

Indonesian Geriatrics Society Consensus on COVID-19 Management in Older Adults

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ABSTRACT

More than 80% of death cases and 95% of severe COVID-19 occur in patients aged over 60 years. Atypical clinical manifestations with high morbidity and mortality further emphasize the importance of COVID-19 management in older adults. Some older patients may appear asymptomatic while other may present with acute respiratory distress syndrome and multi organ failure. Fever, higher respiratory rate and crackles may present. The most common chest x-ray finding is ground glass opacity. Other imaging modalities that are often used are pulmonary computed tomography scan and lung ultrasonography. COVID-19 management in older adults should be comprehensive, starting from oxygen, fluid, nutritional, physical rehabilitation, pharmacology and psychosocial therapy. In this consensus, we also discuss about management of older adults with special condition such as diabetes mellitus, kidney disease, malignancy, frailty, delirium, immobilization and dementia. In post COVID-19 phase, we believe that physical rehabilitation is important as it is done to improve fitness.

Keyword: COVID-19, older adults, consensus, management.

INTRODUCTION

Older adults are highly susceptible to infection. They are more prone to morbidity and mortality caused by Coronavirus Disease-19 (COVID-19) infection. More than 80% of death cases and 95% of severe COVID-19 occur in patients aged over 60 years.¹⁻³ Data in Indonesia about COVID-19 infection suggested that most positive cases are found at the age of 31-45 years (28.7%), while only 11.8% in older adults aged 60 years and older, but the mortality rate in the older adults is the highest at 46.8% among others group of age.⁴

Research and clinical experience show that diagnosing COVID-19 in the older adults is not always easy. The atypical clinical appearance, accompanied by functional and cognitive status decline and the presence of comorbidities make it quite difficult to detect COVID-19 infection at an early stage.⁵ In addition, the administration of drugs to the older adults must consider the dose and side effects related to various organ function decline and interactions between drugs. The management of COVID-19 in the older adults should be comprehensive by paying attention to medical physical aspects and comorbidities, functional and mental status, cognitive function, and adequate fluid and nutrition.⁶ Moreover, COVID-19 survivors can suffer from COVID-19 symptoms after the infection is healed which is called as the post-COVID syndrome. Post-COVID syndrome is associated with age. A multicenter study reported an incidence of 9.9% in the 18 to 49 year age group and increased to 21.9% in the 70 year age group.⁷

Given the magnitude of the problem of COVID-19 infection in the older adults, the Indonesian Geriatrics Society (*Perhimpunan Gerontologi Medik Indonesia* (PERGEMI)) made a Consensus on COVID-19 Management in Older adults. This consensus is based on the latest guidelines issued by health institutions or professional organizations. This consensus also refers to published articles in the form of systematic reviews, primary studies, consensus guidelines or other official guidelines. To obtain this data, several electronic data sources have been searched such as Pubmed, Scopus, bioRxiv/medRxiv with the keywords: COVID, diagnosis, older adults or their synonyms. This search is

not limited to a particular time, place or research design.

METHODS

The COVID-19 consensus in the older adults was made based on the latest guidelines issued by health institutions or professional organizations. Compilation also refers to published articles in the form of systematic reviews, primary studies, consensus guidelines or other official guidelines issued by professional organizations by including citation sources.

This document provides guidelines only, does not set rules that require to be followed. This consensus is the compiler's statement based on the evidence and the authors' views on the handling of COVID-19 in older population. Clinicians who use this consensus should consider individual clinical conditions for treatment. This consensus will be reviewed and updated (if necessary) at least four years from the date it was made, in accordance with developments in medical science and technology.

Etiopathophysiology

There are three factors that influence the Severe Acute Respiratory Syndrome-Coronavirus-2 (SARS-CoV-2) infection, which are agent (virus), host and environmental factors. The cytopathic effect of the virus and the host's ability to respond to the immune response determine the severity of the infection. In the older adults, it is very common to find comorbid chronic diseases such as diabetes mellitus (DM), hypertension, cardiovascular disease, kidney failure and chronic obstructive pulmonary disease (COPD) which increase the severity of COVID-19, by increasing the risk of acute respiratory distress, respiratory failure, sepsis and hypercoagulability.^{8,9} Environmental factors can be overcome by maintaining health protocols, such as washing hands, keeping distance and avoiding crowds (**Figure 1**).

