UKHealthCare

Guideline/Protocol Title	Interim Pharmacotherapy Guidance for SARS-CoV-2 (COVID-19) Infection in Nonhospitalized Adult Patients
Authors	COVID-19 Subcommittee
Committee Review	Pharmacy and Therapeutics Committee
Target Population	Adult patients with confirmed COVID-19
Overview	This guideline discusses the warnings related to off-label and/or experimental use of medications based off of limited clinical data evidence for the management of COVID-19 in adult patients.
Effective Date	04/19/2022
Revised Date	N/A
Expiration Date	N/A
Schedule for Periodic Review	N/A
Implementation Strategy	Guideline will be shared on UK HealthCare COVID-19 Website
Education Strategy	N/A
Primary Outcome (s)	N/A
Outcome Assessment Plan	N/A
Information Technology Needs	N/A

Interim Pharmacotherapy Guidance for SARS-CoV-2 (COVID-19) Infection in Nonhospitalized Adult Patients

Updated 04/19/2022

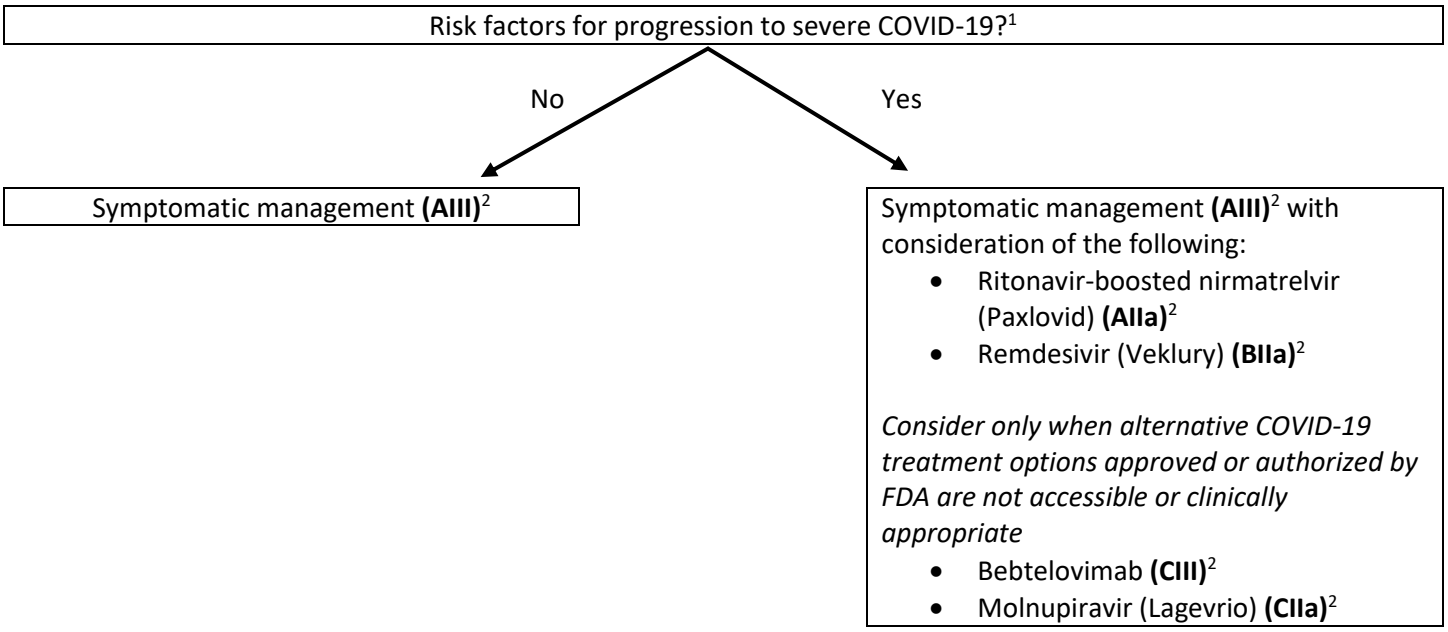
As of April 19, 2022, there is only one FDA approved therapy for the treatment of suspected or confirmed COVID-19. Other therapies for treatment of COVID-19 are available for use under emergency use authorization (EUA). Overall management resembles that for any viral pneumonia. The following guideline discusses the off-label and/or experimental use of some medications based off of limited clinical data. Requirements per the EUA include providing a fact sheet to healthcare providers and patients and reporting any adverse events through MedWatch. As literature surrounding the management of the novel coronavirus emerges, this document will be updated accordingly. Emerging clinical trial study details will be carefully analyzed and balanced with the fact that these are pandemic times necessitating expedient, informed decisions with sometimes limited evidence. Separate interim guidance exists for management of adult hospitalized patients, as well as utilization of tixagevimab/cilgavimab (Evusheld) at UK HealthCare.

