

# **Diagnosis and Treatment Protocol for Novel Coronavirus Pneumonia**

(Trial Version 7)

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Since December 2019, multiple cases of novel coronavirus pneumonia (COVID-19) have been identified in Wuhan, Hubei. With the spread of the epidemic, such cases have also been found in other parts of China and other countries. As an acute respiratory infectious disease, COVID-19 has been included in Class B infectious diseases prescribed in the Law of the People's Republic of China on Prevention and Treatment of Infectious Diseases, and managed as an infectious disease of Class A. By taking a series of preventive control and medical treatment measures, the rise of the epidemic situation in China has been contained to a certain extent, and the epidemic situation has eased in most provinces, but the incidence abroad is on the rise. With increased understanding of the clinical manifestations and pathology of the disease, and the accumulation of experience in diagnosis and treatment, in order to further strengthen the early diagnosis and early treatment of the disease, improve the cure rate, reduce the mortality rate, avoid nosocomial infection as much as possible and pay attention to the spread caused by the imported cases from overseas, we revised the *Diagnosis and Treatment Protocol for Novel Coronavirus Pneumonia (Trial Version 6)* to *Diagnosis and Treatment Protocol for Novel Coronavirus Pneumonia (Trial Version 7)*.

## **I. Etiological Characteristics**

The novel coronaviruses belong to the  $\beta$  genus. They have envelopes, and the particles are round or oval, often polymorphic, with diameter being 60 to 140 nm. Their genetic characteristics are significantly different from SARS-CoV and MERS-CoV. Current research shows that they share more than 85% homology with bat SARS-like coronaviruses (bat-SL-CoVZC45). When isolated and cultured in vitro, the 2019-nCoV can be found in human respiratory epithelial cells in about 96 hours, however it takes about 6 days for the virus to be found if isolated and cultured in Vero E6 and Huh-7 cell lines. Most of the knowledge about the physical and chemical properties of coronavirus comes from the research on SARS-CoV and MERS-CoV. The virus is sensitive to ultraviolet

and heat. Exposure to 56°C for 30 minutes and lipid solvents such as ether, 75% ethanol, chlorine-containing disinfectant, peracetic acid, and chloroform can effectively inactivate the virus. Chlorhexidine has not been effective in inactivating the virus.

## **II. Epidemiological Characteristics**

### **1. Source of infection**

Currently, the patients infected by the novel coronavirus are the main source of infection; asymptomatic infected people can also be an infectious source.

### **2. Route of transmission**

Transmission of the virus happens mainly through respiratory droplets and close contact. There is the possibility of aerosol transmission in a relatively closed environment for a long-time exposure to high concentrations of aerosol. As the novel coronavirus can be isolated in feces and urine, attention should be paid to feces or urine contaminated environment that may lead to aerosol or contact transmission.

### **3. Susceptible groups**

People are generally susceptible.

## **III. Pathological Changes**

Pathological findings from limited autopsies and biopsy studies are summarized below:

### **1. Lungs**

Variable consolidation is present in the lungs.

The alveoli are filled with fluid and fibrin with hyaline membrane formation. Macrophages and many multinucleated syncytial cells are identified within the alveolar exudates. Type II pneumocytes show marked hyperplasia and focal desquamation. Viral inclusions are observed in type II pneumocytes and macrophages. In addition, there is prominent edema and congestion in the alveolar septa which are infiltrated by monocytes and lymphocytes. Fibrin microthrombi are present. In more severely affected area, hemorrhage, necrosis, and overt hemorrhagic infarction are seen. Organization of alveolar exudates and interstitial fibrosis are also present.

Detached epithelial cell and mucus are present in the bronchi, sometimes mucus plugs are seen.

Hyperventilated alveoli, interrupted alveolar interstitium and cystic formation are occasionally seen.

By electronic microscopy, cytoplasmic 2019-nCoV virions are observed in the bronchial

epithelium and type II pneumocytes. Immunostain reveals 2019-nCoV viral immunoreactivity in some alveolar epithelial cells and macrophages and RT-PCR confirms the presence of 2019-nCoV nucleic acid.

#### 2. Spleen, hilar lymph nodes and bone marrow

The spleen is markedly atrophic with a decreased number of lymphocytes. Focal hemorrhage and necrosis are present. Macrophages proliferation and phagocytosis are present in the spleen. Sparsity of lymphocytes and focal necrosis are noted in lymph nodes. CD4+ and CD8+ immunohistochemistry highlights a decreased number of T cells in the spleen and lymph nodes. Myelopoiesis is decreased in bone marrow.

#### 3. Heart and blood vessels

Degenerated or necrosed myocardial cells are present, along with mild infiltration of monocytes, lymphocytes and/or neutrophils in the cardiac interstitium. Shedding of endothelial cells, endovasculitis and thrombi are seen in some blood vessels.

#### 4. Liver and gall bladder

The liver is dark-red and enlarged. Degeneration and focal necrosis of hepatocytes are found, accompanied by infiltration of neutrophils. The sinusoids are congested. The portal areas are infiltrated by lymphocytes and histiocytes. Microthrombi are seen. The gallbladder is prominently distended.