The life cycle of SARS-CoV-2 consists of attachment, penetration, biosynthesis, maturation and release. After the virus binds to the host cell receptor, the virus enters the host cell through the process of endocytosis or membrane fusion. The spike protein present in the structure of SARS-

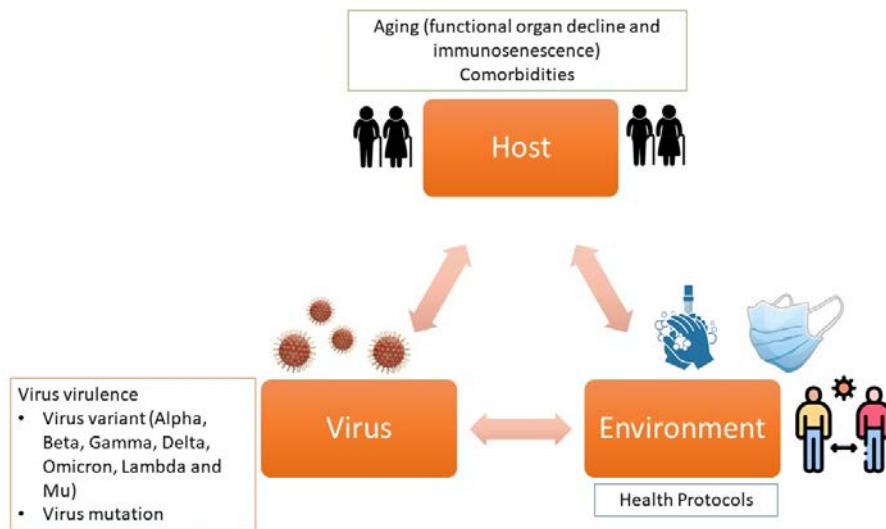


Figure 1. COVID-19 Epidemiology Triology in the Older Adults.

CoV-2 is activated by Type 2 Transmembrane Serine Protease (TMPRSS2) which is present in epithelial type 2 pneumocytes.¹⁰ The activated SARS-CoV-2 spike will bind to the Angiotensin Converting Enzyme 2 (ACE 2) receptor on the apical side of the type II pulmonary alveolar epithelium, causing lung epithelial cell damage.¹¹

The entry of the virus is followed by viral replication, destruction of infected cells and the induction of non-adaptive/innate cell responses. Viral antigens will be presented by antigen presenting cells (APCs) found on macrophages

and dendritic cells that function to phagocytize epithelial cells that are apoptotic due to SARS-CoV-2. APCs further stimulate the body’s humoral and cellular immune responses mediated by virus-specific T and B cells. CD4+ and CD8+ T cells play an important role. CD4+ T cells will activate B cells to increase the production of specific antibodies against SARS-CoV-2, while CD8+ is in charge of killing cells infected with SARS-CoV-2. In the humoral immune response, IgM and IgG are formed against SARS-CoV-2.¹¹

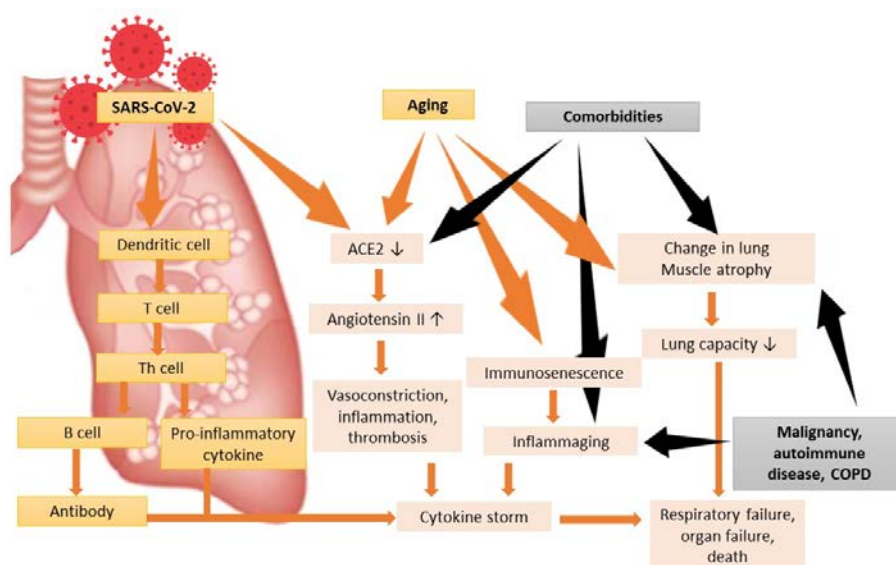


Figure 2. Pathophysiology of COVID-19 Infection in the Older Adults.