Management of Nonhospitalized Adults with COVID-19 Infection

- Focus on prevention of transmission and monitor for worsening of symptoms or clinical deterioration that requires hospitalization. Outpatient treatment should focus on symptom management. Use of therapies can be considered based on eligibility per **Figure 1 with details on utilization and access in Table 1.** For vaccinated persons who subsequently develop COVID-19, it is unknown whether vaccination status should impact treatment decisions. National guidelines do not differentiate treatment recommendations based on vaccination status at this time. Providers should report post vaccination serious adverse events and cases of COVID-19 that result in hospitalization or death according to the UKHC COVID-19 Vaccine Adverse Event Reporting Process.
    - See Appendix A for OTC medication recommendations
    - See Appendix B for homemade rehydration solution recommendations
- It is estimated that the incidence of bacterial co-infection in patients with COVID-19 is approximately 3-7%; however, somewhere between 50-70% of patients are given empiric antibiotic therapy.[10-12] Empiric antibiotics are not recommended in patients with suspected or confirmed COVID-19 unless there is a strong clinical suspicion for bacterial co-infection.
- Dexamethasone or other systemic corticosteroids should not be used for COVID-19 patients that do not require hospitalization or supplemental oxygen in the absence of another indication **(NIH Level of Evidence AIII)**
- Anticoagulants and antiplatelet therapy are not recommended for the prevention of venous thromboembolism or arterial thrombosis unless the patient has other indications for the therapy or is participating in a clinical trial **(NIH Level of Evidence AIIa)**
- Patients with COVID-19 who are receiving concomitant medications (e.g., angiotensin-converting enzyme [ACE] inhibitors, angiotensin receptor blockers [ARBs], HMG-CoA reductase inhibitors [statins], systemic or inhaled corticosteroids, nonsteroidal anti-inflammatory drugs, acid-suppressive therapy) for underlying medical conditions should not discontinue these medications during acute management of COVID-19 unless discontinuation is otherwise warranted by their clinical condition **(NIH Level of Evidence AIIa for ACE inhibitors and ARBs; AIII for other medications)**.

Figure 1: **Therapeutic Options in Nonhospitalized Adult Patients with Confirmed Symptomatic COVID-19**

Only one of these therapies are approved for treatment of COVID-19. This guidance document is meant to provide information on safe use of these agents in populations most likely to benefit as well as outline the process for obtaining these therapies should the clinician deem that the benefits of treatment outweigh the risks.



[1]**Criteria for Identifying Individuals at High Risk** for Progression to Severe COVID-19 Disease in Appendix C

[2]**Level of Evidence** given by the NIH COVID-19 Treatment Guidelines. Rating of Recommendations: A = Strong; B = Moderate; C = Optional. Rating of Evidence: I = One of more randomized trials without major limitations; IIa = Other randomized trails or subgroup analyses of randomized trials; IIb = Nonrandomized trials or observational cohort studies; III = Expert Opinion.

Table 1:

