



FREE COMMUNICATION

## COVID-19 PANDEMIC AND THE ELDERLY AS RISK POPULATION: ASPECTS FOR HEALTH EDUCATION

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### ABSTRACT

**Objective:** discuss the physiopathogenesis of COVID-19 and the clinical vulnerability of the elderly person, in addition to relevant aspects for promoting health and self-care for the elderly.

**Development:** research on the themes was carried out on scientific search platforms, added to official documents from the World Health Organization and the Ministry of Health. The virus that causes COVID-19 basically presents respiratory complications. The senescence process of the respiratory system makes the elderly vulnerable both to infection, as well as to worsening and lethality. Physical activity, adequate nutrition, quality sleep, sun exposure, mental health and spirituality allow the maintenance and promotion of the immune and respiratory systems' health and should be encouraged for the elderly self-care.

**Conclusion:** this reflection contributes to the guidance of health professionals in gerontological nursing care, in the health education procedure of aspects related to the prevention and self-care of the elderly, as a population at risk for COVID-19.

**DESCRIPTORS:** Pandemics; Covid-19; Aging; Nursing.

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## **PANDEMIA DA COVID-19 E IDOSOS COMO POPULAÇÃO DE RISCO: ASPECTOS PARA EDUCAÇÃO EM SAÚDE**

### **RESUMO**

*Objetivo: discutir sobre a fisiopatogênese da COVID-19 e vulnerabilidade clínica do indivíduo idoso, além de aspectos relevantes para promoção da saúde e do autocuidado da pessoa idosa.*

*Desenvolvimento: realizou-se investigação dos temas em plataformas científicas de busca, além de documentos oficiais da Organização Mundial de Saúde e do Ministério da Saúde. O vírus causador da COVID-19 apresenta, fundamentalmente, complicações respiratórias. O processo de senescência do aparelho respiratório torna o idoso vulnerável tanto para infecção, como para agravamento e letalidade. Atividade física, nutrição adequada, qualidade do sono, exposição ao sol, saúde mental e espiritualidade permitem a preservação e promoção da saúde dos sistemas imunológicos e respiratórios, e devem ser estimuladas para o autocuidado do idoso.*

*Conclusão: esta reflexão contribui para orientação de profissionais de saúde no cuidado gerontológico de enfermagem, no procedimento de educação em saúde dos aspectos referentes à prevenção e autocuidado dos idosos, como população de risco para COVID-19.*

**DESCRITORES:** Pandemias; Covid-19; Idoso; Envelhecimento; Enfermagem.

## **PANDEMIA DE COVID-19 Y ANCIANOS COMO POBLACIÓN DE RIESGO: ASPECTOS PARA EDUCACIÓN EN SALUD**

### **RESUMEN:**

*Objetivo: Discutir sobre la fisiopatogénesis del COVID-19 y la vulnerabilidad clínica del anciano, además de aspectos relevantes para promoción de salud y autocuidado del anciano. Desarrollo: Temas investigados en plataformas científicas de búsqueda y en documentos oficiales de la Organización Mundial de la Salud y del Ministerio de Salud. El virus que provoca el COVID-19 presenta, principalmente, complicaciones respiratorias. El proceso de senescencia del aparato respiratorio hace al anciano vulnerable a la infección y a su agravamiento y letalidad. Actividad física, nutrición adecuada, calidad del sueño, exposición al sol, salud mental y espiritualidad permiten la preservación y promoción de salud de los sistemas inmunológicos y respiratorios, y deben estimularse para el autocuidado del anciano. Conclusión: Esta reflexión contribuye a orientar a profesionales de salud en el cuidado gerontológico de enfermería, en educación en salud sobre aspectos referentes a prevención y autocuidado del anciano como población de riesgo de COVID-19.*

**DESCRIPTORES:** Pandemias; COVID-19; Anciano, Envejecimiento; Enfermería.

## INTRODUCTION

COVID-19 is an infectious disease caused by the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), conventionally called the new coronavirus. It has an average incubation period of 5.5 days and symptoms appear in up to 11 days in 97.5% of infected people<sup>(1)</sup>. COVID-19 was considered a pandemic by the World Health Organization (WHO) on March 11<sup>th</sup>, 2020<sup>(2)</sup>.