#### 5. Kidneys

The kidneys are remarkable for proteinaceous exudates in the Bowman's capsule around glomeruli, degeneration and shedding of renal tubules epithelial cells, and hyaline casts. Microthrombi and fibrotic foci are found in the kidney interstitium.

#### 6. Other organs

Cerebral hyperemia and edema are present, with degeneration of some neurons. Necrotic foci are noted in the adrenal glands. Degeneration, necrosis and desquamation of epithelium mucosae of variable degree are present in the esophageal, stomach and bowel.

### **IV. Clinical Characteristics**

#### 1. Clinical manifestations

Based on the current epidemiological investigation, the incubation period is one to 14 days, mostly three to seven days.

The main manifestations include fever, fatigue and dry cough. Nasal congestion, runny nose, sore throat, myalgia and diarrhea are found in a few cases. Severe patients develop dyspnea and/or hypoxemia after one week and may progress rapidly to acute respiratory

distress syndrome, septic shock, refractory metabolic acidosis, coagulopathy, multiple organ failure etc. It is noteworthy that for severe and critically ill patients may only present with moderate to low fever, or even no fever at all.

Some children and neonatal patients may have atypical symptoms, presented with gastrointestinal symptoms such as vomiting and diarrhea, or only manifested as lethargy and shortness of breath.

The patients with mild symptoms usually do not develop pneumonia but have low fever and mild fatigue.

Based on our experience, most patients have good prognosis and a small percentage of patients are critically ill. The prognosis for the elderly and patients with chronic underlying diseases is poorer. The clinical course of pregnant women with COVID-19 is similar to that of non-pregnant patients of the same age. Symptoms in children are relatively mild.

## 2. Laboratory tests

### General findings

In the early stages of the disease, peripheral WBC count is normal or decreased and the lymphocyte count is decreased. Some patients have elevated liver enzymes, lactate dehydrogenase (LDH), muscle enzymes and myoglobin. Elevated troponin is seen in some critically ill patients. Most patients have elevated C-reactive protein and erythrocyte sedimentation rate and normal procalcitonin. In severe cases, D-dimer increases and peripheral blood lymphocytes progressively decrease. Severe and critically ill patients often have elevated inflammatory factors.

### Pathogenic and serological findings

(1) Pathogenic findings: Novel coronavirus nucleic acid can be detected in nasopharyngeal swabs, sputum, lower respiratory tract secretions, blood, feces and other specimens using RT-PCR and/or NGS methods. It is more accurate if specimens are obtained from lower respiratory tract (sputum or air tract extraction). The specimens should be submitted for testing as soon as possible after collection.

(2) Serological findings: COVID-19 virus specific IgM becomes detectable around 3-5 days after onset; IgG reaches a titration of at least 4-fold increase during convalescence compared with the acute phase.

## 3. Chest imaging

In the early stage, imaging shows multiple small patchy shadows and interstitial changes, more apparent in the peripheral zone of lungs. As the disease progresses, imaging shows multiple ground glass opacities and infiltration in both lungs. In severe cases, pulmonary consolidation may occur. However, pleural effusion is rare.

## **V. Case Definitions**

### **1. Suspect cases**

Considering both the following epidemiological history and clinical manifestations:

#### 1.1 Epidemiological history

1.1.1 History of travel to or residence in Wuhan and its surrounding areas, or in other communities where cases have been reported within 14 days prior to the onset of the disease;

1.1.2 In contact with novel coronavirus infected people (with positive results for the nucleic acid test) within 14 days prior to the onset of the disease;

1.1.3 In contact with patients who have fever or respiratory symptoms from Wuhan and its surrounding area, or from communities where confirmed cases have been reported within 14 days before the onset of the disease; or

1.1.4 Clustered cases (2 or more cases with fever and/or respiratory symptoms in a small area such families, offices, schools etc within 2 weeks).

#### 1.2 Clinical manifestations

1.2.1 Fever and/or respiratory symptoms;

1.2.2 The aforementioned imaging characteristics of COVID-19;

1.2.3 Normal or decreased WBC count, normal or decreased lymphocyte count in the early stage of onset.

A suspect case has any of the epidemiological history plus any two clinical manifestations or all three clinical manifestations if there is no clear epidemiological history.

### **2. Confirmed cases**

Suspect cases with one of the following etiological or serological evidences:

2.1 Real-time fluorescent RT-PCR indicates positive for new coronavirus nucleic acid;

2.2 Viral gene sequence is highly homologous to known new coronaviruses.

2.3 COVID-19 virus specific Ig M and IgG are detectable in serum; COVID-19 virus

specific IgG is detectable or reaches a titration of at least 4-fold increase during convalescence compared with the acute phase.

## **VI. Clinical Classification**

### **1. Mild cases**

The clinical symptoms were mild, and there was no sign of pneumonia on imaging.

### **2. Moderate cases**

Showing fever and respiratory symptoms with radiological findings of pneumonia.