The non-adaptive and adaptive immune responses in the older adults are less effective, making them susceptible to severe COVID-19 exposure. Changes in the immune system due to aging along with multimorbidity make older adults more susceptible to complications from COVID-19.^{12,13}

DIAGNOSIS

History Taking

Older adults patients with COVID-19, had unspecific main complaints, such as fever (83.6%), cough (62.7%), of shortness of breath (25.5%), fatigue (19.9%), productive cough with sputum production (17.7%), chest tightness (15.3%), diarrhea (13.0%), muscle pain (4.6%), no appetite (8.4%), nausea and vomiting (4.4%).¹⁴⁻¹⁶ Some patients may present with minimal or no symptoms, while others may present with severe pneumonia or complications such as acute respiratory syndrome, septic shock, acute myocardial infarction, venous thromboembolism, or multi-organ failure.¹⁷

Older adults patients with COVID-19 are likely to have atypical symptoms, such as delirium, postural instability or diarrhea. They can also be found with behavioral changes, impaired balance, functional decline, reduced mobility, syncope, and falls. In older adults with frailty, The Clinical Frailty Score (CFS) was used to determine grading of frailty at the time of hospital admission.¹⁸⁻²¹

Physical Examination

On physical examination, slight increase of temperature (more than 37.3 °C) may be found. The presence of hypothermia is a sign of a life-threatening infection. Other findings include increased respiratory rate (>25 breaths/min) dan oximetry measurements (oxygen saturation <90%). Lung auscultation revealed wet crackles or coarse crackles. Bronchial breath sounds and egophony suggest pneumonia. Pulmonary percussion revealed a dull sound in the affected area. In addition, there is an increase in pulmonary fremitus.²²

Laboratory Findings

Laboratory abnormalities show elevated white blood cell and neutrophil counts as well

as C-reactive protein. In addition, a decrease in lymphocytes (lymphopenia) in older patients. In moderate to severe cases, there is an increase in procalcitonin levels. In severe cases of COVID-19, or in the presence of cardiac complications and elevated levels of troponin I, d-dimer, and lactate dehydrogenase may be found.^{15,21,23}

Chest X-Ray

The most common chest X-ray findings are patchy or diffuse asymmetric, indistinct borders, airspace opacity, either described as consolidation or as an area of ground glass opacity (GGO), peaking on day 10-12 since symptom onset. The most common distribution found in lungs is bilateral, peripheral, and predominantly basal.²⁴

Pulmonary Computed Tomography-scan (CT-scan)

Pulmonary CT-Scan may be of diagnostic aid to confirm COVID-19 in addition to RT-PCR examination. However, the sensitivity of CT also depends on the time course of symptoms. Findings on CT-scan for diagnosing COVID-19 infection based on time course of symptoms are described as follows:²²

1. Initial stage (0–4 days): GGO, either isolated or contiguous with consolidation (in 57% of older patients). Main findings: pulmonary vasculature (84%), intralobular septal thickening (50%), adjacent pleural thickening (40%), air bronchogram (40%), subpleural lines (25%), and crazy-paving pattern (15%). Consolidation pattern, linear opacity, and crazy-paving pattern in severe/critical patients.
2. Progressive stage (5-8 days): Increased GGO and crazy-paving appearance; sometimes accompanied by an inverted halo. Young patients tend to have more GGO, while older patients tend to have consolidation on multiple lobes. The proportion of multiple lobe involvement in older adults group is higher.
3. Peak stage (9–13 days): Progression of GGO into a consolidated and mixed pattern, superimposed intralobular reticulation produces a crazy paving pattern. The lesions

show mild to moderate progression during the initial 2 weeks from symptom onset. A thin line of hypoattenuation between the visceral pleura and the high-density lesion or subpleural sparing.

4. Absorption stage (>14 days): Enlarged subpleural arch fibrotic area/line and architectural distortion seems to be appear. Either the abnormalities will disappear in 1 month or more, or linear fibrosis streaks persist. As many as 80% of patients had residual lesions at discharge, the majority of which were GGO and residual linear opacities.

Lung Ultrasonography (LUS)

LUS primary findings in COVID-19 infection include all findings that are known as acute respiratory distress syndrome (ARDS). Relevant findings found in LUS for diagnosing COVID-19 infection may include:²²

- a. Pleural line thickening with pleural line irregularity; The serosa can be uneven, disjointed, and fragmented, as is found in ARDS.
- b. B-lines are visualized as B-line group storms (B-patterns), either in separate or converging forms, sometimes giving the appearance of glowing white lungs. These lines correspond to the initial appearance of the “ground glass” area detected on CT, and can often arise from a single point of thickened pleural line and from small peripheral consolidations.
- c. Multifocal posterior subpleural small consolidations in different patterns, including

- non-translobar and translobar consolidation.
- d. Massive consolidation of such tissue without a bronchogram (obstructive atelectasis).
- e. Large pleural effusions (simple or complex) are not common..

