid vaccine, inactivated / tetanus toxoid vaccine, inactivated Intramuscular Injection; 0.5 mL Once

Laboratory

Guidance

Laboratory Testing, COVID-19 ~

Laboratory testing recommendations:

- Positive identification of SARS-CoV-2 (2019-nCoV) RNA by polymerase chain reaction test is considered confirmation of diagnosis
- Routine blood work is not diagnostic, but a pattern of typical abnormalities is emerging in case series of hospitalized patients:
    - Leukopenia may be observed and relative lymphopenia is common, especially in patients with more severe illness
    - Anemia was noted in about half of patients in one series
    - Both elevated and low platelet counts have been seen
    - A prolonged prothrombin time has been reported
    - Levels of D-dimer and fibrinogen may be elevated
    - Elevated levels of lactate dehydrogenase and liver enzymes (ALT and AST) are common
    - Serum procalcitonin levels are usually within reference range; elevated levels have been seen in patients with secondary infection
    - Serum levels of some other acute phase reactants (eg, C-reactive protein, ferritin) are elevated in most patients, as is the erythrocyte sedimentation rate
- Lactate level of 2 mmol/L or higher suggests presence of septic shock

ClinicalKey. (2020). *Coronavirus: novel coronavirus (COVID-19) infection*. Source

Published By: Elsevier

Blood Gases

Lab: Venous Blood Gas, Once
Lab: Arterial Blood Gas (ABG), Once

Chemistry

Lab: Basic Metabolic Profile, Once
Lab: Comprehensive Metabolic Panel, Once
Lab: Brain Natriuretic Peptide, Once
Lab: C-Reactive Protein, Once
Lab: D-Dimer, Quantitative, Once
Lab: Fibrinogen , Once
Lab: Ferritin , Once
Lab: Hepatic Function Panel , Once
Lab: Lactic Acid, Venous , Once

Guidance

Lactate, COVID-19 ~

Lactate level of 2 mmol/L or higher suggests presence of septic shock

ClinicalKey. (2020). *Coronavirus: novel coronavirus (COVID-19) infection*. Source

Published By: Elsevier

Lab: Procalcitonin , Once
Lab: Troponin I, Once

Hematology

Lab: Complete Blood Count (CBC), Once
Lab: Erythrocyte sedimentation rate (ESR) , Once
Lab: Prothrombin time (PT) with INR, Once
Lab: Partial Thromboplastin Time, Once

Microbiology

Blood culture, Once (1 of 2)
Blood culture, Once (2 of 2)
Gram stain, culture and sensitivity, Sputum, Once

Guidance

Sputum Testing, COVID-19 ~

Collect a sputum specimen if a productive cough is present:

Lower respiratory tract

- A deep cough sputum specimen (collected after mouth rinse) is also acceptable
    - WHO advises against attempts to induce sputum, because the process may increase aerosolization and risk of transmission

ClinicalKey. (2020). *Coronavirus: novel coronavirus (COVID-19) infection*. Source

Published By: Elsevier

Sputum Culture, Respiratory illnesses

Sputum Gram stain and culture are indicated for:

- All ICU patients (severe)
    - Use an endotracheal specimen in intubated patients
- Patients being empirically treated for MRSA or *Pseudomonas aeruginosa* (or other resistant gram-negative bacilli)
- Patients previously infected with MRSA or *Pseudomonas aeruginosa* (or other resistant gram-negative bacilli), especially those with prior respiratory tract infection
- Patients who were hospitalized and received parenteral antibiotics, whether during the hospitalization event or not, within the last 90 days

Community-Acquired Pneumonia in Adults Clinical Overview. ClinicalKey.

Metlay J Waterer G Long A et al. Diagnosis and treatment of adults with community-acquired pneumonia. American Journal of Respiratory and Critical Care Medicine. 2019;200, E45-E67. Source

Published By: Elsevier

Gram stain, culture and sensitivity, Urine, Once
Influenza A/B PCR, Nose, Once

Guidance

Influenza A/B Antigen, Respiratory Illness ~

Nasal *Influenza A* and *B virus* antigen

- Obtain nasal swab samples to test for influenza in patients with suspected viral pneumonia

- Use a rapid influenza diagnostic test if it will change the care of the patient or of other patients. The following factors warrant such testing:
    - Hospitalized patients
    - Patients with high-risk conditions
    - Documentation of institutional outbreaks
    - Atypical timing (eg, summer months in temperate climates)
        - Under these circumstances, viral culture is recommended to confirm positive results from rapid tests and to identify strain
- Antigen detection tests: rapid influenza diagnostic tests are usually available at the point of care
    - Performed on nasal or nasopharyngeal swab or aspirate
    - Some can distinguish influenza A from influenza B but cannot identify specific strain
    - Sensitivity is 50% to 70%
    - Specificity is 90% to 95%

Influenza Clinical Overview. ClinicalKey.