Medication	Drug Information	Drug Access
Ritonavir-boosted nirmatrelvir (Paxlovid) **(AIIa)**	Nirmatrelvir + ritonavir is authorized for the treatment of mild-to-moderate COVID-19 in adults with positive results of direct SARS-CoV-2 viral testing **within 5 days of symptom onset** who are at high risk for progression to severe COVID-19. • Not authorized for initiation of treatment in patients requiring hospitalization due to severe or critical COVID-19, for pre-exposure or post-exposure prophylaxis for prevention of COVID-19, or for use longer than 5 consecutive days. • For use under EUA, healthcare providers counsel patients with communication consistent with the Fact Sheet for Patients, Parents, and Caregivers and provide them a copy of the Fact Sheet. You must inform patients that this is an unapproved drug authorized for use and that other therapeutics are currently approved or authorized for the same use. Serious adverse events and medication error must be reported, see Appendix D for the institutional COVID-19 Emergency Use Authorization Adverse Event Reporting Process. Dosing: 300 mg nirmatrelvir (two 150 mg tablets) with 100 mg ritonavir (one 100 mg tablet), with all three tablets taken together orally twice daily for 5 days with or without food. • Dose reduction for moderate renal impairment (eGFR ≥ 30 to < 60 mL/min): 150 mg nirmatrelvir (one 150 mg tablet) with 100 mg ritonavir (one 100 mg tablet), with both tablets taken together twice daily for 5 days • Drug is not recommended in patients with severe renal impairment (eGFR <30 mL/min) and severe hepatic impairment (Child-Pugh Class C). Contraindications • History of clinically significant hypersensitivity reactions to the active ingredients (nirmatrelvir or ritonavir) or any other components. • Co-administration with drugs highly dependent on CYP3A for clearance and for which elevated concentrations are associated with serious and/or life-threatening reactions. • Co-administration with potent CYP3A inducers where significantly reduced nirmatrelvir or ritonavir plasma concentrations may be associated with the potential for loss of virologic response and possible resistance Special Considerations • **Concomitant use with certain other drugs may result in potentially significant drug interactions**. Consult the full Fact Sheet for HealthCare Providers other resources such as	Available at UKHC in Kentucky Clinic and Turfland Retail Pharmacies • Adult COVID-19 Oral Paxlovid Pathway • Adult Pregnancy COVID-19 Oral Paxlovid Pathway ASPR Test-to-Treat Locator

	https://www.covid19-druginteractions.org/checker prior to and during treatment for potential drug interactions. Resources • Letter of Authorization • Fact Sheet for HealthCare Providers • Dear HealthCare Provider Letter • Fact Sheet for Patients, Parents, and Caregivers ○ Spanish • EUA FAQs	

Remdesivir (Veklury)
 	
(BIIa)
	Remdesivir is FDA approved for the treatment of COVID-19 in nonhospitalized adults with mild-to-moderate COVID-19 **within 7 days of symptom onset** who are at high risk for progression to severe COVID-19.
	
	Dosing: Remdesivir 200 mg IV on Day 1, then 100 mg IV once daily on Days 2-3
	• Each infusion should be administered over 30-120 minutes
	• Patients should be observed for an hour after infusion for signs and symptoms of hypersensitivity
	• Perform renal and hepatic at baseline and as clinically appropriate
	  ○ Use is not recommended if eGFR <30 mL/min or receipt of dialysis – remdesivir use may be considered if potential benefit outweighs potential risk (PMID: 33229428, PMID: 33152758, PMID: 33251541, PMID: 33263094, PMID: 33073066)
	  ○ Consider discontinuation if ALT ≥ 10x ULN or ALT elevation is accompanied by signs or symptoms of liver inflammation
	• Assess prothrombin time at baseline and as clinically appropriate
	
	Contraindications
	• History of clinically significant hypersensitivity reactions to the active ingredients or any other components.
	
	Resources
	• Package Insert
	• Patient Information Sheet
		Not available at UKHC
		
		ASPR COVID-19 Therapeutics Locator

Bebtelovimab **(CIII)** [2]	Bebtelovimab is authorized for the treatment of mild-to-moderate COVID-19 in adults with positive results of direct SARS-CoV-2 viral testing **within 7 days of symptom onset** who are at high risk for progressing to severe COVID-19 and **for whom alternative COVID-19 treatment options approved or authorized by FDA are not accessible or clinically appropriate.**	Not available at UKHC ASPR COVID-19 Therapeutics Locator