### **3. Severe cases**

Adult cases meeting any of the following criteria:

(1) Respiratory distress ( $\geq 30$  breaths/ min);

(2) Oxygen saturation  $\leq 93\%$  at rest;

(3) Arterial partial pressure of oxygen ( $\text{PaO}_2$ )/ fraction of inspired oxygen ( $\text{FiO}_2$ )  $\leq 300\text{mmHg}$  ( $1\text{ mmHg}=0.133\text{kPa}$ ).

In high-altitude areas (at an altitude of over 1,000 meters above the sea level),  $\text{PaO}_2$ /  $\text{FiO}_2$  shall be corrected by the following formula:

$\text{PaO}_2$ /  $\text{FiO}_2 \times [\text{Atmospheric pressure (mmHg)}/760]$

Cases with chest imaging that shows obvious lesion progression within 24-48 hours  $>50\%$  shall be managed as severe cases.

Child cases meeting any of the following criteria:

(1) Tachypnea ( $\text{RR} \geq 60$  breaths/min for infants aged below 2 months;  $\text{RR} \geq 50$  BPM for infants aged 2-12 months;  $\text{RR} \geq 40$  BPM for children aged 1-5 years, and  $\text{RR} \geq 30$  BPM for children above 5 years old) independent of fever and crying;

(2) Oxygen saturation  $\leq 92\%$  on finger pulse oximeter taken at rest;

(3) Labored breathing (moaning, nasal fluttering, and infrasternal, supraclavicular and intercostal retraction), cyanosis, and intermittent apnea;

(4) Lethargy and convulsion;

(5) Difficulty feeding and signs of dehydration.

### **4. Critical cases**

Cases meeting any of the following criteria:

4.1 Respiratory failure and requiring mechanical ventilation;

4.2 Shock;

4.3 With other organ failure that requires ICU care.

## **VII. Clinical Early Warning Indicators of Severe and Critical Cases**

1. Adults.

1.1 The peripheral blood lymphocytes decrease progressively;

1.2 Peripheral blood inflammatory factors, such as IL-6 and C-reactive proteins, increase progressively;

1.3 Lactate increases progressively;

1.4 Lung lesions develop rapidly in a short period of time.

2. Children.

2.1 Respiratory rate increased;

2.2 Poor mental reaction and drowsiness;

2.3 Lactate increases progressively;

2.4 Imaging shows infiltration on both sides or multiple lobes, pleural effusion or rapid progress of lesions in a short period of time;

2.5 Infants under the age of 3 months who have either underlying diseases (congenital heart disease, bronchopulmonary dysplasia, respiratory tract deformity, abnormal hemoglobin, and severe malnutrition, etc.) or immune deficiency or hypofunction (long-term use of immunosuppressants).

## **VIII. Differential Diagnosis**

1. The mild manifestations of COVID-19 need to be distinguished from those of upper respiratory tract infections caused by other viruses.

2. COVID-19 is mainly distinguished from other known viral pneumonia and mycoplasma pneumoniae infections such as influenza virus, adenovirus and respiratory syncytial virus. For suspect cases, efforts should be made to use methods such as rapid antigen detection and multiplex PCR nucleic acid testing for detection of common respiratory pathogens.

3. COVID-19 should also be distinguished from non-infectious diseases such as vasculitis, dermatomyositis and organizing pneumonia.

## **IX. Case Finding and Reporting**

Health professionals in medical institutions of all types and at all levels, upon discovering

suspect cases that meet the definition, should immediately keep them in single room for isolation and treatment. If the cases are still considered as suspected after consultation made by hospital experts or attending physicians, it should be reported directly online within 2 hours; samples should be collected for new coronavirus nucleic acid testing and suspect cases should be safely transferred to the designated hospitals immediately. People who have been in close contact with confirmed patients are advised to perform new coronavirus pathogenic testing in a timely manner, even though common respiratory pathogens are tested positive.

If two nucleic acid tests, taken at least 24-hour apart, of an COVID-19 suspect case are negative, and the COVID-19 virus specific IgM and IgG are negative after 7 days from onset, the suspect diagnosis can be ruled out.

## **X. Treatment**

1. Treatment venue determined by the severity of the disease

1.1 Suspected and confirmed cases should be isolated and treated at designated hospitals with effective isolation, protection and prevention conditions in place. A suspect case should be treated in isolation in a single room. Confirmed cases can be treated in the same room.

1.2 Critical cases should be admitted to ICU as soon as possible.

2. General treatment

2.1 Letting patients rest in bed and strengthening support therapy; ensuring sufficient caloric intake for patients; monitoring their water and electrolyte balance to maintain internal environment stability; closely monitoring vital signs and oxygen saturation.

2.2 According to patients' conditions, monitoring blood routine result, urine routine result, c-reactive protein (CRP), biochemical indicators (liver enzyme, myocardial enzyme, renal function etc.), coagulation function, arterial blood gas analysis, chest imaging and cytokines detection if necessary.