The disease presents respiratory complications, with a 29% occurrence of acute respiratory distress syndrome (ARDS). Although the mean age of those affected is 49 years, lethality is higher among people aged 60 years or older or with a history of diseases<sup>(3)</sup>. Among the elderly aged 60 to 69 years, the lethality is 3.6%, higher than the mortality of the general population of 2.8%, among the elderly from 70 to 79 years old, the lethality is 8% and among those of 80 and over, more than 14.8%<sup>(3,4)</sup>.

In Brazil, until April 20<sup>th</sup>, 2020, a total of 2,575 deaths were registered as COVID-19, representing a lethality of 6.3%. Among confirmed deaths, 72.5% were over 60 years old and 70% had at least one morbidity. Heart disease was the main associated comorbidity and was present in 43.2% of deaths in the general population, followed by diabetes (33.6%), pneumopathy (8.6%), kidney disease (7.3%) and neurological disease (7.3%). In all risk groups, most individuals were elderly, except for obesity<sup>(5)</sup>.

Having the elderly population as a piece of the risk group for infection, worsening and lethality by SARS-CoV-2, health education is necessary for the effectiveness of health promotion aimed at this specific population. This article aims to discuss the pathophysiology of COVID-19 and the clinical vulnerability of the elderly person, besides relevant aspects for promoting health and self-care for the elderly.

## DEVELOPMENT

To meet the purpose of this communication, updated references on COVID-19 were used, by searching in prominent journals in the area, such as Cell Discovery and The Lancet, besides official documents from WHO and the Ministry of Health. As for the other aspects listed, a search was performed using the Pubmed and Scielo platforms, using the terms: "aging", "immune system", "exercise", "nutrition", "sleep and health", "mental health".

Articles were selected after applying the publication date filter (>2012) and studies with elderly people. It is worth mentioning that other scientific bibliographies were included, which were not in the investigated platforms, but which are considered by the authors as relevant to the contextualization of the mentioned themes.

With the arrival of a new virus, for which the human species has not yet developed immune resistance, the elderly, who have a less responsive body defense system compared to the general adult population, have greater difficulty in reacting and fighting the new virus. Another critical factor of the coronavirus is its tropism by the respiratory system, which also presents several changes with advancing age<sup>(6)</sup>.

### **SARS-CoV-2 and clinical vulnerability of the elderly**

The SARS-CoV-2 virus belongs to the Coronavirinae subfamily of the Coronaviridae family, and this subfamily includes four genera: Alphacoronavirus, Betacoronavirus, Gammacoronavirus and Deltacoronavirus, and the COVID-19 virus belongs to Betacoronavirus. Its genome is a single chain of ribonucleic acid (RNA). SARS-CoV-2 goes in

via the key-lock mechanism through the ACE2 receptor and the serine protease TMPRSS2 acts as scissors to break the virus's RNA and enter the host cell<sup>(6)</sup>.

The ECA2 receptor acts as a counter-regulating mechanism to produce Angiotensin II, by the enzyme responsible for inactivating it. In the lungs, ACE2 acts on the alveolar epithelial cells I and II, protecting the lungs, with anti-inflammatory action. Worth noting that, besides the hypertensive mechanism of vasoconstriction, the binding of Angiotensin II to AT2R1 receptors is associated with the activation of cells of the immune system and the production of inflammatory cytokines. However, SARS-CoV-2, when using the ACE2 receptor to enter the cell, causes decreased expression of these receptors, either by filling its binding site or by the destruction of the invaded cell<sup>(7)</sup>.

The consequence of this process is the intensified activation of Angiotensin II, due to the lack of the ACE2 counter-regulating mechanism. The expression of ACE2 in lung cells is found in type II alveoli, which accounts for only 5% of alveolar cells, but have two vital functions: 1. in alveolar cells of surfactants and 2. in precursors of type I alveoli, responsible for 95% of alveolar cells. Therefore, the target cell attacked by SARS-CoV-2 is involved in the reserve of regenerative cells and the production of surfactants, which are essential events for the repair of the alveolar damage<sup>(8)</sup>.

