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REVIEW ARTICLE

Risk factors and mortality linked to COVID-19 in geriatric patients

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ABSTRACT

Introduction: the impact of COVID-19 on the geriatric population represents a global health challenge, given their high clinical and social vulnerability.
Objective: to analyze the risk factors and mortality associated with COVID-19 in elderly patients.
Methods: a systematic bibliographic review was conducted in international databases, using key terms related to geriatrics, COVID-19, comorbidities, and mortality. Articles published in English and Spanish between 2020 and 2025 were included, selected for relevance, methodological rigor, and thematic pertinence. The analysis was carried out through narrative synthesis and critical comparison of findings.
Development: the literature shows that immunosenescence, together with various comorbidities, increases the severity of COVID-19 in older adults. Clinical manifestations are often atypical, hindering early diagnosis and increasing complications. At the biochemical level, exacerbated inflammatory response and oxidative stress favor multiorgan failure, while morphologically, pulmonary and cardiovascular changes inherent to aging predispose to severe outcomes. Vaccination has significantly reduced mortality, although immune response may be less robust in this group, with post-COVID rehabilitation programs emerging as complementary strategies to improve quality of life.
Conclusions: findings confirm that advanced age and comorbidities are critical determinants of mortality in geriatric patients with COVID-19. An integral, multidisciplinary, and personalized approach is required, combining prevention, timely diagnosis, adapted treatment, and rehabilitation, with special attention to social inequalities and equitable access to health services.

Keywords: Aged; COVID-19; Risk Factors; Immunosenescence; Mortality.

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INTRODUCTION

Studies on the general foundations of COVID-19 in specific populations such as geriatric patients reveal a complex, multifaceted problem requiring urgent and specialized attention from health systems. [1] The vulnerability of geriatric patients stems from a combination of immunological factors, comorbidities, and social circumstances that place them at higher risk of developing severe infections. As people age, the immune system undergoes immunosenescence—characterized by decreased production of immune cells and reduced capacity to respond to new antigens. [2]

This weakening is further exacerbated by chronic conditions such as diabetes, hypertension, and cardiovascular diseases, which are prevalent in the elderly population. Additionally, social factors—including isolation and limited access to quality healthcare—increase both the risk and severity of COVID-19 in these patients, further deteriorating their health status. [3]

Clinical manifestations of COVID-19 in geriatric patients differ markedly from those observed in younger adults. In older individuals, classic symptoms such as fever, cough, and respiratory distress may be less prominent; instead, atypical symptoms like confusion, delirium, and generalized weakness—leading to falls—may predominate.[4] This atypical clinical picture can result in delayed diagnosis and faster disease progression, highlighting the need for specific management and treatment strategies for this population. Complications are also more common and severe in geriatric patients, including pneumonia, acute respiratory failure, and acute respiratory distress syndrome (ARDS).[5]

Management and treatment of COVID-19 in geriatric patients must consider not only the viral infection but also the ongoing management of comorbidities and prevention of complications. Administration of antivirals, oxygen therapy, and—in severe cases—mechanical ventilation should be accompanied by coordinated efforts among physicians, nurses, and social workers to provide comprehensive care and improve patients' quality of life.[6]

Furthermore, it is vital to understand the biochemical, morphological, and genetic bases influencing the disease—particularly in Latin America, where the elderly population is growing. The COVID-19 pandemic has disproportionately affected geriatric populations, especially those with comorbidities. Patients over 65 years represent a large proportion of hospitalizations and deaths due to the high prevalence of chronic diseases in this age group.[7] It is essential to monitor vital signs and assess oxygen saturation to determine initial disease severity. Additionally, basic laboratory tests—including complete blood count, metabolic panel, and inflammatory markers (CRP, IL-6)—are recommended to evaluate the inflammatory response and detect potential complications.[1]

Management of geriatric patients with COVID-19 must be individualized, taking into account frailty, baseline functional status, and patient preferences. Therapeutic decisions should balance the benefits and risks of interventions, avoiding overly aggressive treatments that may not be tolerated by older adults. [1,8]

