King Faisal Specialist Hospital and Research Center (KFSH&RC)
Guidelines for the Management of Coronavirus Disease 2019 (COVID-19)

*Please Refer to Page **6** for the Names of Healthcare Professional Involved in the Development, Reviewing and Approval of the Prescribing Guidelines. These Prescribing Guidelines are approved by the Formulary & Therapeutics Committee (FTC) and the Executive Director of the Medical & Clinical Affairs on:*
5th of March 2020

1) **The decision to manage a patient in the inpatient or outpatient setting should be made on a case-by-case basis:**
   - Patients with pneumonia and/or high risk features/comorbidities (i.e. elderly, lung disease, cancer, heart failure, cerebrovascular disease, renal disease, liver disease, diabetes, immunocompromising conditions, and pregnancy) should be admitted.
   - Additionally, decision to admit, may depend on patient's ability to engage in monitoring, home isolation, and the risk of transmission in the patient's home environment

2) **Management of Adult Patients:**
   a. **Patients with Upper Respiratory Tract Infection (URTI) with/out Fever:**
      - **Evaluation and Admission:**
        - Evaluate the need for admission
        - If admission ***NOT*** required, patient needs to be placed in home isolation for 14 days
      - **Labs and Workup:**
        - CBC, Urea/Electrolytes, Creatinine, CRP, LFTs, Chest X-ray, Respiratory and Middle East Respiratory Syndrome (MERS) panel, and COVID-19 PCR tests.
      - **Treatment:**
        - No need for treatment If admission is not required

   b. **Patients with Pneumonia (Non-ICU Admission)**
      - **Evaluation and Admission:**
        - Consult Infectious Diseases Team
        - Admission to negative pressure room
      - **Labs and Workup:**
        - CBC, Urea/Electrolytes, Creatinine, CRP, LFT, Chest X-ray, Respiratory and MERS panel, COVID-19 PCR tests, Blood glucose, ECG
      - **Treatment (for Dosing and Medication Related Information, See Table 1):**
        - Start ceftriaxone + azithromycin + oseltamivir
        - In patients with positive COVID-19 PCR test consider starting antiviral medications (lopinavir/ritonavir + ribavirin)
        - Supportive care as needed
        - Treatment duration 6-10 days
        - Drug therapies for the management of COVID-19 are under compassionate use (Form B is ***NOT*** required).
      - **Monitoring:**
        - Follow up of liver function test, CBC and hemolysis workup while on ribavirin
        - Monitor blood glucose (especially in diabetic patients) and electrolytes while on lopinavir/ ritonavir

c. Patients with Pneumonia (ICU Admission)

- **Evaluation and admission:**
  - Consult Infectious Diseases Team
  - Admission to negative pressure room

- **Labs and Workup:**
  - Same workup with additional G6PD screening if chloroquine will be used

Treatment (for Dosing and Medication Related Information, See Table 1):

- Piperacillin/tazobacatm + oseltamivir +/- vancomycin if MRSA risk factors identified
- In patients with positive COVID-19 PCR test consider starting antiviral medications (lopinavir/ritonavir + ribavirin)
- In patients with positive COVID-19 PCR test consider starting chloroquine
- Supportive care as needed
- Treatment duration 6-10 days
- Drug therapies for the management of COVID-19 are under compassionate use (Form B is ***NOT*** required).

3) Management of Pediatric Patients:

a. Patients with Upper Respiratory Tract Infection (URTI) with/out Fever:

- **Evaluation and Admission:**
  - Evaluate the need for admission
  - If admission NOT required, patient needs to be placed in home isolation for 14 days

- **Labs and Workup:**
  - CBC, Urea/Electrolytes, Creatinine, CRP, LFT, Chest X-ray, Respiratory and MERS panel, & COVID-19 PCR tests, Blood glucose, ECG

- **Treatment:**
  - No need for treatment if admission not required

b. Patients with Pneumonia (Non-ICU Admission)

- **Evaluation and Admission:**
  - Consult Infectious Diseases Team
  - Admission to negative pressure room

- **Labs and Workup:**
  - CBC, Urea/Electrolytes, Creatinine, CRP, LFT, Chest X-ray, Respiratory and MERS panel, COVID-19 PCR tests, Blood glucose, ECG

- **Treatment (for Dosing and Medication Related Information, See Table 1):**
  - Start ceftriaxone + azithromycin + oseltamivir
  - In patients with positive COVID-19 PCR test consider starting the antiviral lopinavir/ritonavir
  - Supportive care as needed
  - Treatment duration 6-10 days
  - Drug therapies for the management of COVID-19 are under compassionate use (Form B is ***NOT*** required).

c. Patients with Pneumonia (ICU Admission):

- **Evaluation and Admission:**
  - Consult Infectious Diseases Team
  - Admission to negative pressure room

- **Labs and Workup:**
  - Same workup with additional G6PD screening if chloroquine will be used

- **Treatment (for Dosing and Medication Related Information, See Table 1):**
  - Piperacillin/tazobacatm + osletamivir +/- vancomycin if MRSA risk factors identified
  - In patients with positive COVID-19 PCR test consider starting the antiviral lopinavir/ritonavir
  - In patients with positive COVID-19 PCR test consider starting chloroquine
  - Supportive care as needed
  - Treatment duration 6-10 days
  - Drug therapies for the management of COVID-19 are under compassionate use (Form B is ***NOT*** required).