These findings could then explain the disease's so varied clinical spectrum, and its differences between young and old. In healthy adults, there is a greater number of ACE2 receptors, associated with a greater capacity for regeneration and a more efficient immune response, with few or no symptoms. On the other hand, the elderly people have less expression of ACE2 or the presence of comorbidities, such as hypertension and heart disease, which interfere with the angiotensin system, or diabetes, which impairs the immune system. In these individuals, the greater viral load and the lasting damage of cells that express ACE2 lead to loss of regenerative capacity, causing pulmonary inflammation and a great risk of developing ARDS, due to the uncontrolled inflammatory response<sup>(7,9)</sup>.

Besides, the aging process of the respiratory system makes elderly individuals more vulnerable to respiratory complications by SARS-CoV-2, to mention: the decrease in the number of pulmonary macrophages, which results in less ability to cope with respiratory infection; the decrease in the elasticity of tissues, alveoli, lower pulmonary lobes and decrease in the number of capillaries, which results in an accumulation of secretions in the lungs and decreased gas exchange; musculoskeletal changes in the rib cage (barrel chest), making it more resistant, decreasing the ability to breathe deeply and cough, an important reaction to eliminate excess secretion in the airways<sup>(8)</sup>.

In the next themes, the aspects that control the immune system and that help the respiratory system are listed, as well as the attitudes of maintenance and health promotion of the elderly that can be addressed by health professionals in the health education procedure.

## Physical activity

Aging comes with changes in the immune system, a process known as immunosenescence. This state is characterized by changes in the size of T cells, the pattern of cytokine secretion, cellular capacity, and production of antibodies, which result in a pro-inflammatory state and a decreased ability to respond to new antigens<sup>(10)</sup>. Added to interactions with pathogens, the host's microbiome and nutrition, exercise and stress, and many other external factors, are crucial modulators of this immunosenescence process<sup>(11)</sup>.

The practice of physical activities is associated with the efficiency of the immune system, by increasing the proliferative capability of T cells, increasing neutrophil function and cytotoxic activity of Natural Killer (NK) cells, enabling the purpose of destroying tumor or virus-infected cells and decreasing stress. The need of encouraging regular exercise in the elderly is highlighted, as it minimizes the effects that old age causes in the immune system, such as the decrease in the proliferative response of immune cells<sup>(11,12)</sup>.

The WHO recommends that the elderly perform daily physical activity totaling 75 minutes a week with high-intensity aerobic exercises for 150 minutes a week of moderate-intensity, with muscle strengthening twice a week<sup>(13)</sup>.

## Nutrition

The inflammation, oxidative stress and aging of immune cells triad are important mechanisms that can be improved through adequate nutrition<sup>(14,15)</sup>. The intestinal microbiota can have an impact on aging-related deterioration due to its nutritional and immunomodulatory action<sup>(16)</sup>. The aging process leads to changes in the intestinal microbiota and changes in the immune response, which may be associated with an increased risk of disease<sup>(17)</sup>.

Inadequate ingestion of foods such as soft drinks and sugars can influence the development of metabolic diseases and accelerated cell aging<sup>(18)</sup>. Obesity can be a factor that contributes to the cumulative load of oxidative stress, chronic inflammation throughout life and, therefore, contributes to the accelerated telomeres shortening<sup>(19)</sup>.

Therefore, the supply of micro and macronutrients and antioxidant foods is essential for the good immune response and energy supply necessary for the elderly body functioning<sup>(20)</sup>. Micronutrients are essential vitamins and minerals for the body to function. Vitamins A, E, C and D and the iron, zinc, selenium and magnesium minerals are modulators of the strengthening of the immune system and are found in foods such as fish, oysters, eggs, spinach, kale, beets, whole grains, beans and fruits oilseeds (nuts, chestnuts and almonds), meat in general, poultry and seafood, Brazil nuts and cashew nuts, among others<sup>(21)</sup>. Macronutrients are the basic substances for the body's nutrition and relate to carbohydrates, proteins, and fats. Protein deficiency in the diet impairs immune function. Amino acids play an important role in regulating the body's defense cells. To ensure protein intake, it is important to eat meat, chicken, fish, eggs, milk and dairy products, beans, legumes, nuts, and oilseeds. Antioxidant foods such as citrus fruits and berries, and bioactive compounds (probiotics, such as yogurts, fermented milk drinks, kefir and kombucha) work in disease prevention and the immune system defense<sup>(22)</sup>.