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The COVID-19 pandemic has exposed the profound vulnerability of geriatric patients—especially those living in poverty or with limited access to health services—exacerbating existing inequalities. The health response must be comprehensive and multidisciplinary, incorporating information technologies to facilitate telemedicine, ensuring equitable vaccination, and promoting post-COVID rehabilitation programs addressing physical and psychological sequelae. Coordination across levels of care, alongside policies reducing social and technological gaps, is essential to improve quality of life and reduce mortality in this group. These findings underscore the need for resilient health systems capable of adapting to emergencies and guaranteeing equitable, high-quality care for the geriatric population.[9,10,11,12,13,14] This context motivated the present review, which aimed to analyze risk factors and mortality linked to COVID-19 in elderly patients.

METHODS

Study Design

A systematic literature review was conducted following PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. The objective was to identify and synthesize available evidence on risk factors and mortality associated with COVID-19 in geriatric patients. The search period spanned from January 2010 to June 2024, encompassing both pre-pandemic studies on vulnerability in older adults and those published during the SARS-CoV-2 pandemic. The design adopted a descriptive and comparative approach, integrating clinically, epidemiologically, and therapeutically relevant findings for medical practice and public health.

Information Sources and Search Strategy

The bibliographic search was performed in major biomedical and multidisciplinary databases: PubMed/MEDLINE, SciELO, ScienceDirect, Google Scholar, LILACS, and BVSALUD. These sources were selected for their international coverage and relevance in disseminating scientific literature in Spanish, English, and Portuguese. Secondary references from bibliographies of relevant articles were also reviewed, and gray literature (theses, technical reports, institutional documents) was considered when meeting methodological quality criteria and offering full-text access. Inclusion of gray literature broadened the evidence base and reduced publication bias, especially for regional Latin American studies.

The search strategy employed a structured algorithm with keywords and Boolean operators. Terms included: "COVID-19" AND "older adults," "SARS-CoV-2" AND "risk factors OR mortality," "geriatrics" AND "COVID-19 prognosis," and "elderly patients" AND "COVID-19 outcomes." Boolean operators AND and OR were used to combine and expand results, while truncation and quotation marks refined precision. Articles in Spanish, English, and Portuguese were included without geographic restriction to ensure broad and representative coverage.

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Selection Process

The selection process followed PRISMA recommendations. Initially, approximately 700 records were identified across consulted databases. After duplicate removal and title/abstract screening, the sample was reduced to 300 potentially relevant articles. Full-text reading subsequently excluded studies lacking clinical or methodological relevance. Ultimately, 72 articles meeting established quality and relevance criteria were included. The process was illustrated using a PRISMA flow diagram (Figure 1), depicting identification, screening, eligibility, and inclusion phases.