THERAPY

Comprehensive Geriatric Assessment (CGA)

Analysis of the data in CGA is very important and useful in management, especially in older patients with geriatric syndromes who have COVID-19 infection. The assessment aspects that need to be considered in the CGA are described in Table 1.

Oxygen Therapy

Oxygen therapy can be initiated via a nasal cannula or mask for patients with an oxygen saturation of 92% and a respiratory rate of 24 breaths/min (or a saturation of 88% in those with a history of type II respiratory failure). If clinical improvement does not occur within one hour or clinical deterioration occurs, increase oxygen therapy using a High Flow Nasal Cannula (HFNC).²⁵

Fluid Therapy

Adequate hydration is very important in the management of COVID-19 infection in the older adults, because they are at high risk for dehydration. Improving the condition of dehydration can reduce the risk of mortality in the older adults with pneumonia.²⁶ Hypovolemia is common in critically ill COVID-19 patients. A simple examination to determine hypovolemia is performed bedside in the isolation room with

Table 1. CGA of Older Adults with COVID-19.

CGA Components	Descriptions
Medical Assessment	Complete history including history of organ systems and socio-economic status. A thorough physical examination includes vital signs, oxygen saturation, anthropometry, neurologic and musculoskeletal.
Functional Status	Assessment using Activity Daily Living (ADL) Barthel or KATZ, and Lawton Instrumental Activities of Daily Living (IADL).
Cognitive Status	Abbreviated Mental Test (AMT), the Mini-Mental State Examination (MMSE), MiniCog or Indonesian version of the Montreal Cognitive Assessment (MoCA InA) instruments.
Emotional/Psycho-Affective Status	Geriatric Depression Scale (GDS) instrument.
Nutritional Status	Mini Nutritional Assessment (MNA), Short Form-MNA (SF-MNA), Malnutrition Screening Tool (MST), Subjective Global Assessment (SGA) instruments.

passive leg raising (PLR), lactate clearance, pulse pressure variation (PPV), and collapse or absence of the inferior vena cava. Symptoms of dehydration include changes in mental status, thirst, oliguria, and capillary refilling time.²⁷ The maintenance fluid requirement for the older adults is around 25-30 ml/kg body weight per day. This need will increase if there is a fever, which will increase fluid requirements by about 12.5% for every 100C increase in temperature. Conditions of hyperventilation and sweating will increase fluid requirements by 10-60% and 10-25%, respectively.²⁸ Crystalloid fluids may be given for fluid resuscitation of critically ill COVID-19 patients. Vasopressors may be used if septic shock persists after fluid resuscitation, in order maintaining a MAP of 60-65 mmHg.²⁹

Nutritional Therapy

Nutritional management in older patients with COVID-19 includes screening for nutritional status, diagnosis of nutritional status and nutritional therapy. Seven nutritional screening and assessment tools used were Nutritional Risk Screening 2002 (NRS-2002), Mini Nutritional Assessment (MNA), MNA short form (MNA-SF), Malnutrition Universal Screening Tool (MUST), Nutritional Risk Index (NRI), Geriatric NRI (GNRI), and Modified Nutrition Risk in the Critically ill (mNUTRIC).³⁰⁻³² To establish the diagnosis, there are three phenotypic criterias (presence of weight loss (%), low body mass index (kg/m²), and reduced muscle mass) and two etiological criteria (decreased food intake and presence of inflammation). The diagnosis of malnutrition is established when there is at least one phenotypic criteria and one etiologic criteria.³³ Nutritional therapy should be started as soon as the patient is hospitalized (within the first 24-48 hours). Calorie needs range from 27-30 kcal/kg/day. This caloric requirement must be adjusted to nutritional status, level of physical activity and tolerance. In addition, protein needs of 1 gram/kg/day must be met. The addition of 400 kcal of energy and 25 grams of protein can improve physical fitness and the prognosis of COVID-19 in older adults.^{24,34} The need for fat and carbohydrates in a ratio of 30:70 and a ratio of

50:50 if the patient is on mechanical ventilation. The use of oral nutritional supplements (ONS) should be given to all older adults admitted outside the ICU. The parenteral route is used if the enteral route cannot achieve the target nutritional needs of older adults.²⁴

