



SCIREA Journal of Clinical Medicine

ISSN: 2706-8870

<http://www.scirea.org/journal/CM>

June 26, 2022

Volume 7, Issue 4, August 2022

<https://doi.org/10.54647/cm32834>

## COVID-19 Diseases, Clinical Manifestations and Treatment Guideline

Youngah Choi<sup>1</sup>, Eun-Hyang Song<sup>2</sup>, Bu-Yeon Kim<sup>3</sup>, Hyun-Joo Jin<sup>4</sup>, Shin-Ae Park<sup>5</sup>

<sup>1</sup> Department of Internal Medicine, Seoul Metropolitan Seobuk Hospital, Seoul, Korea

<sup>2</sup> Department of Neurology, Seoul Metropolitan Seobuk Hospital, Seoul, Korea

<sup>3</sup> Department of Thoracic Surgery, Seoul Metropolitan Seobuk Hospital, Seoul, Korea

<sup>4</sup> Department of Pediatrics, Seoul Metropolitan Seobuk Hospital, Seoul, Korea

<sup>5</sup> Department of Family Medicine, Seoul Metropolitan Seobuk Hospital, Seoul, Korea

**Email:** [Youngah12@seoul.go.kr](mailto:Youngah12@seoul.go.kr) (Youngah Choi), [eunhyangs@seoul.go.kr](mailto:eunhyangs@seoul.go.kr) (Eun-Hyang Song), [Yuri1209@seoul.go.kr](mailto:Yuri1209@seoul.go.kr) (Bu-Yeon Kim), [Sbhjin5763@seoul.go.kr](mailto:Sbhjin5763@seoul.go.kr) (Hyun-Joo Jin), [24773@seoul.go.kr](mailto:24773@seoul.go.kr) (Shin-Ae Park)

### Abstract

From March 2nd, 2020th, Seoul Metropolitan Seobuk hospital started as a hospital mainly for COVID-19 infections and has been continuously treating COVID-19 inpatients until now, May 8<sup>th</sup>, 2022th. From the beginning of February, 2020th, to May 8<sup>th</sup>, 2022th, the total cumulative number of confirmed COVID-19 cases in Korea was 17, 544,398, the death toll was 23,360, and the mortality rate is 0.13%. The Korean quarantine system hospitalizes COVID-19 patients in the early stages of the (COVID-19) disease. We believe that it is due to this system that Korea has been able to keep a considerably low death rate compared to many other countries. It is believed that the current quarantine system in Korea, which allows patients to be treated with

Veklury (antiviral agent IV infusion drug) in hospitals at the initial stage of diagnosis, or early oral Paxlovid (antiviral agent) administration at home treatment also lowered the death rate from COVID-19. Our study and data want to clarify the importance of early phase treatment of antiviral agents about COVID-19 regardless of underlying disease patterns and newly diagnosed COVID-19 related disease patterns and age differences. In this paper, with data on 3,827 patients hospitalized from March 2, 2020th to December 31, 2021th at Seoul Metropolitan Seobuk hospital, this paper analyzes the underlying disease patterns of patients and newly diagnosed disease patterns, by analyzing clinical features and medication history of the patients who were hospitalized with COVID-19 in this hospital. We want to clarify the importance of early treatment of antiviral agents about COVID-19 regardless of underlying disease patterns and age differences. The most important thing is that as early as possible Veklury (Remdesivir) should be administered in early period of COVID-19 disease. Until last year, our Veklury administration guideline was as soon as early administration when oxygen saturation drops under 94%. Nowadays, our Veklury administration guideline change to give Veklury administration or Paxlovid right after the diagnosis of COVID-19 disease. It is believed that the current quarantine system in Korea, which allows patients to be treated with Veklury in hospitals at the initial stage of diagnosis, or early oral Paxlovid administration possible at home treatment. Because all antiviral agents costs and hospital treatment costs are free charge to COVID-19 patients because it was covered by government. This Korean quarantine system also helpful to lower the death rate from COVID-19.

**Keywords :** The importance of early phase administration of Veklury or Paxlovid regardless of underlying patients' condition

## **1. Introduction**

Seoul Metropolitan Seobuk Hospital is a public hospital directly managed by Seoul Metropolitan Government, mainly continuously serving as a dedicated tuberculosis hospital and also providing generalized inpatient treatment and outpatient treatment mainly for elderly patients and vulnerable groups including the homeless and the disabled and especially for the chronic tuberculosis patients. It is a long time public hospital of Seoul City government providing primarily inpatient and outpatient treatment for the elderly and vulnerable people

groups, including the homeless and the disabled.