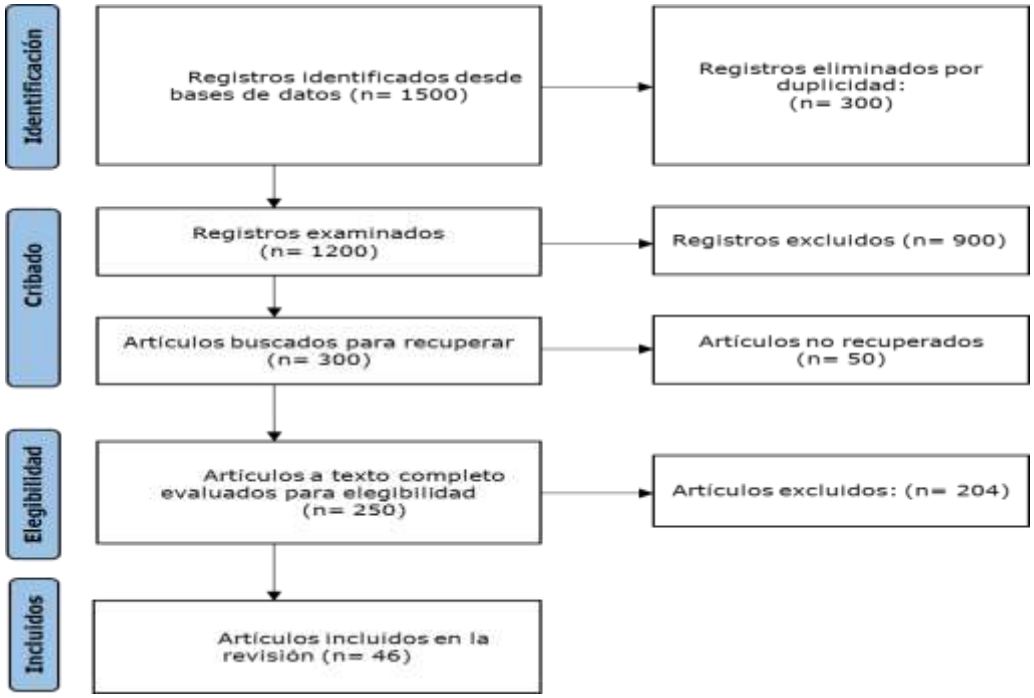

Figure 1. PRISMA flow diagram.

Studies published within the defined timeframe (2010–2024) that directly addressed risk factors and mortality in geriatric patients with COVID-19 were included. Original articles, systematic reviews, meta-analyses, and case reports with relevant clinical, prognostic, and therapeutic data were accepted. Duplicates, articles without full-text access, irrelevant publications, studies outside the temporal range, and those lacking verifiable clinical data were excluded. Rigorous application of these criteria ensured information validity.

Data Extraction and Analysis

Data extraction was performed systematically using an analysis matrix designed to collect key variables: author, publication year, study design, sample size and characteristics, risk factors assessed, main results, and conclusions. A qualitative synthesis of findings was conducted, integrating information into thematic categories (comorbidities, frailty, mortality, respiratory and cardiovascular complications). Where studies presented homogeneous quantitative data, an exploratory meta-analysis was considered; however, methodological and population

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heterogeneity limited this approach, leading to a comparative narrative synthesis. Integration of results enabled identification of common patterns, discrepancies, and knowledge gaps, offering a critical and updated perspective on the topic.

RESULTS

The initial search identified a total of 312 records in international databases. After applying inclusion criteria (publications between 2020 and 2025, studies in English and Spanish, geriatric population ≥65 years, analysis of risk factors and mortality associated with COVID-19) and exclusion criteria (duplicates, non-geriatric samples, or lack of mortality data), 47 articles were finally selected for qualitative synthesis.

Included studies originated primarily from Latin America, Europe, and Asia, with observational designs, prior reviews, and meta-analyses. Most research reported that advanced age and comorbidities (diabetes, hypertension, cardiovascular disease, and chronic lung disease) significantly increase severity and mortality from COVID-19. Atypical clinical manifestations in older adults—such as confusion and delirium—were also described, complicating early diagnosis.

Biochemically, an association was documented between exaggerated inflammatory response, oxidative stress, and increased risk of multiorgan failure. Morphologically, age-related pulmonary and cardiovascular changes predispose to severe outcomes. Regarding interventions, vaccination consistently reduced mortality, although immune response was weaker in frail patients. Complementary strategies—including telemedicine and post-COVID rehabilitation programs—were identified as useful for improving quality of life.

Overall, results confirm that advanced age, frailty, and comorbidities are critical determinants of mortality in geriatric patients with COVID-19, reinforcing the need for an integrated, multidisciplinary approach.

From a biochemical perspective, COVID-19 severely affects geriatric patients due to an exaggerated inflammatory response. SARS-CoV-2 infection triggers the release of proinflammatory cytokines such as interleukin-6 (IL-6) and tumor necrosis factor-alpha (TNF-α). In older adults, this cytokine storm can lead to systemic inflammatory response syndrome, increasing the risk of multiorgan failure. Reduced antioxidant levels and diminished capacity to manage oxidative stress further aggravate this situation, resulting in greater susceptibility to infections and increased risk of severe complications.[15]