Community-Acquired Pneumonia in Adults Clinical Overview. ClinicalKey.

Published By: Elsevier

Influenza A/B PCR, Sputum, Once
Mycoplasma pneumoniae Culture, Sputum, Once
Contact Local Public Health Department for Positive SARS-CoV-2 Polymerase Chain Reaction results
Real-Time Polymerase chain reaction for SARS-CoV-2; Nasopharyngeal swab, Once

Guidance

Pharyngeal Swab, COVID-19 ~

CDC provides specific instructions for collection and handling of specimens.

Upper Respiratory Tract Swab

- Nasopharyngeal swab is preferred; oropharyngeal swab may be submitted in addition, if obtained. Only synthetic fiber swabs with plastic shafts are acceptable. If both are submitted, they may be placed in the same container
- For nasopharyngeal specimen, insert swab into nostril parallel to palate. Leave swab in place for a few seconds to absorb secretions
- For oropharyngeal specimen, swab the posterior pharynx, avoiding tongue and tonsils

ClinicalKey. (2020). *Coronavirus: novel coronavirus (COVID-19) infection*. Source

Published By: Elsevier

Real-Time Polymerase chain reaction for SARS-CoV-2; Oropharyngeal swab, Once

Guidance

Pharyngeal Swab, COVID-19 ~

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ClinicalKey. (2020). *Coronavirus: novel coronavirus (COVID-19) infection*. Source

Published By: Elsevier

Real-Time Polymerase chain reaction for SARS-CoV-2; Serum, Once
Real-time polymerase chain reaction (RT-PCR), sputum , Once ; For SARS-CoV-2
Respiratory Syncytial Virus (RSV) Antigen, Nose , Once

Toxicology

Lab: Alcohol Level, Blood, Once

Urine

Lab: Urinalysis, Once
Lab: Pregnancy Test, Urine, Once
Lab: Drug Screen, Urine , Once

Radiology

Guidance

Imaging, COVID-19 ~

Chest imaging (eg, plain radiography, CT) has shown abnormalities in most reported patients; it usually shows bilateral involvement, varying from consolidation in more severely ill patients to ground-glass opacities in less severe and recovering pneumonia

ClinicalKey. (2020). *Coronavirus: novel coronavirus (COVID-19) infection*. Source

Published By: Elsevier

Plain Films

X-ray, Chest PA/lateral, Once; History: [add diagnosis, symptom(s)]; Question: [add reason for study]
X-ray, Chest PA (Portable), Once; History: [add diagnosis, symptom(s)]; Question: [add reason for study]

CT Scan

Guidance

CT Scan, COVID-19 ~

CT appears to be more sensitive than plain radiographs, but normal CT appearance does not exclude COVID-19

ClinicalKey. (2020). *Coronavirus: novel coronavirus (COVID-19) infection*. Source

Published By: Elsevier

CT, Chest with IV contrast ; History: [add diagnosis, symptom(s)] ; Question: [add reason for study]
CT, Chest without IV contrast ; History: [add diagnosis, symptom(s)] ; Question: [add reason for study]

Diagnostic Studies

Electrocardiogram, with at least 12 leads ; History: [add diagnosis, symptom(s)] ; Question: [add reason for study]

Consults

Consult: Respiratory Therapy ; History: [add diagnosis, symptom(s)] ; Question: [add reason for consult]
Consult: Pulmonary Medicine (Pulmonology); History: [add diagnosis, symptom(s)]; Question: [add reason for consult]
Consult: Infectious Disease; History: [add diagnosis, symptom(s)]; Question: [add reason for consult]
Consult: Critical Care Medicine; History: [add diagnosis, symptom(s)]; Question: [add reason for consult]
Consult: Clinical Social Work; History: [add diagnosis, symptom(s)]; Question: [add reason for consult]
Consult: Public Health ; History: [add reason for consult] ; Question: [add reason for consult] ; further evaluation and management