Seoul Metropolitan Seobuk Hospital is one of the first hospitals to become main hospital for COVID-19 among various national and public hospitals in Seoul from March 2020th as a public hospital in Seoul. From March 2020th to August 2020th, one or two wards were operated as COVID-19 patients, and from August 2020th to the present, 7-8 wards were generally operated by 12-14 specialists from each department (internal medicine, surgery, family medicine, neurology departments, thoracic surgery, pediatrics, etc.) continue to treat inpatients with COVID-19.

For COVID-19 patients' living treatment costs are fully covered by a governmental fund during the patients' stay at an infectious disease hospital or a life treatment center. In other countries, including the United States, most patients are usually only admitted to hospital and receive treatment when their disease reaches a more severe status, when they are in need of oxygen therapy or even a ventilator. In the Republic of Korea, however, the quarantine system operates in such a way that isolation and treatment begin at a life treatment center or a hospital dedicated to COVID-19 within 1-2 days after receiving a positive COVID-19 test result. From March 2nd, 2020th, this our hospital started as a hospital mainly for COVID-19 infections and has been continuously treating COVID-19 inpatients until now, May 8<sup>th</sup>, 2022th.

In early period of 2021th, April in 2021th, in Korea, COVID-19 vaccine was given priority to the elderly (including in nursing homes) and to the vulnerable groups (including nursing homes for the homeless and the disabled), as well as to hospital and other government quarantine facilities staff members. Currently, 80% of the population has completed the second round, and now the focus is on receiving the third vaccine, and the low vaccination rate among adolescents and teen agers can be seen as the reason for the recent surge in COVID-19 patients.

At September 6, 2021th, the total cumulative number of COVID-19 patients in the Republic of Korea is 263,374 and the death toll stands at 2,330. Since September 2021th, those who have two time completed vaccines started being hospitalized as confirmed cases of COVID-19, and as of December 2021th, two time vaccinated COVID-19 patients numbers were nearly 50% of all hospitalized patients, so the government is rapidly implementing a third vaccine (boosting shot). At that time, the mortality rate is 0.88% in the Republic of Korea.

All COVID -19 related hospitals have been continuing to treat many COVID-19 patients during last 2years in Korea. At December 2021th in Korea, as the number of COVID -19 patients surged to more than 5,000 every day in Korea, hospital beds for severe Delta COVID-19 patients became full and then hospitals cannot receive more COVID-19 patients. And then home self quarantine treatment started and increased.

And from January 2022th, omicron COVID-19 infection started in Korea, from that time self home quarantine system more and more increased. And then oral anti-viral agent (Paxlovid) using was started and increased.

Omicron COVID-19 usually induced bronchitis and pleuritis, usually this virus itself didn't induced lung parenchyme inflammation (pneumonia). But other symptoms and inflammation of all other system are similar with Delta COVID-19. And also other superinfected bacterial pneumonia were also usually combined for especially old aged underlying diseased patients. Generally disease severity were decreased and disease infectivity were more increased. Because Omicron COVID-19 usually had severe inflammation at upper respiratory system, and then these could induce upper airway restriction and asthmatic attack.

From the beginning of February 2020th, to May 8<sup>th</sup>, 2022th, during more than 2years , the total cumulative number of confirmed COVID-19 cases in Korea was 17, 544,398 , the death toll was 23,360, and the mortality rate was 0.13%. The mortality rate in the United States and Europe is 1.2-2.3%, and the global fatality rate is estimated to be 1.97%.

And today May 8<sup>th</sup>, 2022th, in Korea 1<sup>st</sup> vaccination rate 87.76 % and 2<sup>nd</sup> vaccination rate 86.82% and 3<sup>rd</sup> vaccination rate is 64.65% .

## **2. Materials and Methods**

In this paper, we made database with 3,827 patients ' charts who were hospitalized from March 2, 2020th to December 31, 2021th at Seoul Metropolitan Seobuk hospital. At December, 2021th, South Korea has recorded about 7,000 daily confirmed cases, and the number of confirmed cases in the Seoul and Gyeonggi-do region accounts for about 64% of country's total cases. At that time 27 hospitals are in operation in Seoul, with 7 public hospitals in Seoul and 20 hospitals as private and national hospitals dedicated to COVID-19 treatment.

According to the data of December 2nd 2021th , 1.813 people are being hospitalized in 27

hospitals, and 3,578 people are quarantined at 15 community life treatment centers under city government and 20 community life treatment centers under the district. Home treatment, which is assigned through the consultation of epidemiological investigators and quarantined as a COVID-19 patient at one's own home according to one's own wishes, has increased significantly in these days because lack of hospital capacity.

Usually patients under the age of 60 have also been transferred to community life treatment centers, if anyone who is in under life treatment centers or home treatment status, oxygen saturation has dropped and problems occurs, they could be transferred to COVID-19 dedicated hospitals via emergency call and 119.