Morphologically, aging induces structural changes in organs and tissues that predispose geriatric patients to severe infections. For example, the lungs exhibit decreased elasticity and increased chest wall rigidity, limiting respiratory capacity. Loss of ciliated cells and reduced mucus production in the upper airways impair pathogen clearance from the respiratory tract, facilitating viral colonization and pneumonia progression in susceptible individuals.[16]

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Genetically, geriatric patients may carry variations in immune-response–related genes affecting susceptibility to COVID-19. Polymorphisms in the ACE2 gene—which encodes the SARS-CoV-2 receptor—may influence viral affinity for host cells and disease severity.[1] Variants in genes involved in inflammation and coagulation, such as IL-6 and F2, may predispose patients to dysregulated inflammatory responses and thrombotic events commonly observed in COVID-19.[17]

In Latin America, the high prevalence of comorbidities among older adults—such as diabetes and cardiovascular diseases—exacerbates the impact of COVID-19. Inequities in healthcare access and health system limitations worsen this scenario. Socioeconomic and cultural factors also play a key role, as overcrowding and poor living conditions increase transmission risk and complications.[18]

Therefore, COVID-19 management in geriatric patients in this region must adopt a multidisciplinary approach, including antivirals and anti-inflammatories alongside adequate nutritional support. Vaccination is fundamental to reduce disease incidence and severity. Additionally, public health policies addressing inequalities and improving access to quality medical services are urgently needed.[19]

COVID-19 presents complex molecular and biochemical implications in geriatric patients. Understanding these mechanisms is crucial for developing effective interventions and improving clinical outcomes in this highly vulnerable population. SARS-CoV-2—the virus causing COVID-19—uses its Spike protein to bind to the ACE2 receptor on human cells, facilitating entry. In older adults, ACE2 expression may vary, influencing susceptibility and infection severity.[20]

Viral binding to ACE2 triggers a cascade of molecular events leading to viral internalization and replication within host cells—particularly affecting pulmonary epithelial cells. The dysregulated immune response in critically ill patients results in a cytokine storm, releasing large amounts of inflammatory mediators—as previously noted—that damage tissue and may cause organ failure. In this context, oxidative stress plays a crucial role in COVID-19 pathogenesis in older adults.[21]

Excessive production of reactive oxygen species during infection can damage lipids, proteins, and DNA.[22] In critically ill patients, antioxidant capacity is diminished, exacerbating cellular damage; this imbalance contributes to chronic inflammation and functional deterioration of key organs—including lungs, heart, kidneys, and liver.[14] COVID-19 is also associated with thrombotic complications due to endothelial dysfunction and coagulopathy. Preexisting conditions such as atherosclerosis and hypertension worsen this tendency, increasing the risk of deep vein thrombosis, pulmonary embolism, and cerebrovascular events.[23]

Treatment of COVID-19 in older adults may be complicated by variability in response to antivirals and other medications. Genetic differences and polymorphisms in drug-metabolizing genes affect treatment efficacy and safety. Additionally, viral resistance—potentially developing with prolonged antiviral use—requires therapy adjustments and exploration of alternative treatments.[24]

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Management of COVID-19 in geriatric patients requires detailed classification considering clinical variability and population-specific characteristics. This classification is based on disease severity, clinical manifestations, and complications, providing guidance for patient management and treatment.[15] Disease severity is typically categorized as mild, moderate, severe, or critical. In older adults, mild cases may present minimal respiratory symptoms without significant hypoxemia, whereas severe cases involve respiratory distress with oxygen saturation <94 % on room air.[24] Critical cases involve respiratory failure and multiorgan dysfunction that significantly endanger the patient.[25]

Within each severity category, cases can be further classified based on specific clinical manifestations. In older adults, atypical symptoms—such as confusion, delirium, and falls—may occur instead of classic respiratory syndromes. This classification helps identify patients requiring intensive interventions and close monitoring. SARS-CoV-2 variants—including Alpha, Beta, Gamma, Delta, and Omicron—also play an important role in disease classification.[26]