	• Not authorized for patients who are hospitalized due to COVID-19 or require oxygen therapy (or increase in baseline oxygen requirement) due to COVID-19. Additionally, bebtelovimab should not be used in regions where infection is likely to have been caused by a non-susceptible SARS-CoV-2 variant. • For use under EUA, healthcare providers counsel patients with communication consistent with the Fact Sheet for Patients, Parents, and Caregivers and provide them a copy of the Fact Sheet. You must inform patients that this is an unapproved drug authorized for use and that other therapeutics are currently approved or authorized for the same use. Serious adverse events and medication error must be reported, see Appendix D for the institutional COVID-19 Emergency Use Authorization Adverse Event Reporting Process. Dosing: 175mg administered as a single intravenous injection over at least 30 seconds • Patients should be observed for at least one hour after injection is complete. Special Considerations • Serious hypersensitivity reactions, including anaphylaxis, have been observed with administration of other SARS-CoV-2 monoclonal antibodies and could occur with administration of bebtelovimab. Infusion-related reactions may occur up to 24 hours post injection. These reactions may be severe or life threatening. • Clinical worsening of COVID-19 after administration of SARS-CoV-2 monoclonal antibody treatment has been reported and may include signs or symptoms of fever, hypoxia or increased respiratory difficulty, arrhythmia (e.g., atrial fibrillation, sinus tachycardia, bradycardia), fatigue, and altered mental status. Some of these events required hospitalization. It is not known if these events were related to SARS-CoV-2 monoclonal antibody use or were due to progression of COVID-19. Resources • Letter of Authorization • Fact Sheet for HealthCare Providers • Fact Sheet for Patients, Parents, and Caregivers ○ Spanish • EUA FAQs	
Molnupiravir (Lagevrio) **(CIIa)** [2]	Molnupiravir is authorized for the treatment of mild-to-moderate COVID-19 in adults with positive results of direct SARS-CoV-2 viral testing **within 5 days of symptom onset** who are at high risk for progressing to severe COVID-19 and **for whom alternative COVID-19 treatment options approved or authorized by FDA are not accessible or clinically appropriate.**	Not available at UKHC ASPR COVID-19 Therapeutics Locator

	• Not authorized for patients < 18 years old, for initiation of treatment in patients requiring hospitalization due to severe or critical COVID-19, for pre-exposure or post-exposure prophylaxis for prevention of COVID-19, or for use longer than 5 consecutive days. • For use under EUA, healthcare providers counsel patients with communication consistent with the Fact Sheet for Patients, Parents, and Caregivers and provide them a copy of the Fact Sheet. You must inform patients that this is an unapproved drug authorized for use and that other therapeutics are currently approved or authorized for the same use. Serious adverse events and medication error must be reported, see Appendix D for the institutional COVID-19 Emergency Use Authorization Adverse Event Reporting Process. Dosing: 800 mg (four 200 mg capsules) taken orally every 12 hours for 5 days, with or without food. Special Considerations • The FDA EUA states that molnupiravir is not recommended for use in pregnant patients due to concerns about the instances of fetal toxicity observed during animal studies. However, when other therapies are not available, pregnant people with COVID-19 who are at high risk of progressing to severe disease may reasonably choose molnupiravir therapy after being fully informed of the risks, particularly those who are beyond the time of embryogenesis (i.e., >10 weeks' gestation). The prescribing clinician should document that a discussion of the risks and benefits occurred and that the patient chose this therapy. • Patients of childbearing potential should be counseled about abstaining from sex or using reliable contraception for the duration of therapy and for up to 4 days after receiving molnupiravir. Reproductive toxicity has been reported in animal studies of molnupiravir, and molnupiravir may be mutagenic during pregnancy. • Men of reproductive potential who are sexually active with individuals of childbearing potential should abstain from sex or use a reliable method of contraception for the duration of treatment and for at least 3 months after the last dose of molnupiravir. • Based on the lack of data on the use of molnupiravir in lactating people and the potential for adverse effects in the infant from molnupiravir exposure, the current recommendation is to avoid feeding an infant breast milk during molnupiravir treatment and for 4 days after the final dose. Pumping and discarding breast milk to maintain supply during this time is recommended. Resources • Letter of Authorization • Fact Sheet for HealthCare Providers	ASPR Test-to-Treat Locator

	• Fact Sheet for Patients, Parents, and Caregivers ○ Spanish • Dear HealthCare Provider • EUA FAQs • Provider Checklist	

Appendix A. OTC Supportive Care Recommendations[5]