As soon as COVID-19 patients were diagnosed through COVID-19 test, they were given inpatient treatment at an infectious disease hospital or quarantine treatment at community life treatment centers. All treatment costs at quarantined living expenses or infectious disease hospitals are fully supplied by the government while the COVID-19 test is positive, and COVID-19 patients could be hospitalized with free of charge.

In the case of other countries, including the United States, most of them receive hospital treatment only when the disease called COVID-19 has become more severe and treatment needed such as oxygen therapy or ventilator. However, in Korea, the quarantine system in Korea has been and is still operating in such a way that isolation and treatment begin within 1-2 days after positive COVID test, if possible, at a community life treatment center or a hospital dedicated to COVID-19, from the moment the COVID-19 test is positive.

And from January 2022th, omicron COVID-19 infection started in Korea, from that time self home quarantine system more and more increased. Because Omicron COVID-19 usually induced bronchitis and pleuritis, usually this virus itself didn't induced lung parenchyme inflammation (pneumonia). But other symptoms and inflammation of all other system are similar with Delta COVID-19. And also other superinfected bacterial pneumonia were also usually combined for especially old aged underlying diseased patients. Omicron COVID-19 could have decreased disease severity and increased disease infectivity. Because Omicron COVID -19 usually had severe inflammation at upper respiratory system, and then, sometimes these could induce upper airway restriction and asthmatic attack and have highly increased infectivity.

In this paper, with data on 3,827 patients hospitalized from March 2, 2020th to December 31,

2021th at Seoul Metropolitan Seobuk hospital, this paper analyzes the disease patterns of patients, by analyzing clinical features and medication history of the patients and the existing diseases of the COVID-19 patients who were hospitalized in the hospital. And by reviewing of clinical medical charts about 3,827 hospitalized patients, we can find out newly occurred clinical symptoms and disease patterns of COVID-19 patients. These COVID-19 patients are from Alpha, Beta, Gamma, Delta COVID-19 patients database except Omicron COVID-19. Because in Korea, omicron COVID-19 started after 2022th, these database could not contain Omicron COVID-19 patients. We made tables about patients status by age and gender status and nationality and underlying diseases and newly diagnosed diseases.

In fact, in general, it is expected that the course and clinical manifestations of the COVID-19 disease will be different with age or underlying chronic disease, but this was not necessarily the case. Although the young patients had no pre-existing disease and were very young and healthy, if there disease could be severely changed, the course of the disease called COVID-19 progressed very quickly, rapidly and severely. In the case of elderly patients with many chronic diseases, there were many cases where they overcame the disease called COVID-19 without any major problems. In this paper, with patients charts of 3.827 patients who received inpatients treatment from March 2, 2020<sup>th</sup> to December 31, 2021<sup>th</sup> as a hospital mainly for COVID-19 infectious disease, analyzes the disease patterns of patients, by analyzing clinical features and medication history of the patients and the existing diseases of the COVID-19 patients who were hospitalized in the hospital. By summarizing the treatments and treatment results, including medications, we would like to share and suggest ways to understand and cope with the disease called COVID-19.

### **3. Results**

In this paper, we analyzed the patients charts of 3.827 patients who received inpatients treatment from March 2, 2020<sup>th</sup> to December 31<sup>th</sup>, 2021<sup>th</sup> as a hospital mainly for COVID-19 infectious disease.

#### **1) First part results**

Patient status by age Table 1, gender status Table 2, and patient status according to patient's nationality Table 3 are explained.

**Table 1.** Status of inpatients by age from March 2, 2020 to December 31, 2021.

<b>Age division</b>	<b>Number of patients</b>
1-10yrs	199
11-20yrs	200
21-30yrs	327
31-40yrs	456
41-50yrs	436
51-60yrs	614
61-70yrs	945
71-80yrs	504
81-90yrs	126
Sum	3,827

**Table 2.** Status of inpatients by gender from March 2, 2020 to December 31, 2021..

<b>Gender</b>	<b>Number of patients</b>
Male	1,944
Female	1,883
Sum	3,827

**Table 3.** Status of inpatients by nationality from March 2, 2020 to December 31, 2021..

<b>Nation</b>	<b>Number of patients</b>
South Korea	3,687
China	90
USA	11
Russia	6
Vietnam	5
England	4

Kazakhstan	4
Nepal	3
Mongolia	2
Thailand	2
Uzbekistan	2
Bangladesh	1
China (Korean)	1
Pakistan	1
India	1
Australia	1
Saudi Arabia	1
Senegal	1
Ethiopia	1
United Arab Emirates	1
Iraq	1
Overseas Korean	1
Sum	3,827

2) Second part of results, from Table 4 to Table 11, the tables are classified by disease institution with patients' underlying diseases or newly diagnosed diseases.