Physical Rehabilitation Therapy

Physical rehabilitation program should be started as soon as possible, because recent meta-analysis showed physical training can improve older patients' outcome during acute, critical, and post-COVID phase,²² which includes special needs related to the aging process, such as disability, geriatric syndrome, frailty, cognitive impairment and decreased sensory abilities.³⁵ On recent meta-analysis, physical training proven to improved patients' outcome in acute phase, critical phase and post-COVID-phase.³⁶ Rehabilitation options are more directed towards the respiratory system, cardiovascular system and psychological aspects of the patient.^{37,38} Geriatric rehabilitation carried out in post-COVID-19 patients such as self-management, swallowing exercises, cognitive exercises, breathing exercises, physical exercises and stress management.³⁹ Cough exercises can be done using the active cycle breathing technique and the self-air stack technique⁴⁰ to help in airway clearance.⁴¹⁻⁴³

Routine screening for sarcopenia in the older adults following diagnosis of COVID-19 should be started as early as possible as acute sarcopenia is a common complication. Cytokine storm will induced various pro-inflammatory cytokine causing acute sarcopenia.⁴⁴ Acute sarcopenia was associated with immune dysregulation and cytokine storm, length of stay and readmission, and ICU admission and mechanical ventilation.⁴⁵ The prolonged duration of bed rest causes a decrease in the physical activity of the older adults which can decrease protein synthesis, resulting in a decrease in skeletal muscle mass and strength.^{39,46} Muscle mass was assessed by magnetic resonance imaging (MRI), CT-scan, ultrasound, anthropometric calculations and bioelectric impedance analysis (BIA). Muscle strength can be assessed with a grip strength test.^{47,48}

Pharmacologic Therapy

1. Multivitamin

Some vitamins that play a role in the immune system, their effects on COVID-19 infection, dosage recommendations, and their functions are describe as follows:

- a. Vitamin A with recommended dose of 600 mcg/day plays a role in maintaining the integrity of the epithelial lining of the airways, including maintaining the number of airway cilia.⁴⁹⁻⁵¹
- b. Vitamin B regulates intestinal immune system (gut barrier function), proliferation of T lymphocytes, B cells, and natural killer (NK) cell activity, reduce inflammation through homocysteine metabolism, reduce pro-inflammatory cytokines and prevent hypercoagulability. In severe COVID-19, it is recommended to give thiamine (B1) 1 ampoule / 24 hours.⁵²
- c. Vitamin C maintains epithelial integrity, plays a role in leukocyte migration to the site of infection, phagocytosis, bactericidal activity, natural killer (NK) cell activity, T lymphocytes (especially CD8+ cells), and antibody production. Recommended administration of non-acidic vitamin C 500 mg/6-8 hours orally or lozenges 500 mg/12 hours in asymptomatic or mild COVID-19 infection and 200-400 mg/8 hours is recommended for moderate and severe cases.^{53,54}
- d. Vitamin D may improve epithelial integrity, synthesis of antimicrobial peptides (e.g.: cathelicidin) by epithelial

cells and macrophages, and enhance the non-specific immune system by increasing phagocytosis.^{51,55} 400-1000 IU of vitamin D supplementation has been recommended for COVID-19 infection.⁵⁶

- e. Vitamin E enhance chemotaxis and phagocytosis, NK cell activity, lymphocyte cell proliferation, and increase response to vaccination.⁵³ However, there is still not much information about the effect of vitamin E supplementation on COVID-19 infection.

2. Antiviral

Antiviral therapy with the right time of administration is highly recommended in the early course of COVID-19 patients. Oseltamivir reduces mortality in influenza patients.⁵⁷ Remdesivir is a monophosphoramidate prodrug of an adenosine analog that affects viral ribonucleic acid (RNA) polymerase and may reduce viral RNA production.⁵⁸ Lopinavir/ritonavir (LPV/RTV) as a therapy for COVID-19 infection is still controversial.⁵⁹ Favipiravir (FPV), a purine nucleic acid analogue that targets RNA-dependent RNA polymerase (RdRP). Arbidol is a broad-spectrum antiviral molecule that inhibits both DNA and RNA viruses by altering the viral membrane structure.⁶⁰

3. Anticoagulant

Prophylactic dose heparin therapy should be given to prevent thromboembolic complications and is recommended in

Table 2. Dosage of Thromboprophylactic Anticoagulants in COVID-19 Patients.

