

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:
19th of March 2020

1) Definitions:

- **High Risk Patients:**
 - i. Any patient with Coronavirus Disease 2019 (COVID-19) with any of the following comorbidities elderly, children < 1-year-old, lung disease, cancer, heart failure, cardiovascular disease, cerebrovascular disease, renal disease, liver disease, diabetes, immunocompromising conditions, and pregnancy
- **Upper Respiratory Tract Symptoms:**
 - i. Patients presenting with sore throat, low grade fever, or dry cough.

2) Management of Adult Patients:

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

- **Labs and Workup:**
 - CBC, Urea/Electrolytes, Creatinine, CRP, LFTs, Chest X-ray, Respiratory viral panel and Middle East Respiratory Syndrome (MERS) panel, COVID-19 PCR tests, Blood glucose, ECG, Ferritin level
- **Treatment:**
 - Consult Infectious Diseases team
 - Hydroxychloroquine and azithromycin
 - Treatment duration 6-10 days

b. Patients with Pneumonia (Non-ICU Admission)

- **Labs and Workup:**
 - CBC, Urea/Electrolytes, Creatinine, CRP, LFTs, Chest X-ray, Respiratory viral panel and MERS panel, COVID-19 PCR tests, Blood glucose, ECG, Ferritin level
- **Treatment (for Dosing and Medication Related Information, See Table 1):**
 - Consult Infectious Diseases team
 - Start ceftriaxone + azithromycin + oseltamivir
 - Start hydroxychloroquine in addition to the above
 - Addition of lopinavir/ritonavir or chloroquine should be decided by Infectious Diseases team
 - 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)

- **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/tazobactam + oseltamivir + azithromycin +/- vancomycin if MRSA risk factors identified
 - Add hydroxychloroquine to the above regimen
 - Addition of lopinavir/ritonavir or chloroquine should be decided by Infectious Diseases team
 - 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):

- **Labs and Workup:**
 - CBC, Urea/Electrolytes, Creatinine, CRP, LFTs, Chest X-ray, Respiratory viral panel and MERS panel, COVID-19 PCR tests, Blood glucose, ECG, Ferritin level
- **Treatment:**
 - Consult Infectious Diseases team
 - Hydroxychloroquine and azithromycin
 - Treatment duration 6-10 days

b. Patients with Pneumonia (Non-ICU Admission)

- **Labs and Workup:**
 - CBC, Urea/Electrolytes, Creatinine, CRP, LFTs, Chest X-ray, Respiratory and MERS panel, COVID-19 PCR tests, Blood glucose, ECG, Ferritin level
- **Treatment (for Dosing and Medication Related Information, See Table 1):**
 - Start ceftriaxone + azithromycin + oseltamivir
 - Start hydroxychloroquine in addition to above
 - Addition of lopinavir/ritonavir or chloroquine should be decided by Infectious Diseases team
 - 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):

- **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/tazobactam + oseltamivir + azithromycin +/- vancomycin if MRSA risk factors identified
 - Add hydroxychloroquine to the above regimen
 - Addition of lopinavir/ritonavir or chloroquine should be decided by Infectious Diseases team
 - 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).

4) Monitoring:

- Monitor CBC, liver and renal function, blood glucose while on hydroxychloroquine
- Monitor blood glucose (especially in diabetic patients) and electrolytes while on lopinavir/ritonavir

Table 1: Dosing and Medication Related Information

Medication	Dose	Notes
Ceftriaxone	<u>Adults:</u> 2 g IV daily <u>Pediatrics:</u> 100 mg/kg/dose once daily (usual maximum daily dose: 2,000 mg/day)	
Azithromycin	<u>Adults:</u> 500 mg orally daily for a minimum of 3 days <u>Pediatrics:</u> 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	<u>Adults:</u> 75 mg every 12 hours for 5 days (a longer duration can be considered in severely ill or immunocompromised patients). <u>Pediatrics:</u> <ul style="list-style-type: none"> • ≤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/ Ritonavir	<u>Adults:</u> 400/100 every 12 hours <u>Pediatrics:</u> Dosage based on weight, presented based on mg of lopinavir; maximum dose: Lopinavir 400 mg/ritonavir 100 mg <ul style="list-style-type: none"> • 7–15 kg: 12 mg/kg twice daily • 15–40 kg: 10 mg/kg twice daily • >40 kg: 400 mg/100 mg twice daily 	<ul style="list-style-type: none"> • 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.
Piperacillin/ Tazobactam	<u>Adults:</u> 4.5 g IV every 6 hours <u>Pediatrics:</u> 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/tazobactam dose according to hospital formulary.
Vancomycin	<u>Adults:</u> 15-20 mg/kg/dose every 8 to 12 hours <u>Pediatrics:</u> 15 mg/kg/dose every 6 hours	<ul style="list-style-type: none"> • 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	<u>Adults:</u> 500 mg every 12 hours <u>Pediatrics:</u> (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.	<ul style="list-style-type: none"> • 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