**Table 4.** Cardiovascular comorbidities.

<b>Underlying or newly diagnosed disease</b>	<b>Numbers of patients</b>
Hypertension and hypertensive heart disease	1109
Hyperlipidemia	693
Coronary artery disease and complications (angina, myocardial infarction, etc.)	141
Unspecified arrhythmias (atrial fibrillation, tachycardia, bradycardia, atrioventricular block, etc.)	97



<b>Underlying or newly diagnosed disease</b>	<b>Numbers of patients</b>
Deep vein thrombosis	63
Artificial valve and coronary artery, presence of aortic implant, aortic aneurysm, etc.	27
Other heart failure (pulmonary edema, pericardial effusion)	18

**Table 5.** Respiratory comorbidities.

<b>underlying or newly diagnosed diseases</b>	<b>Number of patients</b>
Asthma, unspecified	79
Respiratory infection sequelae and tuberculosis sequelae	59
Chronic obstructive pulmonary disease and emphysema bronchitis	45
Atelectasis	28
Pulmonary nodule, pulmonary embolism	17
bronchiectasis with bronchiectasis, bronchial stenosis	12
Interstitial lung disease	8

**Table 6.** Endocrine comorbidities.

<b>underlying or newly diagnosed diseases</b>	<b>Number of patients</b>
Diabetes mellitus with unspecified complications	611
Thyroid postoperative status, thyroiditis, hypothyroidism	80
Prediabetes and glucose tolerance	24
Hyperthyroidism, Graves' disease	17

**Table 7.** Kidney and urinary system comorbidities.

<b>underlying or newly diagnosed diseases</b>	<b>Numbers of patients</b>
Prostatic hypertrophy and prostatitis	110
Persistent proteinuria, unspecified renal failure	47

Urinary tract infection, stones, and hematuria	27
Electrolyte abnormalities (hyperkalemia, hypokalemia)	6
kidney transplant status	5

**Table 8.** Chronic Infectious Diseases and Allergic Diseases.

<b>underlying or newly diagnosed diseases</b>	<b>Number of patients</b>
Unspecified skin allergy, rash, drug, environment	72
Chronic allergic rhinitis	28
Herpes zoster	11
late syphilis	7
Psoriasis	7
Ankylosing Spondylitis	7
Behcet's disease, ulcerative proctitis	4
celiac disease	1
systemic lupus erythematosus	1

**Table 9.** Chronic Hematological Tumor Diseases.

<b>underlying or newly diagnosed diseases</b>	<b>Number of patients</b>
Thyroid malignant neoplasia postoperative status	34
Unspecified iron deficiency anemia, nutrient deficiency anemia	33
Postoperative status of malignant neoplasm of the breast	30
Colon and rectal malignant neoplasms postoperative status	16
Postoperative status of malignant neoplasm of the prostate	14
Chronic myelogenous leukemia, hematologic cancer, MDS, multiple myeloma, etc.	9
Gastric cancer postoperative status	8

Kidney cancer postoperative status	6
Postoperative condition for cervical cancer	6
Lung cancer ( small cell Ca etc)	5
Postoperative status for head and neck cancer, Postoperative status for brain tumor	4
Gallbladder Cancer Postoperative Condition	4
Tonsil cancer postoperative condition	2
Secondary Thrombocytopenia	2

**Table 10.** Chronic digestive system diseases.

<b>underlying or newly diagnosed diseases</b>	<b>Number of patients</b>
Elevated Liver Function Levels and Toxic Hepatitis	221
Chronic hepatitis B and C	156
Gastric ulcer, drug-induced gastroenteritis and colitis, esophageal reflux, esophagitis	129
Acute and chronic pancreatitis	14
Liver cirrhosis, biliary cirrhosis	13
Cholelithiasis, condition after gallbladder removal. cholecystitis	10
Chronic Constipation	10
After peritonitis surgery, after hernia surgery, after appendix surgery, after colostomy	6

**Table 11.** Chronic neuropsychiatric diseases and disorders.

<b>underlying or newly diagnosed diseases</b>	<b>Number of patients</b>
Schizophrenia, bipolar disorder, anxiety disorder, panic disorder	99
Cerebral blood vessels, cerebral infarction, cerebral lesions due to trauma, cerebral aneurysm	83
Alzheimer's dementia and Parkinson's dementia	44

Sleep Disorders	40
Epilepsy, encephalopathy, including epilepsy. cerebral palsy	15
physical disability	8
Intellectual disability	7
Autism Disorder	6
Visual disability	6
Developmental disability	5
obsessive compulsive disorder	2