2.3 Timely providing effective oxygen therapy, including nasal catheter and mask oxygenation and nasal high-flow oxygen therapy. If possible, inhalation of mixed hydrogen and oxygen (H<sub>2</sub>/O<sub>2</sub>: 66.6%/33.3%) can be applied.

2.4 Antiviral therapy: Hospitals can try Alpha-interferon (5 million U or equivalent dose each time for adults, adding 2ml of sterilized water, atomization inhalation twice daily), lopinavir/ritonavir (200 mg/50mg per pill for adults, two pills each time, twice daily, no

longer than 10 days), Ribavirin (suggested to be used jointly with interferon or lopinavir/ritonavir, 500 mg each time for adults, twice or three times of intravenous injection daily, no longer than 10 days), chloroquine phosphate (500 mg bid for 7 days for adults aged 18-65 with body weight over 50 kg; 500 mg bid for Days 1&2 and 500 mg qd for Days 3-7 for adults with body weight below 50 kg), Arbidol (200 mg tid for adults, no longer than 10 days). Be aware of the adverse reactions, contraindications (for example, chloroquine cannot be used for patients with heart diseases) and interactions of the above-mentioned drugs. Further evaluate the efficacy of those drugs currently being used. Using three or more antiviral drugs at the same time is not recommend; if an intolerable toxic side effect occurs, the respective drug should be discontinued. For the treatment of pregnant women, issues such as the number of gestational weeks, choice of drugs having the least impact on the fetus, as well as whether pregnancy being terminated before treatment should be considered with patients being informed of these considerations.

2.5 Antibiotic drug treatment: Blind or inappropriate use of antibiotic drugs should be avoided, especially in combination with broad-spectrum antibiotics.

### 3. Treatment of severe and critical cases

3.1 Treatment principle: On the basis of symptomatic treatment, complications should be proactively prevented, underlying diseases should be treated, secondary infections also be prevented, and organ function support should be provided timely.

#### 3.2 Respiratory support:

3.2.1 Oxygen therapy: Patients with severe symptoms should receive nasal cannulas or masks for oxygen inhalation and timely assessment of respiratory distress and/or hypoxemia should be performed.

3.2.2 High-flow nasal-catheter oxygenation or noninvasive mechanical ventilation: When respiratory distress and/or hypoxemia of the patient cannot be alleviated after receiving standard oxygen therapy, high-flow nasal cannula oxygen therapy or non-invasive ventilation can be considered. If conditions do not improve or even get worse within a short time (1-2 hours), tracheal intubation and invasive mechanical ventilation should be used in a timely manner.

3.2.3 Invasive mechanical ventilation: Lung protective ventilation strategy, namely low tidal volume (6-8ml/kg of ideal body weight) and low level of airway platform pressure

(<30cmH<sub>2</sub>O) should be used to perform mechanical ventilation to reduce ventilator-related lung injury. While the airway platform pressure maintained  $\leq$  30cmH<sub>2</sub>O, high PEEP can be used to keep the airway warm and moist; avoid long sedation and wake the patient early for lung rehabilitation. There are many cases of human-machine asynchronization, therefore sedation and muscle relaxants should be used in a timely manner. Use closed sputum suction according to the airway secretion, if necessary, administer appropriate treatment based on bronchoscopy findings.

3.2.4 Rescue therapy: Pulmonary re-tensioning is recommended for patients with severe ARDS. With sufficient human resources, prone position ventilation should be performed for more than 12 hours per day. If the outcome of prone position ventilation is poor, extracorporeal membrane oxygenation (ECMO) should be considered as soon as possible. Indications include: ①When FiO<sub>2</sub>>90%, the oxygenation index is less than 80mmHg for more than 3-4 hours; ②For patients with only respiratory failure when the airway platform pressure  $\geq$  35cmH<sub>2</sub>O, VV-ECMO mode is preferred; if circulatory support is needed, VA-ECMO mode should be used. When underlying diseases are under control and the cardiopulmonary function shows signs of recovery, withdrawal of ECMO can be tried.

3.3 Circulatory support: On the basis of adequate fluid resuscitation, efforts should be made to improve microcirculation, use vasoactive drugs, closely monitor changes in blood pressure, heart rate and urine volume as well as lactate and base excess in arterial blood gas analysis. If necessary, use non-invasive or invasive hemodynamic monitor such as Doppler ultrasound, echocardiography, invasive blood pressure or continuous cardiac output (PiCCO) monitoring. In the process of treatment, pay attention to the liquid balance strategy to avoid excessive or insufficient fluid intake.

If the heart rate suddenly increases more than 20% of the basic value or the decrease of blood pressure is more than 20% of the basic value with manifestations of poor skin perfusion and decreased urine volume, make sure to closely observe whether the patient has septic shock, gastrointestinal hemorrhage or heart failure.

3.4 Renal failure and renal replacement therapy: Active efforts should be made to look for causes for renal function damage in critical cases such as low perfusion and drugs. For the treatment of patients with renal failure, focus should be on the balance of body

fluid, acid and base and electrolyte balance, as well as on nutrition support including nitrogen balance and the supplementation of energies and trace elements. For critical cases, continuous renal replacement therapy (CRRT) can be used. The indications include: ① hyperkalemia; ② acidosis; ③ pulmonary edema or water overload; ④ fluid management in multiple organ dysfunction.