Modules

Guidance

COVID-19 Module Use, COVID-19 ~

Please note that the Medication Infusion Module and the Mechanical Ventilation Module are not COVID-specific. COVID-specific guidance is below:

Medication Infusion

Management of septic shock includes use of vasopressors if fluid administration does not restore adequate perfusion. Surviving Sepsis Campaign, NIH COVID-19 treatment guideline, and WHO provide guidance specific to the treatment of shock in patients with COVID-19

- In adults, begin with norepinephrine; epinephrine or vasopressin are preferred as second line over dopamine if norepinephrine is unavailable
    - Hemodynamic goal: mean arterial pressure of 60 to 65 mm Hg

- In patients who do not respond adequately to usual doses of norepinephrine, Surviving Sepsis Campaign guideline on managing critically ill adults with COVID-19 recommends adding vasopressin rather than further titrating norepinephrine
- For patients with COVID-19, refractory shock despite fluid and norepinephrine, and evidence of cardiac dysfunction, Surviving Sepsis Campaign guideline on managing critically ill adults with COVID-19 recommends adding dobutamine rather than further titrating norepinephrine
- In children, epinephrine is considered the first line agent, and norepinephrine may be added if necessary

WHO, NIH, and Surviving Sepsis Campaign provide specific guidance for oxygenation, ventilation, and fluid management in COVID-19

- Patients with severe respiratory distress, obstructed or absent breathing, central cyanosis, shock, seizures, or coma require aggressive airway management (which may include intubation) and oxygen
- Oxygenation and ventilation
    - Begin supplemental oxygen when O_2 saturation falls below 90% to 92%
    - Nasal cannula at 5 L/minute or face mask with reservoir bag at 10 to 15 L/minute
        - Titrate to reach SpO_2 of 94% or more initially
        - Once stable, target SpO_2 of 90% or higher in nonpregnant adults; 92% or higher in pregnant patients
        - In most children the target SpO_2 is 90% or greater; for those who require urgent resuscitation (eg, those with apnea or obstructed breathing, severe respiratory distress, central cyanosis, shock, seizures, or coma), a target SpO_2 of 94% or higher is recommended
    - High-flow nasal oxygen or noninvasive ventilation has been used to achieve adequate oxygenation in some patients
        - High-flow nasal oxygen is recommended by Surviving Sepsis Campaign and NIH for COVID-19 patients who develop hypoxemic respiratory failure despite conventional oxygen therapy; there is some evidence that it averts the need for intubation and mechanical ventilation. Noninvasive positive pressure ventilation may be used if high-flow nasal oxygen is not available
        - However, there is concern that these techniques may result in higher risk of aerosolization of the virus. Additionally, sudden deterioration may require emergent intubation, which is associated with more risk to both patient and provider. Therefore, some authorities reserve these options for settings in which airborne precautions can be taken and close monitoring provided
    - Mechanical ventilation may become necessary for patients in whom oxygenation targets cannot be met with less invasive measures or who cannot maintain the work of breathing
        - Recommended settings are tidal volume of 4 to 8 mL/kg (predicted body weight) and inspiratory pressures less than 30 cm H_2O
        - In children, tidal volumes of 5 to 8 mL/kg (predicted body weight) for preserved lung compliance and 3 to 6 mL/kg for poor compliance; inspiratory pressures should be less than 28 cm H_2O
        - Use of PEEP may be necessary in patients with acute respiratory distress syndrome. Optimal regimen is not clearly defined, although guidelines suggest higher pressures (eg, more than 10 cm H_2O) rather than lower pressures. A protocol is available from ARDSnet
        - For patients with moderate to severe acute respiratory distress syndrome, prone positioning for 12 to 16 hours/day is recommended
            - Lateral decubitus position for pregnant women
    - Extracorporeal membrane oxygenation has been used in severely ill patients, and it can be considered if resources and expertise are available

ClinicalKey. (2020). *Coronavirus: novel coronavirus (COVID-19) infection*. Source

Published By: Elsevier

Medication Infusions - Module
Mechanical Ventilation - Module
Respiratory Therapy - Module
Smoking Cessation/Tobacco Withdrawal - Ambulatory Module