COVID-19 Severity	Body Weight	Anticoagulant Dosage
Moderate	Not considering body weight	CrCL 60 mL/min: enoxaparin 1x40 mg/day, subcutaneously or fondaparinux 1x2.5 mg subcutaneously
		CrCL <60 mL/min: UFH 2x5000 units/day subcutaneously
Severe / Critical	Body weight ≥60 kg	CrCL 60 mL/min: LMWH (enoxaparin) 2x40 mg/day, subcutaneously
		CrCL <60 mL/min: UFH 3x7500 units/day subcutaneously
	Obesity (≥120 kg or BMI ≥35)	CrCL 60 mL/min: LMWH (enoxaparin) 0.5 mg/kgBW 2 times a day (maximum dose 2x100 mg/day)
		CrCL <60 mL/min: UFH 3x10000 units/day subcutaneously
Body weight <60 kg	CrCL 60 mL/min: LMWH (enoxaparin) 2x30 mg/day, subcutaneously	
	CrCL <60 mL/min: UFH 3x7500 units/day subcutaneously	

hospitalized COVID-19 patients with elevated D-dimers.⁶¹ In the absence of impaired renal function, the use of low molecular weight heparin (LMWH) is recommended over unfractionated heparin (UFH) or oral anticoagulants.⁶² Administration of LMWH or oral anticoagulants given post-hospital from COVID-19 infection care for 14 - 30 days.⁶³

4. Steroids

Steroid administration improves survival and better outcomes in severe COVID-19 infection patients with hypoxia. It can be given to patients with severe COVID-19 infection and not to patients with mild or moderate degrees. Dexamethasone 6 mg per day intravenously equivalent dose can be given for 10 days.²⁵

5. Anti IL-6

Interleukin-6 plays a role in the differentiation of T cells into Th17 and also plays a direct role in systemic inflammation that occurs in autoimmune rheumatic diseases. Anti-IL-6 inhibits the binding of IL-6 to its receptors thereby preventing the inflammatory cascade.

6. Antibiotics

WHO recommends giving antibiotics only in severe cases of COVID-19 infection and does not recommend routine antibiotics in cases of mild COVID-19 infection.

7. Convalescent Plasma

According to the meta-analysis done by Aryana et al, convalescent plasma therapy was associated with lower mortality risk in older patients with COVID-19. It is recommended to administer convalescent

plasma early due to more beneficial effect.⁶⁴ Contraindications to administration are history of allergy to plasma products, pregnancy, breastfeeding women, IgA deficiency, acute thrombosis and severe heart failure with the risk of fluid overload. Other contraindications are relative, such as septic shock, renal failure on hemodialysis, disseminated intravascular coagulation or comorbid conditions that may increase the risk of thrombosis.

6. Intravenous Immunoglobulin (IVIG)

Therapy with IVIG gives promising results although there are still controversial results. The doses of IVIG used in these studies varied widely, but most of these studies used large doses of IVIG of about 0.3-0.5 grams/kg/day for 3 or 5 consecutive days.

Psychosocial Therapy

Psychological and mental health problems caused by COVID-19 infection are major problems because the older adults are physically and mentally more vulnerable.⁶⁵ During the COVID-19 pandemic, the older adults experienced social isolation that could increase the mental health problem prevalences such as depression, anxiety, stress, and insomnia.²⁹

Supportive therapy for the older adults to overcome psychosocial problems during the COVID-19 pandemic including doing hobbies (such as light exercise, art, recreational activities, etc.) and distance psychotherapy.⁶⁶ Psychotherapy management can work together with health care workers (doctors, psychologists) by utilizing technology such as telephone, telemedicine or the internet called as Internet Cognitive Based Therapy.⁶⁷

Table 3. Indications for Anti-IL-6 Therapy.

SOFA score < 3 with a score of CURB-65 > 2 OR
Oxygen saturation < 93% but it can be corrected by giving oxygen fraction < 50% (equivalent to O ₂ no more than 6 L/min by nasal cannula or simple mask) OR
Respiratory rate > 30 per minute OR
The chest X-ray shows bilateral multilobed infiltrates, with one of the following biologic markers:
- D-dimer ≥ 0,7 mcg/L
- IL-6 ≥ 40 pg/mL
- Lymphocyte < 800x10 ⁹ /L
- Ferritin ≥ 700 mcg/L
- Fibrinogen > 700 mg/dL

Table 4. Efforts to Maintain Mental and Physical Health of Older Adults During Acute COVID-19.⁶⁵