As an accompanying underlying disease, respiratory diseases such as chronic obstructive pulmonary disease, emphysema, tuberculosis sequelae, asthma, and bronchiectasis were common. For all patients hospitalized for COVID-19, chest CT scans check the course of the disease, so the underlying lung disease also can be known. After 5-7 days of COVID-19 infection, due to changes by the personal immune system, the normal bacteria in the oropharyngeal area have chance of infectivity and severity as germs, and another viral pneumonia and bacterial pneumonia caused by COVID -19 infection. Therefore, the administration of antibiotics were often necessary. When the sputum spit from the patients was cultured at the time of admission, the Pseudomonas strain was most commonly cultured, and this strain sensitive to tazoperan and third-generation cephalosporins. Although the degree of pneumonia varies from person to person, from within 10% of lung volume to more than 60-70% of severe pneumonia, it usually recovered and decreased during 2-3 weeks of hospitalization by antibiotics and general supportive care. Changes in the lung can be confirmed through low dose CT. Even if the pneumonia improved, sequelae as like fibrosis could be remained in some cases.

Diabetes mellitus was the most common endocrine disease as a companion underlying disease, and many patients were hospitalized and diagnosed with diabetes, and there were many people who were before no Diabetes history, but their blood sugar temporarily rose as like impaired glucose tolerance. COVID -19 disease itself tends to raise blood sugar overall. In addition the extreme stressful situation can be viewed as a situation in which diabetes is easily developed along with continuous stimulation of the sympathetic nervous system. In addition, there was a lot of increase in blood sugar due to the use of the treatment itself

(dexamethasone) during the treatment of COVID-19 disease.

As an accompanying underlying disease, there were quite a few patients with chronic kidney failure who continued to take medication and diet, although prostate-related diseases and dialysis treatment were not performed among renal and urinary system diseases. And the disease called COVID-19 itself causes a lot of problems with persistent high fever, difficulty in eating, and dehydration. During the epidemic period of COVID-19, there were many cases of dehydration, acute renal failure, and electrolyte abnormalities. Dehydration is very common problem. Dehydration could induce acute renal failure. Dehydration correction is very important in early phase of disease.

Chronic infectious diseases and autoimmune diseases as accompanying underlying diseases, such as late syphilis, psoriasis, Behcet's disease, ulcerative proctitis, lupus, and ankylosing spondylitis, were patients who had stable conditions with chronic and long-term treatment. There were cases where it was originally an underlying disease, but there were also skin rashes that were newly developed during hospitalization due to COVID-19. Patients' reactions to the COVID-19 itself are often felt as a reaction of individual immunity and individual allergy or anaphylaxis. However, it was difficult to decide or predict about that patients with chronic allergies or autoimmune diseases, as existing diseases, reveal to more severe pneumonia or not due to sensitive reactions such as anaphylaxis.

As a comorbid underlying disease, chronic tumor or cancer diseases are mostly patients who have completed surgery and chemotherapy within the last 5 years and are currently only following up. In some cases, chronic myeloid leukemia patients temporarily stopped their leukemia treatment procedures & drugs and received public treatment related to the COVID-19 disease. There are many cases where the blood test findings at the moment when the amplification of the COVID-19 virus in the body is slightly similar to leukemia laboratory finding or sepsis finding. In particular, when the fever is very severe and the inflammatory reaction is severe for some time, there were a significant number of patients who had a temporary decrease in platelet and a decrease in neutrophil count that appeared to be sepsis in blood tests. And then symptoms and laboratory findings are normalized again as the COVID-19 recovered after 3-4 days with or without other specific treatment.

It can be seen that the most common diagnosis during hospitalization or accompanying underlying disease of confirmed COVID-19 patients is liver function elevation due to liver inflammation, that is, toxic hepatitis due to COVID-19 itself. In severe cases, the elevation

increased to more than 10 times the normal level in some cases. After COVID-19 treatments including antiviral agent and monoclonal antibody, and time over with this disease, liver function test slowly to normalize during 2-3 wks. Most of the patients said that liver function tests were normal before admission. Even in patients with existing chronic diseases such as hepatitis B, hepatitis C, and cirrhosis, they were patients who usually maintained their liver function levels at normal levels by taking antiviral drugs for the existing hepatitis before the onset of COVID-19.

During the hospitalization period, the most common digestive symptoms were diarrhea and nausea and vomiting and poor oral intake. Generally in case of very severe diarrhea, Loperamide was used, and there was usually some improvement with the almagate agent, and with the recovery of the COVID-19 disease itself, it showed improvement with digestive organ-related symptoms. No smell and no taste and nausea vomiting are usually correlated with dehydration.

Cerebrovascular disease and psychiatric disease as comorbid underlying diseases were long-term chronic diseases, and were patients who had to be hospitalized with the caregiver or family member due to a comorbid condition or disability. There were difficulties in communication and isolation due to psychiatric problems and disabilities with bedridden status but we did not think that the existing underlying diseases had a lot of influence on the clinical picture and severity of COVID disease itself.