Antipyretics/Analgesics		
Drug	**Adult Dose**	**Notes**
Acetaminophen	325mg – 625mg every 4 to 6 hours Do not exceed 4,000mg/day Chronic liver disease: do not exceed 2,000mg/day	Until additional data is available concerning ibuprofen and COVID-19, consider using acetaminophen as first-line for fever Acetaminophen is contained in many OTC cough and cold products. Remember to add those doses in total daily dose Preferential antipyretic for patients with chronic cardiovascular and chronic kidney disease OTC suppository available if unable to tolerate oral
Ibuprofen	400mg every 4 to 6 hours	Until additional data is available concerning ibuprofen and COVID-19, consider using acetaminophen as first-line for fever Avoid use in patients with CKD 4 or 5 Avoid use in patient with chronic cardiovascular disease
Aspirin	**>18 years:** 325mg every 4 to 6 hours Do not exceed 4,000mg/day	Avoid if on current antiplatelet therapy (e.g., clopiodgrel, ticagrelor, etc.) OTC suppository is available if unable to tolerate oral meds
Drug	**Adult Dose**	**Notes**
Dextromethorphan	10 – 20mg every 4 hours 20 – 30mg every 6 to 8 hours Extended release: 60mg every 12 hours Do not exceed 120mg/day	Consult pediatrician before use in children <4 years Commonly co-formulated with guaifenesin
Guaifenesin	Immediate release: 200 – 400mg every 4 hours Extended release: 600 – 1,200mg every 12 hours Do not exceed 2,400mg/day	Counsel patients to drink plenty of water Do not use in children in <2 years

Decongestants		
Drug	**Adult Dose**	**Notes**
Chlorpheniramine	Immediate release: 4mg every 4 to 6 hours Extended release: 12mg every 12 hours Do not exceed 24mg/day	No renal or hepatic dose adjustments Use with caution in patients with cardiovascular disease, glaucoma, symptomatic BPH
Oxymetazoline	0.05%: instill 2 to 3 sprays in each nostril every 12 hours	**DO NOT USE for >3 days**
Pseudoephedrine	Immediate release: 60mg every 4 to 6 hours Extended release: 120mg every 12 hours Do not exceed 240mg/day	No renal or hepatic dose adjustments Avoid use in patients with chronic cardiovascular disease Use with caution in patients with chronic kidney disease, glaucoma, symptomatic BPH, and seizure disorders Available behind the pharmacy counter with driver's license

Phenylephrine	10mg every 4 hours Do not exceed 60mg/day	No renal or hepatic dose adjustments	

Antidiarrheals			
Loperamide	Initial 4mg dose; 2mg after each loose stool Do not exceed 16mg/day	2 to 5 years (13 to <21 kg): 1mg after each loose stool 6 to 8 years (21 to 27 kg): initial 2mg dose; 1mg after each loose stool 9 to 11 years (27.1 to 43 kg): initial 2mg dose; 1mg after each loose stool ≥12 years: initial 4 mg dose; 2 mg after each loose stool 2 to 5 years (13 to <21 kg): do not exceed 3mg/day 6 to 8 years (21 to 27 kg): do not exceed 4mg/day 9 to 11 years (27.1 to 43 kg): do not exceed 6mg/day ≥12 years: do not exceed 8mg/day	
Herbals			
Elderberry	Consult package labeling	Consult package labeling Syrup not recommend for children <1 year Gummies not recommend for children <3 years	Counsel patients to only use commercially prepared products with a “USP” or “GMP” seal on the product Although efficacy is questionable, it is generally safe when using a commercially prepared product Counsel patients to avoid homemade products. Case reports of severe GI distress, pancreatitis, and death have been reported with homemade products.

Appendix B. Homemade Rehydration Solutions[6]

Base Beverage	Recipe	
Water	• 1 quart water • ¾ teaspoon table salt • 2 tablespoons sugar	
Chicken Broth	• 4 cups water • 1 dry chicken broth cube • ¼ teaspoon table salt • 2 tablespoons sugar	**OR** • 2 cups liquid chicken broth (not low sodium) • 2 cups water • 2 tablespoons sugar
Tomato Juice	• 2 and ½ cups plain tomato juice • 1 and ½ cups water	
Cranberry Juice	• ¾ cup cranberry juice • 3 and ¼ cups water • ¾ teaspoon table salt	

Appendix C: Criteria for Identifying Individuals at High Risk for Progression to Severe COVID-19 Disease

It is important to note that COVID-19 does not affect all populations groups equally.

- The risk of severe COVID-19 increases as the number of underlying medical conditions increases in an individual.
- **Older adults** are more likely to get severely ill from COVID-19. Age is the strongest risk factor for severe outcomes.
- Long-standing systemic health and social inequities have put various groups of people at increased risk of getting sick and dying from COVID-19, including many **racial and ethnic minority groups and people with disabilities**.