Hydroxychloroquine	<p><u>Adults:</u> loading dose of 400 mg orally every 12 hours, followed by a maintenance dose of 200 mg orally every 12 hours</p> <p><u>Pediatrics:</u> 10 mg/kg orally every 12 hours (max: 600 mg/dose), followed by 3 mg/kg orally every 8 hours (max: 200 mg/dose)</p>	<ul style="list-style-type: none"> • Check contraindications carefully • Use with caution in QT interval prolongation • 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
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5) Chloroquine Contraindications

- 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, fludrocortisone.

6) 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

7) References:

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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
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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.
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6. Ministry of Health. Coronavirus Diseases 19 (COVID-19) guidelines. February 2020
7. 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
8. WHO. Table of therapeutic appendix. February 17 2020
9. Li et al. Therapeutic Options for 2019 novel coronavirus (2019-CoV). *Nature review. February 2020*
10. Colson P.et.al. Chloroquine and hydroxychloroquine as available weapons to fight COVID-19. *International Journal of Antimicrobial Agents*. Available online 4 March 2020, 105932
11. Yao X. et.al. In Vitro Antiviral Activity and Projection of Optimized Dosing Design of Hydroxychloroquine for the Treatment of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2). *Clin Infect Dis*. 2020 Mar 9. pii: ciaa237. doi: 10.1093/cid/ciaa237. [Epub ahead of print]
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13. Cao et al. A trial of Lopinavir-Ritonavir in adults hospitalized with severe COVID-19. *New England Journal of Medicine*. March 18 2020
14. Michigan medicine. Inpatient guidance for diagnosis and treatment of covid-19 in adults and children. med.umich.edu/asp.



8) 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

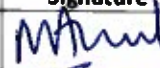

Dates:

Preparation Date:	5 th of March, 2020
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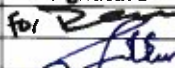

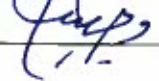
9) Names and Titles of Physicians, and other Healthcare Professional Involved in:**a) Preparation of the Guidelines**

Name	Title and Affiliation	Signature	Date
Hibah Alruwaisan, Pharm.D	Clinical Pharmacist, Infectious Diseases		19/3/2020
Reem Almaghrabi, MD	Consultant, Infectious Diseases Chairperson, Antimicrobial Utilization Evaluation Subcommittee		19/3/20

b) Review of the Guidelines

Name	Title and Affiliation	Signature	Date
Mohamed Ahmed, MPharm	Riyadh Coordinator, Formulary & Therapeutics Committee (FTC)		19-MAR-2020
Lujain Alsuhaibani, Pharm. D.	Corporate Coordinator, Formulary & Therapeutics Committee (FTC)		19 th of March, 2020

c) Approval of the Guidelines

Name	Title and Affiliation	Signature	Date
Magid Mohamed, MD	Head, Section of Infectious Disease		19/3/20
Sami Alhajjar, MD	Chairman, Department of Pediatrics		19/03/20
Wajeeh Aldekhail, MD	Chairman, Formulary & Therapeutics Committee (FTC)		19/3/2020

For Formulary & Therapeutics Committee (FTC) Use:**10) Recommendations of the FTC:**

<input type="checkbox"/> Guidelines Approved with Minor Revision (s)
<input type="checkbox"/> Guidelines Approved with Major Revision (s)
<input type="checkbox"/> Guideline Not Approved
<input type="checkbox"/> Waiver of "FORM B" Requirement for the Requested Indication (s)
<input type="checkbox"/> A Medication Utilization Evaluation [MUE] by the Medication Safety and Utilization Committee
<input type="checkbox"/> Therapy Outcome Report by the Requesting Section (s) after _____ Months