## **4. Discussions about Treatments**

### **1) Oxygen therapy ( low dose and high dose therapy)**

We would like to talk about oxygen therapy for COVID-19 patients. Patients were admitted to the hospital and had a self-saturation check machine to check and record the saturation several times a day. When the oxygen saturation in room air was less than 94%, oxygen therapy was given. Oxygen was sometimes used intermittently for chest tightness without dropping of saturation monitor. In the case of using oxygen, oxygen saturation could be maintained over 94% , we can use oxygen with 1L/min -7L/min through the nasal cannula or reservoir mask, as the pneumonia improves, oxygen is tapered and stopped at the time of discharge. In order to be discharge without oxygen, the patient had to check saturation in room air without oxygen more than 95% for more than one day. In addition, if oxygen saturation cannot be maintained over 95% by using a reservoir mask of 7L/min due to a high oxygen demand, we use a high flow O2 supply machine, this machine which has nasal cannula and more powerful oxygen supply possible. This

machine is good for alert mental status and oral eating possible. Usually COVID-19 disease clinical manifestations are fastly changed by anti-viral agent and anti-inflammatory drugs. And COVID -19 disease clinical course duration usually 2-3weeks. We start usually at FiO<sub>2</sub> 0.5 and flow 50, we can increase FiO<sub>2</sub> and flow level. If the pneumonia improved, we could change with nasal O<sub>2</sub> and then tapered with nasal O<sub>2</sub>, the patient was finally able to be discharged without oxygen within 2-3 weeks. If there was no improvement even if FiO<sub>2</sub> was continuously increased, and then we were referred to the university hospital because of the possibility of intubation, ventilator using, and ECMO using. The purpose of this study is to analyze data on treatment drugs for COVID-19 patients. In most cases, X-rays were hardly visible unless the pneumonia was severe. When pneumonia occurred, the increase or decrease of pneumonia over time could be confirmed with low-dose chest CT by taking two or three images during the hospitalization period.

## **2) Public supports and anti-viral treatments and immune modulators ( monoclonal antibody treatments.**

Public treatments (analgesic, antipyretic, antihistamine, fluid therapy, etc.) were implemented according to general respiratory infections (bacteria, virus). Kaletra, which was an AIDS treatment as an antiviral agent to treat the COVID-19, was also used in 686 patients at the hospital from March 2020th to April 2021th. Of course, many patients felt difficulties while oral taking Kaletra, and there were many patients who stopped in the middle of treatment due to side effects such as diarrhea and GI symptoms. At that time, there was an opinion that Kaletra would reduce the viral load of the COVID-19 virus at that time. But in the end, it was concluded that it was not of much help. From August 2020th, many elderly, medically ill, and worsening patients were hospitalized in Korea, and they started to receive the drugs recommended for treatment. In particular, the start of administration of the antiviral drug Veklury (Remdesivir) in our hospital was from November 2020th, and the start of administration of the monoclonal antibody Regdanvimab (Regkirona) was from February 2021th. The start of administration of steroids including dexamethasone injection was also in August 2020th. In most cases, if pneumonia was present, oxygen saturation was maintained at 95% or higher in room air, and symptoms occurred within 7 days, the monoclonal antibody Regdanvimab (Regkirona) was preferentially administered. If there is pneumonia and oxygen saturation falls below 94% in room air, we start oxygen therapy and use Veklury (Remdesivir) as an antiviral agent for 5 days with 6 vials. Dexamethasone injection 1.2 mg was also mainly used together with Veklury (Remdesivir)

injection. As the pneumonia improved, oxygen saturation was restored without the need for oxygen by using monoclonal antibody therapy, antiviral drugs, and antibiotics together. Oxygen was usually used for about 1-2 weeks throughout the hospitalization period. Veklury (Remdesivir) injection should be administered as early as possible after the onset of symptoms when the oxygen saturation begins to drop below 94% to prevent the progression to severe pneumonia as much as possible. It was discovered that it could serve as an important therapeutic agent. In fact, in Korea's quarantine system, it is possible to administer Regdanvimab (Regkirona) and Veklury (Remdesivir) in the early stages of an COVID-19 disease. It is considered that the mortality rate in Korea is low because it is a quarantine system that can be treated in early phase of COVID-19 disease in hospitals.

**Table 12.** Regdanvimab (Regkirona) Administration Status. Feb. 2021th- Dec. 31 2021th.

Using Period	sum of using patients
2021.Febuary -December 31.2021th	1,212

**Table 13.** Veklury (Remdesivir) administration status. Nov. 2020th - Dec.31. 2021th.

Using Period	sum of using patients
2020.November -December 31.2021th	659

**Table 14.** Steroid ( Methyl PD or Dexamethasone )using, 2020 March-Dec. 31. 2021th

Using Period	Methyl PD IV& Dexamethasone IV	Dexamethasone oral & PD oral agent using
2020. Mar-2021.Dec	957	399



### 3) Treatment result analysis and discussion

**Table 15. Discharge status of 3,827 hospitalized patients.**

Period	Total admission Number	Referral to other hospitals (severe cases, special treatment, )	Referral to living treatment center, Referral to other hospital(for family care)	Death discharge
2020th	848	110	17	1
2021th	2979	145	10	23

According to the data summarized through the chart of the 3,827 COVID-19 confirmed patients who were hospitalized from March 2nd 2020th to December 31th 2021th, the hospitalization period of the inpatients was usually within two to three weeks.