Table 1: Dosing and Medication Related Information

Medication	Dose	Notes
Ceftriaxone	Adults: 2 g IV daily Pediatrics: 100 mg/kg/dose once daily (usual maximum daily dose: 2,000 mg/day)	
Azithromycin	Adults: 500 mg orally daily for a minimum of 3 days Pediatrics: 10 mg/kg once on day 1 (maximum dose: 500 mg/dose), followed by 5 mg/kg (maximum dose: 250 mg/dose) once daily on days 2 to 5	Monitor ECG in high risk patients due to the risk of QT_c prolongation.
Oseltamivir	Adults: 75 mg every 12 hours for 5 days (a longer duration can be considered in severely ill or immunocompromised patients). Pediatrics: • ≤15 kg: 30 mg orally twice daily • >15 to 23 kg: 45 mg orally twice daily • >23 to 40 kg: 60 mg orally twice daily • >40 kg: 75 mg orally twice daily For 5 days.	In patients with impaired renal function, adjust oseltamivir dose according to hospital formulary.
Lopinavir/ Ritovanir	Adults: 400/100 every 12 hours Pediatrics: Dosage based on weight, presented based on mg of lopinavir; maximum dose: Lopinavir 400 mg/ritonavir 100 mg • 7–15 kg: 12 mg/kg twice daily • 15–40 kg: 10 mg/kg twice daily • >40 kg: 400 mg/100 mg twice daily	• Do not use lopinavir/ ritonavir in pre-term or full term neonates before 14 days of gestational age. • Check for drug-drug interaction (consult clinical pharmacist for recommendations). • If lopinavir/ritonavir is not available may consider darunavir/cobicistat as an alternative.
Ribavirin	Adults: according to Crcl: • > 50 ml/min: 2000 mg loading dose, followed by 1200 mg every 8 h for 4 days then, 600 mg every 8 h for 4–6 days	• Check for drug-drug interaction (consult clinical pharmacist for recommendations). • In case of ribavirin induced hematological toxicity, adjust the dose according to hemoglobin, platelet or white blood cell count using the hospital formulary

	• 20-50 ml/min: 2000 mg loading dose, followed by 600 mg every 8 h for 4 days then, 200 mg every 6 h for 4–6 days • < 20 ml/min or on dialysis: 2000 mg loading dose, followed by 200 mg every 6 h for 4 days then, 200 mg every 12 h for 4–6 days	• Ribavirin for the compassionate management of COVID-19 .
Piperacillin/ Tazobacatm	Adults: 4.5 g IV every 6 hours Pediatrics: 300 mg/ kg/day divided every 6-8 hours	Maximum daily dose for pediatrics: 16 g/day In patients with impaired renal function, adjust piperacillin/tazobacatm dose according to hospital formulary.
Vancomycin	Adults: 15-20 mg/kg/dose every 8 to 12 hours Pediatrics: 15 mg/kg/dose every 6 hours	• In patients with impaired renal function, adjust vancomycin dose according to hospital formulary and guidelines. • Adjust the dose to target trough of 15-20 mcg/ml
Chloroquine	Adults: 500 mg every 12 hours Pediatrics: (dosing based on chloroquine base) loading 10 mg/kg orally (maximum 600 mg) followed by 5 mg/kg orally (maximum: 300 mg) daily 6 hours after the loading dose for 5 days.	• Check contraindications carefully • Use with caution in QT interval prolongation • Can't be used concomitantly with macrolides • Check for drug-drug interaction (consult clinical pharmacist for recommendations) • Pediatric dose may change based on future studies • Chloroquine for the compassionate management of COVID-19

4) Chloroquine Contraindications

- Female patients during pregnancy
- Patients who are allergic to 4-aminoquinoline
- Patients with hematological diseases
- Patients with chronic liver and kidney disease and reaching end-stage
- Patients with arrhythmia and chronic heart disease
- Patients known to have retinal disease or hearing loss
- Patients known to have a mental illness
- Skin disorders (including rash, dermatitis, and psoriasis)
- Glucose-6-phosphate dehydrogenase (G6PD) deficiency
- Due to the original underlying disease, the concomitant use of the following medications is not recommended: digitalis, butaparin, heparin, penicillamine, amiodarone, benpridil, domperidone, droperidol, haloperidol, azithromycin, astemizole, erythromycin, clarithromycin, posaconazole, methadone, procainamide, hydrochlorothiazide, sparfloxacin, levofloxacin, moxifloxacin, cisapride, indapamide, chlorpromazine, streptomycin, heparin, Patients with penicillamine, ammonium chloride, ondansetron, apomorphine, octreotide monoamine oxidase inhibitor, fludroprednisolone.

