COVID-19 - Emergency Department (3.2)

Order Set Details

Type: Order Set  Version: 3.2
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 possible (but not yet well established) 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.


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Severe pneumonia characterized by tachypnea (respiratory rate greater than 30 breaths per minute), severe respiratory distress, inadequate oxygenation (e.g., SpO₂ less than 90%)

- Pediatric criteria include central cyanosis or SpO₂ less than 90%; signs of severe respiratory distress (e.g., 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 (e.g., septic shock, acute respiratory distress syndrome)


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**Resuscitation Status**

Resuscitation Status: Do not resuscitate

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**Nursing**

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

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**Precautions**

**Guidance**

**Screening, COVID-19 ~**

At-risk populations

- Screening of travelers from affected areas is being done under the guidance of public health authorities at 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
- 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

Screening tests

- 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)

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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 and place the patient in a closed room (preferably with structural and engineering safeguards against airborne transmission, such as negative pressure and frequent air exchange) pending further evaluation and disposition decisions.

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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.

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Household Members and Caregivers, COVID-19 ~
Household members/caregivers should:

- Wear face masks, gowns, and gloves when caring for patient; remove and discard all when leaving the room (do not reuse)
  - Dispose of these 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

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**Respiratory**

**Guidance**

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**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 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 H₂O.
  - 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 H₂O.
  - Use of PEEP may be necessary in patients with acute respiratory distress syndrome. Optimal regimen is not clearly defined, although guidelines suggest higher pressures (e.g., more than 10 cm H₂O) 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.


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Oxygen Supplementation

A clinical practice guideline from the British Medical Journal:

- Recommends that oxygen saturation be maintained no higher than 96% (Strong Recommendation).
- Suggests not providing oxygen therapy to patients with acute stroke or myocardial infarction with oxygen saturation of 90-92% on room air. (Weak Recommendation).
- Recommends not providing oxygen therapy to patients with acute stroke or myocardial infarction with oxygen saturation more than 92% on room air. (Strong Recommendation).

In acutely ill adults, liberal oxygen therapy increases mortality by 1% without improving other patient-important outcomes:

- Oxygen is not recommended for patients with normal oxygen saturation levels regardless of presenting symptoms or diagnosis.
- When providing oxygen, titrate oxygen supplementation to a target saturation of 94-96% for patients with hypoxia, except:
  - Use a target of no more than 92% for patients with acute stroke or myocardial infarction.
  - Use a target of 88-92% for those at risk of hypercapnic respiratory failure.

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 for COVID-19 patients who develop hypoxic 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


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Ventilator Orders

Guidance

COVID-specific Ventilator Settings, COVID-19 ~

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 H₂O
- 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 H₂O
- 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 H₂O) 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


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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 10 cmH2O

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)


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**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

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**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. 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
  - Remdesivir is an experimental antiviral agent with significant in vitro activity against coronaviruses and some evidence of efficacy in an animal model of MERS
• Several clinical trials are in progress, and the drug may be available through expanded access and compassionate use programs
  • 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
    • 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
    • Surviving Sepsis Campaign guideline on managing critically ill adults with COVID-19 recommends against use of lopinavir-ritonavir
    • Surviving Sepsis Campaign guideline on managing critically ill adults with COVID-19 recommends against use recombinant interferons, based on lack of data in COVID-19 and on data from studies on MERS showing lack of efficacy
  • 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
  • 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
    • 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
• 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. Until additional data are available, acetaminophen may be preferred for temperature control
• 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 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/mm³ 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. Both Surviving Sepsis Campaign 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.

- Macrolide
  - Azithromycin
    - Azithromycin Oral tablet; Adults: Data are limited and efficacy has not been established. Risk of adverse events must be weighed against potential benefit. Azithromycin 500 mg PO on day 1 then 250 mg PO once daily for 5 days with hydroxychloroquine has been used.

- Monoclonal antibodies
  - Tocilizumab
    - Tocilizumab Solution for injection; Adults: Available data are limited, and efficacy has not been established. 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.


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**Analgesics**

Acetaminophen Oral Tablet; 650 mg Once
Ibuprofen Oral Tablet; 800 mg Once

**Guidance**

**NSAIDs in Older Adults**

Avoid NSAIDs in older adults:

- Heart failure (possible fluid retention and symptom exacerbation)
- Chronic kidney disease, stages IV or V (increased risk of kidney injury)
- History of gastric or peptic ulcers (exacerbate or cause ulcers)
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

- Upper gastrointestinal ulcers, gross bleeding, or perforation caused by NSAIDs occur in ~1% of patients treated for 3-6 months and in ~2%-4% of patients treated for 1 year; these trends continue with longer duration of use
- Use of proton-pump inhibitor or misoprostol reduces but does not eliminate risk
- Also can increase blood pressure and induce kidney injury. Risks are dose related

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

*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

*Ketorolac Drug Monograph. ClinicalKey.*


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Acetaminophen 325 MG / HYDROcodone BitaTrate 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
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**

According to the Beers Criteria, benzodiazepines are considered potentially inappropriate medications (PIMs) for use in geriatric patients and avoidance is generally recommended. Older adults have an increased sensitivity to benzodiazepines.

In general, all benzodiazepines increase the risk of:

- Cognitive impairment
- Delirium
- Falls
- Fractures
- Motor vehicle accidents

The Panel recommends avoiding benzodiazepines in geriatric patients with the following disease states or symptoms due to the potential for exacerbation of the condition or increased risk of adverse effects:

- Delirium (possible new-onset or worsening delirium)
- Dementia (adverse CNS effects)
- History of falls / fractures (ataxia, impaired psychomotor function, syncope, and additional falls)

*Lorazepam Drug Monograph. ClinicalKey.*


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Immunizations

Guidance

Immunization Schedule, Aged 19 Years or Older

Table 1. Recommended Adult Immunizations for ages 19 years or older, United States, 2020

Always make recommendations by determining needed vaccines based on age 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
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

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**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

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**Guidance**

**Lactate, COVID-19 ~**

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

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Lab: Procalcitonin , Once
Lab: Troponin I, Once

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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 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.*


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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

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 (e.g., 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%

ClinicalKey. Influenza Clinical Overview.

Community-Acquired Pneumonia in Adults Clinical Overview. ClinicalKey.

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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.


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

Guidance

Pharyngeal Swab, COVID-19

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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 Emergency, 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

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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

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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. Both Surviving Sepsis Campaign 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 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 SpO₂ of 94% or more initially
- Once stable, target SpO₂ of 90% or higher in nonpregnant adults; 92% or higher in pregnant patients
- In most children the target SpO₂ 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 SpO₂ 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 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 H₂O
- 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 H₂O
- 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 H₂O) 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


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