From March 2nd 2020th to December 31th 2021th, among the 3,827 confirmed of COVID-19 patients were hospitalized, 3,521 were cured and discharged, 255 were transferred to other hospitals because of developing to severe cases need for ventilator or ECMO or for special treatment and hospitalization with other family members. 27 patients were discharged to the community living treatment center or other hospital for more quarantine and 24 patients were died discharged from our hospital.

#### 4) Final conclusion about COVID-19 by clinical experiences

Severe Acute Respiratory Syndrome Coronavirus 2( SARS-CoV-2) is a positive -stranded RNA virus with an envelope that is 80 % or more similar in RNA sequence to bat coronavirus. Human-to-human transmission is assumed to be the primary route of infection, but a number of research results suggesting the possibility of airborne transmission have been published recently. It is known that infection with SARSCov-2 is most contagious just before the onset of symptoms and in the early stages of the disease, and the infectivity is weakened 5 days after the onset of symptoms. There is an incubation period of 1 to 2 weeks from being infected to the COVID-19 until symptoms appear, there is a lot of individual difference and 50% of infected people can be asymptomatic. It seems that the COVID-19 had no choice but to spread around the world because there are many people who are asymptomatic or have only slight cold symptoms and they didn't test for the COVID-19 and they spread the

COVID-19 to others around the world.

In Korea 50% of COVID-19 patients were asymptomatic, and about 40% of patients suffer from mild to moderate pneumonia and generalized symptoms caused by multi-organ COVID-19 infection. And nearly 10% of COVID-19 patients appear to progress to severe pneumonia form, systemic sepsis, thrombosis and ARDS as if anaphylaxis and hypersensitivity reaction. Elderly patients and bed-ridden patients have a high mortality rate. Usually elderly patients with various chronic diseases, disabled bed-ridden status patients, have a hard time coping with any type of pneumonia. Usually COVID-19 pneumonia could be combined with other bacterial pneumonia, elderly and chronic disabled multi-diseased people could be more suffered by COVID-19 infection.

From late 2020th, Regdanvimab (Regkirona) and Veklury (Remdesivir) began to be administer. In early period of 2021th, April in 2021th, in Korea, COVID-19 vaccine was given priority to the elderly and to the vulnerable groups.

Korean quarantine system has been operated that isolation and treatment could be begun at a life treatment center or a hospital dedicated to COVID-19 within 1-2 days after receiving a positive COVID-19 test result.

At the time of admission in hospital, when symptoms occurred within 7 days, pneumonia was present, and oxygen saturation was maintained at 94% or higher, Regdanvimab (Regkirona) was administered. And when the high fever started to cause pneumonia and the CRP started to rise above 3, the antibiotic Tazoperan or 3<sup>rd</sup> generation Cefalosporin was also added for 5 days or more.

From 2020th December, Veklury (Remdesivir) was administered as soon as the patients' oxygen saturation fell below 94%. From 2022th, Veklury infusion guideline changed. 3days Veklury regimen could be administered without COVID-19 patients' oxygen dropping. Usually Veklury (Remdesivir) administered mainly for 5 days and for more very severe cases Veklury (Remdesivir) can be administered for 10 days. Usually, during the 5 days of administration of Veklury (Remdesivir), the fever dropped and the oxygen demand gradually decreased.

It was difficult to predict which type of patients would develop to severe pneumonia or not. It is certainly that it can be prevented a lot of progression to severe form of COVID-19 disease through the early administartion of Regdanvimab (Regkirona) and Veklury (Remdesivir)

regardless of underlying diseases or age or disease severity.

In April in 2021th, COVID-19 vaccine was given priority to the elderly and to the vulnerable groups. In addition, usually those who received the vaccine two times were not hospitalized due to COVID-19 until September 2021th. But elderly vaccine completion patients started to be hospitalized around September 2021th. Usually elderly vaccine 2nd times completion patients get well easier than non-vaccine completion patients. However, from the beginning of November 2021th, the number of patients who completed the 2nd vaccine, like those who did not get the vaccine, started to progress to severe form of COVID-19 cases. From then on, our government start 3<sup>rd</sup> booster vaccine.