Considerations	Practical Advice
Physical Health (COVID-19 infection inducing stress)	<ol style="list-style-type: none"> 1. Stop reading, watching, and hearing news including social media about the pandemic because repeated exposure to information about the COVID-19 infection can induce stress and anxiety. 2. Refrain from spreading unofficial information. 3. Understand that it is normal to feel stressed and afraid in unexpected situations. 4. Take a deep breath, stretch and do yoga or meditation. 5. Pay attention to one's needs, emotions and thoughts. 6. Decide on actions after considering collective and social influences. 7. Refrain from discriminating against or blaming certain individuals or groups for the infection. 8. Take care and encourage yourself 9. Those with mental illness or substance abuse may be particularly vulnerable in an emergency and, as such, should continue for giving treatment. Pay attention to the symptoms, if such thing happen in this case seek medical help.
Social Support System (Social Health)	<ol style="list-style-type: none"> 10. Maintain contact with family and friends. 11. Maintain regular religious activities and contact with local communities. 12. Be informed in advance of where and how to receive counseling and services. 13. Make sure any family member and close friends know when symptoms of sadness, depression and anxiety occur.
Physical Activity (Physical Health)	<ol style="list-style-type: none"> 14. Maintain a daily schedule and exercise pattern to keep health y. 15. Have regular habits to maintain health. 16. Make time for some leisure activities and find fun activities. 17. Maintain a healthy and balanced diet. 18. Get enough sleep. 19. Avoid excessive drinking and drug use. 20. Take prescription drugs as usual.

Therapy Considerations for Special Conditions

1. Older adults with DM

Older patients with uncontrolled diabetes mellitus are more susceptible to secondary bacterial infections that can worsen COVID-19 course of disease.⁶⁸ It requires monitoring of blood sugar, the use of intravenous and subcutaneous insulin, and multidisciplinary cooperation in the application of therapeutic regimens and patient education. Preprandial/fasting blood glucose target for frail older patients is higher (140-180 mg/dL).⁶⁹ In older adults patients with few comorbidities and life expectancy >10 years, the HbA1c target is <7.5%. In older patients with frailty and life expectancy <5 years, the HbA1c target is <8.5%.⁶⁹⁻⁷¹

2. Older adults with Kidney Diseases

The use of antivirals and immunosuppressant drugs used in the treatment of COVID-19 infection can trigger acute kidney injury (AKI).⁷² In older patients with chronic kidney disease (CKD), each drug dosage should be adjusted. For the prevention of thrombosis, LMWH can be given at the same dose without the need for dose adjustment. Tocilizumab can be given at normal doses without the need for a dose adjustment. Remdesivir and favipiravir are not recommended for CKD patients with glomerular filtration rate (GFR) < 30 ml/min/1.73 m² except in severe cases where the benefits outweigh the risks. Hemodialysis (HD) patients must continue to come to the HD unit regularly with airborne isolation room facilities for COVID-19

Table 5. List of Drugs in Type 2 DM Patients Related to COVID-19 Infection.

Drugs of choices	Recommendations
Metformin	Not recommended in patients with severe/critical symptoms, with gastrointestinal disturbances or hypoxia. Can be continued on an outpatient basis if there are no complaints.
Sulfonylureas	Can be continued on an outpatient basis if symptoms are mild. Risk of hypoglycemia if food intake is not adequate.
Alpha Glucosidase Inhibitors	Can be used to control blood sugar after meals. Not recommended in patients with severe/critical symptoms or with gastrointestinal symptoms.
Thiazolidinediones (TZD)	Can be used during treatment with glucocorticoids on an outpatient basis. Risk of fluid retention and not recommended in hemodynamic compromise.
DPP-4 <i>inhibitor</i>	Can be continued if symptoms are mild.
SGLT-2 inhibitor	Not recommended for COVID-19 patients with moderate to severe symptoms due to the risk of dehydration and ketosis.
GLP-1 RA	Continue on an outpatient basis with no gastrointestinal symptoms
Insulin	Generally used in hospitalization with moderate to severe symptoms. Caution the risk of hypoglycemia.
Aspirin	Generally continued on an outpatient basis for secondary prevention of cardiovascular disease.
Statin	Generally continued on an outpatient basis. On inpatient individualization decisions needed along with another considerations.

confirmed, suspected, probable, and close contact patients. CKD patients undergoing Continuous Ambulatory Peritoneal Dialysis (CAPD) are advised to visit the CAPD unit as little as possible. Visit to the CAPD unit only if there is severe peritonitis or infection found at the existing site.⁷²

AKI is common in COVID-19 infection and is associated with viral cytopathic effects, sepsis, and massive activation of the immune system with cytokine storm, hypoxia, rhabdomyolysis, and renal hypoperfusion. Extracorporeal therapies such as hemoperfusion or hemofiltration can be used as renal support therapy.⁷²

3. Older adults with Malignancy

Some cancer therapy modalities and considerations for their administration during COVID-19 infection:

- d. Surgical Treatment: surgical procedures on an elective or non-invasive basis may be delayed, but considering the risk of tumor progression and other therapeutic alternatives. Surgery aimed at reducing symptoms and reducing neurological complications is prioritized in surgical treatment procedures during

COVID-19 infection.