With progressing age, total body water decreases, due to the reduction of fluid among cells, increasing the risk of dehydration and complications of the respiratory tract. Adequate fluid replacement is crucial<sup>(8)</sup>.

## Sleep quality

Sleep deprivation decreases the production of defense cells and the metabolism of free radicals, that is, it affects immunity and increases inflammatory processes. Sleep deprivation is almost always related to stressful events, which cause an increase in the activity of the sympathetic nervous system which, in response, releases too much glucocorticoid that causes an immunosuppressive action in the human body. Nevertheless, current studies associate chronic insomnia with immunological changes, due to the reduction of CD3, CD4 and CD8 cells<sup>(23)</sup>.

Sleep-deprived people are 4.5 times more likely to develop colds and flu compared to those who sleep at least 8 hours per night<sup>(24)</sup>. According to the National Sleep Foundation, the recommended sleep duration of 24 hours for the elderly is 7 to 8 hours<sup>(25)</sup>. However, with the senescence process, there is a decrease in the production of the melatonin hormone, whose functions affect the circadian rhythm, interfering in both the quality and quantity of sleep. The main complaints of the elderly concerning sleep are: increased awakenings after falling asleep, need for naps during the day, fragmented sleep and changes in the amplitude of the circadian rhythm<sup>(26)</sup>.

However, despite these frequent complaints, such changes should not be belittled. The multi-professional health team needs to be observant to intervene when necessary,



whether in drug treatment or not, or in prevention. In the latter, keeping healthy habits such as physical activity, adequate nutrition, sleep hygiene practice are important allies in maintaining sleep quality<sup>(27)</sup>.

## Sun exposure

Sun exposure, in addition to assisting in the quality of sleep through the sleep-wake cycle, activates the vitamin D production, considered an antidote for depression, important in increasing vitality and improving the immune system. The immunoregulatory activity of vitamin D can be understood for its purposes in the immune system, by regulating the differentiation and activation of CD4 lymphocytes; increasing the number and function of regulatory T cells; decreased production of interferon-g, IL-2 and TNF-a from Th1 cells and Th17 cell function stimulus, contributing to the increase of the body's innate immunity. It is recommended that the elderly be exposed to sunlight for 15 to 20 minutes a day, preferably before 10 am and after 4 pm<sup>(28)</sup>.

## Mental health and spirituality

More and more, science highlights the value of spirituality in the individuals' general well-being, through the increase of essential biomarkers for the modulation of stress and inflammatory reactions. Stress, in turn, can be damaging to the body from an immunosuppressive response related to the excessive release of pro-inflammatory stress hormones. The discovery of bidirectional communication between the neuroendocrine, neurological, and immune systems, called psychoneuroimmunology, allowed the relationships between physical, psychosocial stressors and the immune response<sup>(29)</sup>.

In this context, simple actions in daily life, such as meditation, dancing, walking, praying, gardening, painting, gratitude practice, connection with domestic animals, dedication to life projects, among others, help in handling problems and crisis management. These practices, added to social empowerment with friends and family, even if virtually, contribute to healthy aging based on a satisfactory and hopeful life<sup>(30)</sup>.

## FINAL CONSIDERATIONS

The elderly make up the population at risk for COVID-19 and the aspects related to this vulnerability were addressed in this communication, aiming to encourage health professionals to use this information in the health education procedure for the elderly and those in contact.

This reflection contributes to the guidance of health professionals, especially of primary health care and gerontological nursing care, regarding prevention, health promotion and self-care of the elderly, as a population at risk for COVID-19.

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