3.5 Convalescent plasma treatment: It is suitable for patients with rapid disease progression, severe and critically ill patients. Usage and dosage should refer to *Protocol of Clinical Treatment with Convalescent Plasma for COVID-19 Patients (2<sup>nd</sup> trial version)*.

3.6 Blood purification treatment: Blood purification system including plasma exchange, absorption, perfusion and blood/plasma filtration can remove inflammatory factors and block "cytokine storm", so as to reduce the damage of inflammatory reactions to the body. It can be used for the treatment of severe and critical cases in the early and middle stages of cytokine storm.

3.7 Immunotherapy: For patients with extensive lung lesions and severe cases who also show an increased level of IL-6 in laboratory testing, Tocilizumab can be used for treatment. The initial dose is 4-8mg/kg with the recommended dose of 400mg diluted with 0.9% normal saline to 100ml. The infusion time should be more than 1 hour. If the initial medication is not effective, one extra administration can be given after 12 hours (same dose as before). No more than two administrations should be given with the maximum single dose no more than 800mg. Watch out for allergic reactions. Administration is forbidden for people with active infections such as tuberculosis.

### 3.8 Other therapeutic measures

For patients with progressive deterioration of oxygenation indicators, rapid progress in imaging and excessive activation of the body's inflammatory response, glucocorticoids can be used in a short period of time (three to five days). It is recommended that dose should not exceed the equivalent of methylprednisolone 1-2 mg/kg/day. Note that a larger dose of glucocorticoid will delay the removal of coronavirus due to immunosuppressive effects. Xuebijing 100ml/time can be administered intravenously twice a day. Intestinal microecological regulators can be used to maintain intestinal microecological balance and

prevent secondary bacterial infections.

Child severe and critical cases can be given intravenous infusion of  $\gamma$ -globulin.

For pregnant severe and critical cases, pregnancy should be terminated preferably with c-section.

Patients often suffer from anxiety and fear and they should be supported by psychological counseling.

#### 4. Traditional Chinese medicine treatment

This disease belongs to plague in traditional Chinese medicine (TCM), caused by the epidemic pathogenic factors. According to the different local climate characteristic and individual state of illness and physical conditions, the following treatment Protocol may vary. The use of over-pharmacopoeia doses should be directed by a physician.

##### 4.1 During medical observation

Clinical manifestation 1: fatigue and gastrointestinal discomfort

Recommended Chinese patent medicine: Huoxiang Zhengqi capsules (pills, liquid, or oral solution)

Clinical manifestation 2: fatigue and fever

Recommended Chinese patent medicines: Jinhua Qinggan granules, Lianhua Qingwen capsules (granules), Shufeng Jiedu capsules (granules)

##### 4.2 During clinical treatment (confirmed cases)

###### 4.2.1 Qingfei Paidu decoction

Scope of application: It is suitable for light, moderate and severe patients, and can be used reasonably in combination with the actual situation of patients in the treatment of critically ill patients.

Recommended prescription: Ma Huang (Ephedrae Herba) 9g, Zhi Gan Cao (Glycyrrhizae Radix) 6g, Xing Ren (Armeniacae Semen) 9g, Sheng Shi Gao (Gypsum fibrosum) (decocted first) 15-30g, Gui Zhi (Cinnamomi Ramulus) 9g, Ze Xie (Alismatis Rhizoma) 9g, Zhu Ling (Polyporus) 9g, Bai Zhu (Atractylodis macrocephalae Rhizoma) 9g, Fu Ling (Poria) 15g, Chai Hu (Bupleuri Radix) 16g, Huang Qin (Scutellariae Radix) 6g, Jiang Ban Xia (Pinellinae Rhizoma Praeparatum) 9g, Sheng Jiang (Zingiberis Rhizoma recens) 9g, Zi Wan (Asteris Radix) 9g, Kuan Dong Hua (Farfarae Flos) 9g, She Gan (Belamcandae Rhizoma) 9g, Xi Xin (Asari Radix et Rhizoma) 6g, Shan Yao (Dioscoreae Rhizoma) 12g, Zhi Shi (Aurantii Fructus immaturus) 6g, Chen Pi (Citri reticulatae

Pericarpium) 6g, Huo Xiang (Pogostemonis Herba) 9g.

Suggested use: Traditional Chinese medicine decoction pieces for decocting in water.

One dose daily with half of the dose taken in the morning and half in the evening (forty minutes after meal) with warm water. Three days make a course of treatment.

If conditions permit, the patient can take half a bowl of rice soup each time after taking the medicine, and can take up to one bowl if the patient has a dry tongue and is deficient in bodily fluids. (Note: If the patient does not have a fever, the amount of gypsum should be little. If having a fever or high fever, the amount of gypsum can be increased). If the symptoms improve but do not fully recover, then take the second course of treatment. If the patient has special conditions or other underlying diseases, the prescription of the second course of treatment can be modified based on the actual situation and the medicine should be discontinued when the symptoms disappear.