It is still difficult to determine who will develop pneumonia severely or not. Age or pre-existing underlying diseases were not necessary factors that made pneumonia getting worse. Of course, it is true that it is difficult for elderly complexed diseased people to endure severe pneumonia and treatment itself, so the mortality rate increases. It is thought that the severity of pneumonia varies depending on the individual immune response, such as anaphylaxis reaction to the COVID-19 virus.

It is not clear what the individual risk factors are, but obesity itself can be seen as a risk factor that makes the COVID-19 disease to be more severe form.

One of the most important things of clinical picture during hospitalization is that the continuation of high fever itself means the progression of pneumonia. And pneumonia, which rapidly progresses in clinical features day by day, was characterized by uncontrolled and repeated continuous high fever and a rapid decrease in oxygen saturation.

The important thing is that Regdanvimab (Regkirona) should administered as early as possible in the early stage of infection and Veklury (Remdesivir) also should be administered as soon as possible at the time when oxygen saturation starts to drop below 94 %. It is believed that the current Korean quarantine system take COVID patients to hospital in early period of this disease. And free charge administration with Regdanvimab (Regkirona) and Veklury (Remdesivir) for the treatment about COVID-19 in Korea allows patients to be treated in hospitals at the initial stage. These all things together finally lowered the death rate from COVID-19 in Korea.

## References

- [1] Giuseppe Lisco etc , COVID-19 and Endocrine System : A Comprehensive Review on the Theme, *Journal of Clinical Medicine*, 2021, 10, 2920
- [2] Mehdi Ghasemi etc, SARS-CoV-2 and Acute Cerebrovascular Events : An Overview , *Journal of Clinical Medicine*, 2021, 10, 3349 ,.
- [3] Talida Georgiana Cut etc. Article: Spontaneous Pneumomediastinum, Pneumothorax, pneumopericardium and Subcutaneous Emphysema – Not So Uncommon Complications in Patients with COVID-19 Pulmonary Infection – A Series of Cases, *Journal of Clinical Medicine*, 2021, 10, 1346,
- [4] Chieh-Chen Wu etc. Article: Statin Use Is Associated with a Decreased Risk of Mortality among Patients with COVID-19. *Journal of Clinical Medicine*, 2021, 10, 1450,
- [5] Andreas Rank etc. Article: One Year after Mild COVID-19; The Majority of Patients Maintain Specific Immunity , But One in Four Still Suffer from Long term Symptoms. *Journal of Clinical Medicine*, 2021, 10, 3305,
- [6] Brunella Posteraro etc. Article: Risk Factors for Mortality in Adult COVID-19 Patients Who Develop Bloodstream Infections Mostly Caused by Antimicrobial-Resistant Organisms : Analysis at a Large Teaching Hospital in Italy, *Journal of Clinical Medicine*, 2021, 10, 1752 ,
- [7] Fabiola Atzeni etc. Review: The Rheumatology Drugs for COVID-19 Management : Which and When ? *Journal of Clinical Medicine*, 2021, 10, 783,
- [8] Mehdi Ghasemi etc. Review: SARS-CoV-2 and Acute Cerebrovascular Events: An Overview, *Journal of Clinical Medicine*, 2021, 10, 3349 ,
- [9] Joon-Young Song etc Article: Ciclesonide Inhaler Treatment for Mild-to-Moderate COVID-19 : A Randomized, Open-Label, Phase 2 Trial, *Journal of Clinical Medicine*, 2021, 10, 3545,.
- [10] National medical center/ Office for the central infectious disease hospital , South Korea, 2020
- [11] Fabiola Atzeni etc. The Rheumatology Drugs for COVID-19 management : Which and When ? *Journal of Clinical Medicine*, 2021, 10, 783,
- [12] Monika Gudowska-Sawcwuk etc. The role of Neuropilin-1 ( NRP-1) in SARS-CoV-2 infection : Review *Journal of Clinical Medicine*, 2021, 10, 2772,
- [13] Md. Mohaimenul Islam etc. A state of the Art Survey on Artificial Intelligence to Fight

- COVID-19, Journal of Clinical medicine, 2021, 10, 1961,
- [14] Afshin Derakhshani etc. Arginas1( ARG1) as an Un-Regulated Gene in COVID-19 Patients: A Promise Marker in COVID-19 Immunopathy, Journal of Clinical Medicine. 2021, 10, 1051,
- [15] Youngah Choi etc. The importance of Early Treatment for COVID-19, American Journal of Biomedical Science & Research ,2021-14(4)
- [16] Youngah Choi etc. COVID-19 Disease Clinical Manifestations and Treatment Analysis , Science Journal of Clinical Medicine 2022:11(1):25-32
- [17] Joon-Young Song etc. Ciclesonide inhaler Treatment for Mild- to-Moderate COVID-19: A Randomized,Open –Label, Phase 2 Trial, Journal of Clinical Medicine. 2021,10,3545