In critically ill patients, certain variants may be more dangerous due to their ability to evade prior immunity and cause severe lesions. Comorbidities are crucial in classifying COVID-19 in geriatric patients; conditions such as diabetes, hypertension, and chronic cardiovascular and pulmonary diseases significantly influence prognosis and management.[23] The presence of multiple comorbidities increases the risk of complications and mortality, necessitating a multidisciplinary treatment approach. Additionally, associated complications—such as secondary pneumonia, acute kidney injury, coagulopathies, and delirium—are critical factors in disease classification among older adults.[27]

These complications not only affect disease severity but also influence treatment strategies and long-term prognosis. Assessment of frailty and functional status is essential in classifying COVID-19 in elderly patients.[15] Frailty—a syndrome characterized by reduced physiological reserve and resistance to stressors—is associated with worse clinical outcomes and higher mortality in patients with COVID-19.[28]

Vaccination has proven effective in reducing severity and mortality from COVID-19 in geriatric patients. Disease classification should consider the patient's vaccination status—including number of doses received and vaccine type—as immunization provides an additional layer of protection, although immune response may be less robust in older adults—especially those with immunodeficiency or comorbidities.[29]

All comorbidities, current medications, and specific symptoms must be documented. Vital sign measurement and oxygen saturation assessment are essential to determine initial disease severity.[27] Basic laboratory tests—including complete blood count, CRP, and liver and kidney function tests—are recommended. Diagnostic techniques include PCR testing for viral confirmation.[30]

Radiological imaging—such as chest X-ray and computed tomography (CT)—is essential to evaluate pulmonary involvement. In geriatric patients, CT is particularly useful for detecting pulmonary infiltrates and complications such as ARDS. A thorough clinical history, including comorbidities, is fundamental for treating COVID-19 in older adults.[31]

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Cardiovascular diseases, diabetes, respiratory conditions, and obesity require specific treatment adjustments. For example, diabetic patients must closely monitor glucose levels and adjust medications as directed by healthcare personnel.[19] Patients with cardiovascular diseases need careful anticoagulation management and blood pressure control, emphasizing that treatment must be individualized. Some antivirals—such as remdesivir—may be used to reduce viral load but must be administered with caution regarding potential side effects.[31] Corticosteroids—such as dexamethasone—are effective in reducing inflammation in severe cases. Anticoagulant therapy is used to prevent complications.[32]

Additionally, nutritional supplements and vitamins should be considered to support a deficient immune system. Close monitoring of vital signs, oxygen saturation, and daily laboratory parameters is essential. Any clinical deterioration—such as worsening dyspnea or onset of confusion—must be immediately evaluated by healthcare staff. Therefore, periodic reevaluation of comorbidities and antiviral/anti-inflammatory treatment efficacy is essential to optimize therapies and achieve better clinical outcomes.[33]

Antivirals such as remdesivir—as previously noted—are a management option for critically ill COVID-19 patients. Remdesivir has been shown to reduce viral load and improve recovery times in older adults.[34] However, its use in Latin America faces challenges related to access and drug cost. In many countries in the region, availability is limited, and high prices can be a major barrier.[28]

Corticosteroids—particularly dexamethasone—are equally essential in treatment, reducing mortality in patients requiring oxygen therapy or ventilation. In Latin America, dexamethasone is widely available and represents a viable option to counteract the inflammatory response in critically ill patients, clearly improving outcomes.[26] The risk of thrombotic complications in geriatric COVID-19 patients necessitates anticoagulant use—such as low-molecular-weight heparin—to reduce thromboembolic events. In Latin America, anticoagulant use faces challenges including adequate monitoring and medication access.[24] Nevertheless, thrombosis prevention is crucial to reduce mortality and severe complications in this population segment.[28]

Supportive therapy—including oxygen therapy and mechanical ventilation—is fundamental in managing critically ill COVID-19 patients. Oxygen therapy can significantly improve oxygen saturation in hypoxemic patients.[27] In the most severe cases, non-invasive or invasive ventilation may be necessary. In Latin America, availability of respiratory support equipment is often limited in underdeveloped health systems, negatively impacting outcomes. Management of comorbidities in critically ill COVID-19 patients—such as hypertension, diabetes, and cardiovascular diseases—must be strictly controlled.[35] Similarly, malnutrition—a frequent problem among the elderly in Latin America—must be addressed integrally through supplementation programs to improve health and support recovery.[23]