Source of prescription: *Notice on Recommending the Use of 'Qingfei Paidu decoction' in Treatment of COVID-19 by Integrated Traditional Chinese and Western Medicine* by the Office of the National Administration of Traditional Chinese Medicine & the General Office of the National Health Commission. (2022 No.22)

#### 4.2.2 Mild cases

##### 4.2.2.1 Cold dampness and stagnation lung syndrome

Clinical manifestations: fever, fatigue, sore body, cough, expectoration, chest tightness, suffocation, loss of appetite, nausea, vomiting, sticky stools. Tongue has thin fat tooth mark or is light red, and the coating is white thick rot or white greasy and the pulse is soggy or slippery.

Recommended prescription: Sheng Ma Huang (Ephedrae Herba) 6g, Sheng Shi Gao (Gypsum fibrosum) 15g, Xing Ren (Armeniaca Semen) 9g, Qiang Huo (Notopterygii Rhizoma seu Radix) 15g, Ting Li Zi (Lepidii/Descurainiae Semen) 15g, Guan Zhong (Cyrtomii Rhizoma) 9g, Di Long (Pheretima) 15g, Xu Chang Qing (Cynanchi paniculati Radix) 15g, Huo Xiang (Pogostemonis Herba) 15g, Pei Lan (Eupatorii Herba) 9g, Cang Zhu (Atractylodis Rhizoma) 15g, Yun Ling (Poria) 45g, Sheng Bai Zhu (Atractylodis macrocephalae Rhizoma) 30g, Jiao San Xian (Jiao Shan Zha (Crataegi Fructus), Jiao Shen Qu (Massa medicata fermentata), and Jiao Mai Ya (Hordei Fructus germinatus)) 9g each, Hou Po (Magnoliae officinalis Cortex) 15g, Jiao Bing Lang (Arecae Semen) 9g, Wei Cao Guo (Tsaoko Fructus) 9g, Sheng Jiang (Zingiberis Rhizoma recens) 15g.

Suggested use: One dose daily, boiled with 600ml water, taking 1/3 of the dose in the

morning, at noon and in the evening respectively before meal.

#### 4.2.2.2 Dampness and heat-accumulation lung syndrome

Clinical manifestations: low or no fever, slight chills, fatigue, heavy head and body, muscle soreness, dry cough, sore throat, dry mouth without desire of drinking much water, or accompanied by chest tightness, no sweat or sweating, or vomiting and loss of appetite, diarrhea or sticky stool. The tongue is reddish, and the coating is white, thick and greasy or thin yellow, and the pulse is slippery or soggy.

Recommended prescription: Bing Lang (*Arecae Semen*) 10g, Cao Guo (*Tsaoko Fructus*) 10g, Hou Po (*Magnoliae officinalis Cortex*) 10g, Zhi Mu (*Anemarrhenae Rhizoma*) 10g, Huang Qin (*Scutellariae Radix*) 10g, Chai Hu (*Bupleuri Radix*) 10g, Chi Shao (*Paeoniae Radix rubra*) 10g, Lian Qiao (*Forsythiae Fructus*) 15g, Qing Hao (*Artemisiae annuae Herba*) (added later) 10g, Cang Zhu (*Atractylodis Rhizoma*) 10g, Da Qing Ye (*Isatidis Folium*) 10g, Sheng Gan Cao (*Glycyrrhizae Radix*) 5g.

Suggested use: One dose daily, boiled with 400ml water, taking half of the dose in the morning and the other half in the evening.

#### 4.2.3 Moderate cases

##### 4.2.3.1 Dampness and stagnation lung syndrome

Clinical manifestations: fever, cough and scanty sputum, or yellow sputum, suffocation, shortness of breath, bloating, and constipation. The tongue is dark red and fat; the coating is greasy or yellow and the pulse is slippery or stringy.

Recommended prescription: Sheng Ma Huang (*Ephedrae Herba*) 6g, Ku Xing Ren (*Armeniaca Semen*) 15g, Sheng Shi Gao (*Gypsum fibrosum*) 30g, Sheng Yi Yi Ren (*Coicis Semen*) 30g, Mao Cang Zhu (*Atractylodis Rhizoma*) 10g, Guang Huo Xiang (*Pogostemonis Herba*) 15g, Qing Hao Cao (*Artemisiae annuae Herba*) 12g, Hu Zhang (*Polygoni cuspidati Rhizoma*) 20g, Ma Bian Cao (*Verbenae Herba*) 30g, Gan Lu Gen (*Phragmitis Rhizoma*) 30g, Ting Li Zi (*Lepidii/Descurainiae Semen*) 15g, Hua Ju Hong (*Citri grandis Exocarpium rubrum*) 15g, Sheng Gan Cao (*Glycyrrhizae Radix*) 10g.

Suggested use: One dose daily, boiled with 400ml water, taking half of the dose in the morning and the other half in the evening.