5) Pregnancy and Lactation:

- Management of infection with COVID-19 in pregnancy is mainly based on supportive care. Consideration of antiviral therapy should be based on patient condition, safety profile and preference of the patient and treating team

6) References:

1. Jin, Y.H., et al., *A rapid advice guideline for the diagnosis and treatment of 2019 novel coronavirus (2019-nCoV) infected pneumonia (standard version).* Mil Med Res, 2020. **7**(1): p. 4.
2. She, J., et al., *2019 novel coronavirus of pneumonia in Wuhan, China: emerging attack and management strategies.* Clin Transl Med, 2020. **9**(1): p. 19
3. Li, J.Y., et al., *The epidemic of 2019-novel-coronavirus (2019-nCoV) pneumonia and insights for emerging infectious diseases in the future.* Microbes Infect, 2020.
4. Multicenter collaboration group of Department of, S., P. Technology of Guangdong, and p. Health Commission of Guangdong Province for chloroquine in the treatment of novel coronavirus, *[Expert consensus on chloroquine phosphate for the treatment of novel coronavirus pneumonia].* Zhonghua Jie He He Hu Xi Za Zhi, 2020. **43**(0): p. E019.
5. Gao, J., Z. Tian, and X. Yang, *Breakthrough: Chloroquine phosphate has shown apparent efficacy in treatment of COVID-19 associated pneumonia in clinical studies.* Biosci Trends, 2020.
6. Ministry of Health. Coronavirus Diseases 19 (COVID-19) guidelines. February 2020
7. Omrani A, et.al. Ribavirin and interferon alfa-2a for severe Middle East respiratory syndrome coronavirus infection: a retrospective cohort study. Lancet Infect Dis 2014; 14: 1090–95
8. Momattin H, et.al. Therapeutic Options for Middle East Respiratory Syndrome Coronavirus (MERS-CoV): possible lessons from a systematic review of SARS-CoV therapy. *International Journal of Infection Diseases*. 2013. 17(10): e792-e798
9. WHO. Table of therapeutic appendix. February 17 2020
10. Li et al. Therapeutic Options for 2019 novel coronavirus (2019-CoV). *Nature review. Februrary 2020*

7) Abbreviation (s) Used:

- COVID-19: Coronavirus Disease 2019
- MERS: Middle East Respiratory Syndrome
- CBC: Complete Blood Count
- CRP: C-Reactive Protein
- LFT: Liver Function Test
- PCR: Polymerase Chain Reaction
- ECG: Electrocardiogram
- MRSA: Methicillin-Resistant Staphylococcus Aureus
- G6PD: Glucose-6-Phosphate Dehydrogenase

Dates:

Preparation Date:	5th of March, 2020
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Revision Date:	

8) Names and Titles of Physicians, and other Healthcare Professional Involved in:

a) Preparation of the Guidelines

Name	Title and Affiliation	Signature	Date
Hibah Alruwaisan, Pharm.D	Clinical Pharmacist, Infectious Diseases		5/3/2020
Reem Almaghrabi, MD	Consultant, Infectious Diseases Chairperson, Antimicrobial Utilization Evaluation Subcommittee		5/3/20

b) Review of the Guidelines

Name	Title and Affiliation	Signature	Date
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Lujain Alsuhaibani, Pharm. D.	Corporate Coordinator, Formulary & Therapeutics Committee (FTC)		5th of March, 2020

c) Approval of the Guidelines

Name	Title and Affiliation	Signature	Date
Magid Mohamed, MD	Head, Section of Infectious Disease		5/3/20
Sami Alhajjar, MD	Chairman, Department of Pediatrics		5/3/2020
Wajeeh Aldekhail, MD	Chairman, Formulary & Therapeutics Committee (FTC)		05/03/2020

For Formulary & Therapeutics Committee (FTC) Use:

9) Recommendations of the FTC:

☐ Guidelines Approved with Minor Revision (s)
☐ Guidelines Approved with Major Revision (s)
☐ Guideline Not Approved
☐ Waiver of "FORM B" Requirement for the Requested Indication (s)
☐ A Medication Utilization Evaluation [MUE] by the Medication Safety and Utilization Committee
☐ Therapy Outcome Report by the Requesting Section (s) after _____Months