- e. Radiotherapy : need to be postponed if there is no significant benefit or progress. In curative radiotherapy, a short-term hypofraction regimen is given. Intraoperative radiotherapy is considered in the older adults undergoing surgery to reduce outpatient visits. Patients undergoing palliative radiotherapy need to be given a small fraction.
- f. Systemic therapy (including chemotherapy, targeted therapy, hormonal therapy, and immunotherapy): need to consider the higher risk of infection in the treatment group who are myelosuppressed or require more frequent hospital visits.
- g. Palliative Care: discussion of terminal patient care plans and goals. This can be done with the care by telemedicine assistance. It is required to assist communication between the patients and their family.
4. Older adults with Frailty (Pre-Frailty and Frailty)
Older adults patients with COVID-19 had a frailty rate of up to 78%.⁷³ Frailty was

associated with higher mortality risk in older adults with COVID-19.⁷⁴ Some of the interventions that can be chosen for older adults with COVID-19 are physical activity, nutrition, and pharmacology. Physical activity needed is a combination of resistance training, aerobics, coordination and balance training.^{34,75} Recommended protein supplementation (15 grams of milk protein twice a day) for six months or protein consumption of at least 1-1.5 g/kg/day.⁷⁶ Other interventions are in the form of Mediterranean diet, prebiotics, supplementation of antioxidants and multivitamins help improve the condition of frailty.^{77,78}

5. Older adults with Delirium

Delirium is a symptom often found in various serious diseases in older people, including severe COVID-19 infection. Ultra-Brief Confusion Assessment Method can be used for rapid assessment and observation of cognition. With this method is only take less than 1 minute to complete the examination of delirium. Delirium interventions in the older adults who are being treated of COVID-19 infection include orientation interventions, therapeutic activities, improving sleep quality, early mobilization, hearing and vision adaptation, maintaining oral and fluid intake, social minimization, and providing psychoactive medication.⁷⁹

6. Older adults with Dementia

In this current situation of COVID-19 pandemic, isolation affects older people with dementia who have memory and orientation problems and behavioral disorders. Several strategies for treating older adults patients with dementia and COVID-19 infection are described as follows:⁸⁰

1. Mild cognitive impairment or mild dementia

- a. For patients: plan work and activities by day of the week to prevent time disorientation; have a regular sleep schedule; maintain physical health by following a healthy diet, doing sports according

to ability, meditation and cognitive exercise; create contact lists and save emergency contact numbers; think positively and limit yourself to negative news about COVID-19.

- b. For families and nurses: pay more attention to the mental and physical health of patients; routine telecommunications and frequent frequency; seek medical help if there are symptomatic changes in the patient; make sure to only communicate positive things to patients.
 - c. For doctors and health workers: maintain personal hygiene and always use personal protective equipment; check the patient regularly; provide guidelines for personal hygiene and directions for reducing stress; providing tele-counseling; and provide immediate assistance when there are symptoms of acute illness.
- #### 2. Moderate and severe dementia
- Strategies that can be implemented are education on the use of hand sanitizing products; change public equipment to personal; carry out disinfection; periodically check the ventilation of the room; checking body temperature and any symptoms related to COVID-19; perform a COVID-19 test (if needed); provide guidelines for workers; carry out COVID-19 tests on workers regularly.

7. Older adults with Immobilization

Prolonged immobilization causes a decrease in muscle mass, muscle strength, and changes in the structure of muscle contractile proteins, which will cause a decrease in functional status in the older adults. Some of the interventions that can be done to prevent such conditions are:⁸¹

- a. Early Strength Intervention: light to moderate resistance training to prevent loss of muscle mass, muscle strength, and functional capacity, started as soon as possible; regular limb mobilization; progressive resistance training after the acute phase; and active mobilization and

- muscle strength training.
- b. Neuromuscular Electrical Stimulation: performed on critically ill patients who cannot perform physical exercise, combined with dynamic mobilization and functional strength training.
- c. Heat therapy: heat therapy throughout the body to aid muscle recovery, reduce cell damage and protein degradation.

PREVENTIONS

Patients in the convalescent phase often experience persistent symptoms. Several options that can be chosen to reduce the complaints include:⁸²

1. Increase the intensity of activity and exercise gradually, as well as improve breathing technique to reduce shortness of breath.
2. Exercise to improve physical and mental health.
3. Speak unforcefully, opt for other communication media, and stay hydrated in the case of hoarse voice.
4. Regular meal and hydration time in the case of intubated patient, in which swallowing is temporarily or permanently impaired.
5. Seek help in the case of difficulties in returning to daily activities.

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