##### 4.2.3.2 Cold dampness lung syndrome

Clinical manifestations: low fever, submerged fever or absence of fever, dry cough,

scanty sputum, fatigue, chest tightness, stuffy and full sensation in the stomach, or nausea. The tongue is pale or red, and the coating is white or greasy, and the pulse is soggy.

Recommended prescription: Cang Zhu (*Atractylodis Rhizoma*) 15g, Chen Pi (*Citri reticulatae Pericarpium*) 10g, Hou Po (*Magnoliae officinalis Cortex*) 10g, Huo Xiang (*Pogostemonis Herba*) 10g, Cao Guo (*Tsaoko Fructus*) 6g, Sheng Ma Huang (*Ephedrae Herba*) 6g, Qiang Huo (*Notopterygii Rhizoma seu Radix*) 10g, Sheng Jiang (*Zingiberis Rhizoma recens*) 10g, Bing Lang (*Arecae Semen*) 10g.

Suggested use: one dose daily, boiled with 400ml water, taking half of the dose in the morning and the other half in the evening.

#### 4.2.4 Severe cases

##### 4.2.4.1 Plague poison and lung-closing syndrome

Clinical manifestations: fever, flushing, cough, yellowish phlegm, or blood in sputum, wheezing, shortness of breath, tiredness, fatigue, dryness, bitterness and stickiness in the mouth, nausea, loss of appetite, poor stool, and short urination. The tongue is red; the coating is yellow greasy and the pulse is slippery.

Recommended prescription: Sheng Ma Huang (*Ephedrae Herba*) 6g, Xing Ren (*Armeniacae Semen*) 9g, Sheng Shi Gao (*Gypsum fibrosum*) 15g, Gan Cao (*Glycyrrhizae Radix*) 3g, Huo Xiang (*Pogostemonis Herba*) (added later) 10g, Hou Po (*Magnoliae officinalis Cortex*) 10g, Cang Zhu (*Atractylodis Rhizoma*) 15g, Cao Guo (*Tsaoko Fructus*) 10g, Fa Ban Xia (*Pinellinae Rhizoma Praeparatum*) 9g, Fu Ling (*Poria*) 15g, Sheng Da Huang (*Rhei Radix et Rhizoma*) (added later) 5g, Sheng Huang Qi (*Astragali Radix*) 10g, Ting Li Zi (*Lepidii/Descurainiae Semen*) 10g, Chi Shao (*Paeoniae Radix rubra*) 10g.

Suggested use: one or two doses daily, boiled with 100-200ml water, finish the dose(s) in 2-4 times across the day, oral or nasal feeding.

##### 4.2.4.2 Blazing of both qi and *ying* syndrome

Clinical manifestations: Hot fever, thirst, shortness of breath, delirium and unconsciousness, blurred vision, or spotted rash, or hematemesis, epistaxis, or convulsions in the limbs. The tongue is crimson with little or no coating. The pulse is deep, fine and rapid, or floating, large and rapid.

Recommended prescription: Sheng Shi Gao (*Gypsum fibrosum*) (decocted first) 30-60g, Zhi Mu (*Anemarrhenae Rhizoma*) 30g, Sheng Di (*Rehmanniae Radix*) 30-60g, Shui Niu

Jiao (Bubali Cornu) (decocted first) 30g, Chi Shao (Paeoniae Radix rubra) 30g, Xuan Shen (Scrophulariae Radix) 30g, Lian Qiao (Forsythiae Fructus) 15g, Dan Pi (Moutan Cortex) 15g, Huang Lian (Coptidis Rhizoma) 6g, Zhu Ye (Phyllostachys nigrae Folium) 12g, Ting Li Zi (Lepidii/Descurainiae Semen) 15g, Sheng Gan Cao (Glycyrrhizae Radix) 6g.

Suggested use: 1 dose per day, decoction, first decoct Sheng Gan Cao (Glycyrrhizae Radix) and Shui Niu Jiao (Bubali Cornu), then apply other pieces, boiled with 100-200ml water, finish the dose(s) in 2-4 times across the day, orally or nasally.

Recommended Chinese patent medicines: Xiyanping injection, Xuebijing injection, Reduning injection, Tanreqing injection, Xingnaojing injection. Drugs with similar efficacy can be selected according to individual conditions, or can be used in combination according to clinical symptoms. Traditional Chinese medicine injection can be used in combination with TCM decoction.

#### 4.2.5 Critical cases (Internal blockage and external desertion syndrome)

Clinical manifestations: dyspnea, asthma or mechanical ventilation needed, fainting, irritability, sweating, cold limbs, dark purple tongue, thick greasy or dry coating, and large floating pulse without root.

Recommended prescription: Ren Shen (Ginseng Radix) 15g, Hei Shun Pian (Aconiti Radix lateralis praeparata) (decocted first) 10g, Shan Zhu Yu (Corni Fructus) 15g, delivered with Suhexiang Pill or Angong Niu Huang Pill.

For patients on mechanical ventilation with abdominal distention or constipation: 5-10g of Sheng Da Huang (Rhei Radix et Rhizoma). For patients with human-machine asynchronization: 5-10g of Sheng Da Huang (Rhei Radix et Rhizoma) and 5-10g of Mang Xiao (Natrii Sulfas) while administering sedatives and muscle relaxants.