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In Latin America, the elderly population has been particularly affected by the pandemic. Infection and mortality rates are significantly higher in older adults due to weakened immune responses and the presence of comorbidities. Countries such as Brazil and Mexico have reported high comorbidity burdens in older adults, underscoring this population's vulnerability to COVID-19. Health service access inequalities—exacerbated during the pandemic—have negatively impacted treatment outcomes.[36]

In Latin America, where access to intensive care may be limited, mortality among elderly patients with COVID-19 remains high to this day.[37] Public health policies must prioritize protection and treatment of this vulnerable population to improve survival. Respiratory complications are common in geriatric patients; viral pneumonia can rapidly progress to acute respiratory distress—especially in individuals with chronic respiratory diseases such as COPD.[38]

Respiratory failure requires rapid and appropriate interventions, but in many areas of Latin America, lack of resources and mechanical ventilation equipment limits treatment options, increasing elderly mortality. Cardiovascular complications are also more frequent in these patients due to the high prevalence of hypertension and heart disease. COVID-19 can cause myocarditis, arrhythmias, and exacerbate heart failure.[23] Patients with cardiovascular comorbidities face significantly higher risks of adverse events and even sudden death. In Latin America, management of these complications is hindered by limited access to specialized care and appropriate medications.[39]

Metabolic complications—such as hyperglycemia and diabetic ketoacidosis—are frequent in geriatric patients with diabetes. Strict glucose control is essential to avoid these complications. However, in many regions of Latin America, limited access to insulin and other necessary medications hinders proper management, leading to malnutrition and generalized debilitation that further worsen health status and increase complication and mortality risks.[40]

Older adults—especially those with weakened immune systems—experience more severe infections. The body's diminished immune capacity makes it harder to combat the virus, and comorbidities such as hypertension and cardiovascular diseases impair the ability to withstand the physiological stress caused by SARS-CoV-2 infection.[28] Social factors—including isolation and limited access to quality healthcare during peak pandemic periods—were devastating for these patients. In Latin America, social isolation often resulted in reduced emotional and physical support, further deteriorating patients' health and recovery capacity.[41]

Clinical manifestations in geriatric patients can differ significantly from those in younger adults who have experienced the virus. Management must go beyond multidisciplinary care to include strict personalization based on preexisting comorbidities. However, coordinated work among therapists, nurses, and physicians is essential and must be held accountable.[39]

A distinct aspect is aging itself, which leads to profound immunosuppression—not only due to bodily changes over time but also due to accumulated illnesses. This combination increases susceptibility to SARS-CoV-2 infection and reduces the capacity to mount an effective defense. Care for geriatric patients must include consideration of psychological aspects and emotional support to mitigate atypical mood states.[42]

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Combined efforts are essential to provide a standard of care and quality of life for these individuals throughout the illness course. Management of geriatric patients is complex and multifaceted, requiring coordinated, comprehensive care that addresses both the viral infection and preexisting comorbidities. Testing, prevention through vaccination, and adherence to hygiene and social distancing measures are essential to protect this highly vulnerable population.[43,44,45,46]

CONCLUSIONS

Older adults with comorbidities such as diabetes, hypertension, and cardiovascular diseases exhibit a weakened immune system due to immunosenescence and "inflammaging," making them more vulnerable to severe infections and increasing the risk of complications and mortality from COVID-19. Although this study used a non-representative sample, its findings align with WHO and PAHO reports on clinical manifestations in geriatric patients, contributing detailed epidemiological data by age and sex. Older adults may present atypical symptoms—including confusion, delirium, and weakness—delaying diagnosis and favoring progression to pneumonia or acute respiratory distress syndrome. Their management demands a multidisciplinary approach addressing both infection and comorbidities, ensuring comprehensive care and quality of life. In Latin America, socioeconomic inequalities and health system limitations intensify the pandemic's impact on this population, underscoring the urgency of public policies that reduce gaps and improve access to quality medical services.

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