Higher Risk

- Cancer
- Cerebrovascular disease
- Chronic kidney disease
- Chronic lung diseases (interstitial lung disease, pulmonary embolism, pulmonary hypertension, bronchiectasis, COPD)
- Chronic liver diseases (cirrhosis, non-alcoholic fatty liver disease, alcoholic liver disease, autoimmune hepatitis)
- Cystic fibrosis
- Diabetes mellitus, type 1 and type 2
- Disabilities (attention-deficit/hyperactivity disorder, cerebral palsy, congenital malformations (birth defects), limitations with self-care or activities of daily living, intellectual and developmental disabilities, learning disabilities, spinal cord injuries)
- Heart conditions (heart failure, coronary artery disease, or cardiomyopathies)
- Human immunodeficiency virus
- Mental health disorders (mood disorders, including depression, schizophrenia spectrum disorders)
- Neurologic conditions (dementia)
- Obesity (BMI ≥30 kg/m^2)
- Primary Immunodeficiencies
- Pregnancy and recent pregnancy
- Physical inactivity
- Sickle cell disease
- Smoking, current and former
- Solid organ or hematopoietic cell transplantation
- Tuberculosis
- Use of corticosteroids or other immunosuppressive medications

Suggestive Higher Risk

- Overweight (BMI ≥25 kg/m^2, but <30 kg/m^2)
- Sickle cell disease
- Substance use disorders
- Thalassemia

Mixed Evidence

- Alpha 1 antitrypsin deficiency
- Asthma
- Bronchopulmonary dysplasia
- Hepatitis B
- Hepatitis C
- Hypertension

Appendix D: COVID-19 Emergency Use Authorization Adverse Event Reporting Process

Applies to agents issued an emergency use authorization for prophylaxis or treatment of COVID-19. For fully FDA approved COVID-19 therapeutics [e.g., remdesivir for the treatment of COVID-19 in adults and pediatric patients (12 years of age and older and weighing at least 40 kg)], it is up to the provider to determine clinical necessity of reporting internally and to MedWatch; please follow the Adverse Drug Reaction reporting policy #A14.150.

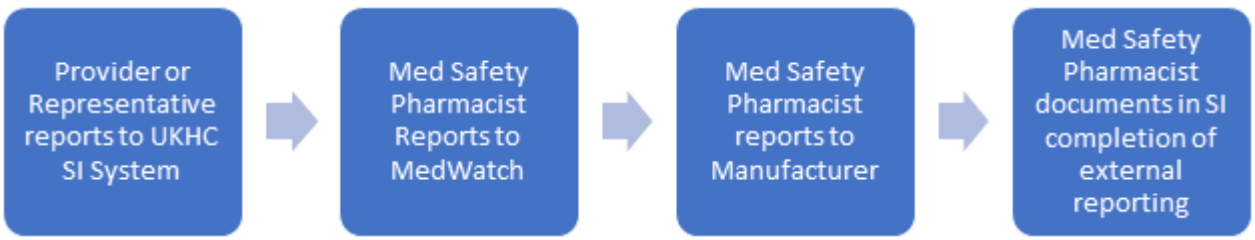
Mandatory reporting to FDA MedWatch within 7 calendar days from the onset or awareness of the event is required in 2 scenarios for COVID-19 drug administration under emergency use authorization (EUA).

	Scenario	Responsible Party
1.	Medication errors whether or not associated with an adverse event	Primary Provider or Representative
2.	Serious adverse events (irrespective of attribution to vaccination), defined as: • Death • A life-threatening adverse event • Inpatient hospitalization or prolongation of existing hospitalization • A persistent or significant incapacity or substantial disruption of the ability to conduct normal life functions • A congenital anomaly/birth defect • An important medical event that based on appropriate medical judgement may jeopardize the individual and may require medical or surgical intervention to prevent one of the outcomes listed above	Primary Provider or Representative

Reporting Process

In the case that a medication error occurs or a recipient of an EUA drug experiences a side effect, adverse drug reaction, or adverse drug event, the following should occur:

1. Provider, administering nurse, or other team member identifies medication error or serious adverse event.
2. Provider or Representative reports to internal UKHC reporting system under the event type 'Adverse Drug Reaction' or 'Medication Event' as appropriate using template below. - http://careweb.mc.uky.edu/psn/
3. Once reported internally, the Med Safety Pharmacist (Liz Hess) submits MedWatch form to FDA - https://vaers.hhs.gov/reportevent.html. Reporter will be contacted if there are additional questions.
4. Med Safety Pharmacist attaches MedWatch Report to SI Report.
5. Med Safety Pharmacist reports adverse event to manufacturer online as needed and attaches to SI report.