Recommended Chinese patent medicines: Xuebijing injection, Reduning injection, Tanreqing injection, Xingnaojing injection, Shenfu injection, Shengmai injection, Shenmai injection. Drugs with similar efficacy can be selected according to individual conditions, or can be used in combination according to clinical symptoms. Traditional Chinese medicine injection can be used in combination with TCM decoction.

#### **Note: Recommended usage of TCM injections for severe and critical cases**

The use of TCM injections follows the principle of starting from a small dose and gradually adjusting the dosage according to the instructions of the drug. The

recommended usage is as follows:

Viral infection or combined mild bacterial infection: 0.9% sodium chloride injection 250ml plus Xiyanping injection 100mg bid, or 0.9% sodium chloride injection 250ml Reduning injection 20ml, or 0.9% sodium chloride injection 250ml plus Tanreqing injection 40ml bid.

High fever with disturbance of consciousness: 250ml of 0.9% sodium chloride injection and 20ml bid of Xingnaojing injection.

Systemic inflammatory response syndrome or/and multiple organ failure: 250ml of 0.9% sodium chloride injection and 100ml of Xuebijing injection.

Immunosuppression: 250ml of glucose injection with 100ml of Shenmai injection or 20-60ml of Shengmai injection, bid.

#### 4.2.6 Convalescent period

##### 4.2.6.1 Lung and spleen qi deficiency syndrome

Clinical manifestations: shortness of breath, fatigue, anorexia, nausea, fullness, loose stool, and uneasiness. The tongue is pale and greasy.

Recommended prescription: Fa Ban Xia (Pinellinae Rhizoma Praeparatum) 9g, Chen Pi (Citri reticulatae Pericarpium) 10g, Dang Shen (Codonopsis Radix) 15g, Zhi Huang Qi (Astragali Radix) 30g, Chao Bai Zhu (Atractylodis macrocephalae Rhizoma) 10g, Fu Ling (Poria) 15g, Huo Xiang (Pogostemonis Herba) 10g, Sha Ren (AmomiFructus) (added later) 6g, Gan Cao (Glycyrrhizae Radix) 6g.

Suggested use: One dose per day, boiled with 400ml of water, taking half of the dose in the morning and the other half in the evening.

##### 4.2.6.2 Deficiency of both qi and yin syndrome

Clinical manifestations: fatigue, shortness of breath, dry mouth, thirst, palpitations, sweating, poor appetite, low or no fever, dry cough, dry tongue, fine or weak pulse.

Recommended prescription: Nan Sha Shen (Adenophorae Radix) 10g, Bei Sha Shen (Glehniae Radix) 10g, Mai Dong (Ophiopogonis Radix) 15g, Xi Yang Shen (Panacis quinquefolii Radix) 6g, Wu Wei Zi (Schisandrae Fructus) 6g, Sheng Shi Gao (Gypsum fibrosum) 15g, Dan Zhu Ye (Lophatheri Herba) 10g, Sang Ye (Mori Folium) 10g, Lu Gen (Phragmitis Rhizoma) 15g, Dan Shen (Salviae miltiorrhizae Radix) 15g, Sheng Gan Cao (Glycyrrhizae Radix) 6g.

Suggested use: One dose per day, boiled with 400ml of water, taking half of the dose in

the morning and the other half in the evening.

## **XI. Discharge Criteria and After-discharge Considerations**

### 1. Discharge criteria

- 1) Body temperature is back to normal for more than three days;
- 2) Respiratory symptoms improve obviously;
- 3) Pulmonary imaging shows obvious absorption of inflammation,
- 4) Nuclei acid tests negative twice consecutively on respiratory tract samples such as sputum and nasopharyngeal swabs (sampling interval being at least 24 hours).

Those who meet the above criteria can be discharged.

### 2. After-discharge considerations

2.1 The designated hospitals should contact the primary healthcare facilities where the patients live and share patients' medical record, to send the information of the discharged patients to the community committee and primary healthcare facility where the patients reside.

2.2. After discharge, it is recommended for patients to monitor their own health status in isolation for 14 days, wear a mask, live in well-ventilated single room if possible, minimize close contact with family members, separate dining, practice hand hygiene and avoid going out.

2.3 It is recommended for the patients to return to the hospitals for follow-up and re-visit in two and four weeks after discharge.

## **XII. Patient Transportation Principles**

Patients should be transported in accordance with the *Work Protocol for Transfer of the Novel Coronavirus Pneumonia Patients (Trial Version)* issued by the National Health Commission.

## **XIII. Nosocomial Infection Prevention and Control**

Measures to prevent and control nosocomial infection should be implemented in accordance with the requirements of the *Technical Guidelines for the Prevention and Control of Infection by the Novel Coronavirus in Medical Institutions (First Edition)* and the *Guidelines on the Usage of Common Medical Protective Equipment against Novel Coronavirus Infection (Trial Version)* formulated by the National Health Commission.

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