Recommended COVID EUA Reporting Template

Use this template to report internally (copy/paste) or write down pertinent details, prior to internal reporting. Delete text that is not utilized (e.g. COVID hospitalization).

Patient Name: _____
DOB: ___/_____/_____
Patient phone: _____
Patient email:_____
Allergies (drug/food and reaction):_____

Date(s) of Administration: _____
Dose and Frequency: _____
Route of Administration: ____
Manufacturer: _____
Lot #: _____
Clinic or Unit Administering Drug: _____
Injection site (if applicable):_____
Description of event/reaction: _____

Date of Clinic Visit or Hospitalization: ____/_____/2022
Reason for clinic visit or hospitalization: _____
COVID-19 positive test result: Yes or No; if Yes, date ____/____/2022
Plans to monitor (include medications if prescribed):_____

Level of Evidence (LOE) Definitions:

- Rating of Recommendation:
  - A = Strong
  - B = Moderate
  - C = Optional
- Rating of Evidence
  - I – One or more randomized control trials with clinical outcomes and/or validated laboratory endpoints
  - IIa – Other randomized trials or subgroup analyses of randomized trials
  - IIb – Nonrandomized trials or observational cohort studies
  - III – Expert opinion

Other Resources:

- ASPR COVID-19 Outpatient Therapeutics Clinical Decision Aid: Therapeutics Decision Aid (hhs.gov)
- Underlying Medical Conditions Associated with Higher Risk for Severe COVID-19: Information for Healthcare Professionals: https://www.cdc.gov/coronavirus/2019-ncov/hcp/clinical-care/underlyingconditions.html
  - Scientific Evidence for Conditions Associated with Higher Risk for Severe COVID-19 | CDC
-
- Drug-drug interactions: https://www.covid19-druginteractions.org/
- Administration in cases of swallowing difficulties: https://liverpool-covid19.s3.eu-west-2.

References:

Click links to access documents

General:

1. https://www.fda.gov/emergency-preparedness-and-response/mcm-legal-regulatory-and-policy-framework/emergency-use-authorization
2. https://www.cdc.gov/coronavirus/2019-ncov/hcp/clinical-guidance-management-patients.html. Accessed 3/16/20.
3. https://www.who.int/publications-detail/clinical-management-of-severe-acute-respiratory-infection-when-novel-coronavirus-(ncov)-infection-is-suspected. Accessed 3/16/20.
4. https://goldcopd.org/wp-content/uploads/2019/11/GOLD-2020-REPORT-ver1.0wms.pdf. Page 107. Accessed 3/15/20.
5. All drug dosing and safety recommendations found in Lexicomp. Accessed 3/14/20.
6. https://med.virginia.edu/ginutrition/wp-content/uploads/sites/199/2018/09/Homemade-Oral-Rehydration-Solutions-9-2018.pdf. Accessed 3/15/20.
7. IDSA Guidelines 4/11/2020: https://www.idsociety.org/practice-guideline/covid-19-guideline-treatment-and-management/
8. NIH Guidelines 4/21/2020: https://covid19treatmentguidelines.nih.gov/introduction/
9. SIDP: https://sidp.org/resources/Documents/COVID19/Zahra%20COVID-19%20Ppt%20HCQ%20and%20CQ%20ZKE%203.20.20.pdf

Primary Literature (not an exhaustive list):

Antimicrobial Stewardship:

10. Empiric antibacterial therapy and community-onset bacterial co-infection in COVID-19 *Clin Infect Dis* 8/21/20: https://academic.oup.com/cid/advance-article/doi/10.1093/cid/ciaa1239/5895253
11. COVID-19: An emerging threat to antibiotic stewardship in the ED *West J Emerg Med* 8/7/20: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7514390/pdf/wjem-21-1283.pdf
12. Antimicrobial stewardship in ICUs during COVID-19 *Intensive Care Medicine* 10/17/20: https://link.springer.com/article/10.1007/s00134-020-06278-x

Remdesivir

13. Early remdesivir to prevent progression to severe COVID-19 in outpatients *NEJM* 1/27/2022: https://www.nejm.org/doi/full/10.1056/NEJMoa2116846