

## RESEARCH ARTICLE

# Approaches of Reducing the Incidence of Arvi Among Elderly Patients

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## ABSTRACT

The article investigates approaches to reducing the incidence of acute respiratory viral infections among elderly patients. According to the author, in comparison with young people, respiratory viral infection in people over 65 years of age is associated with increased morbidity and mortality. Elderly patients may have severe lower respiratory tract infections, pneumonia, or exacerbation of chronic multimorbid conditions. Additional problems arise due to the fact that elderly patients often do not have fever or respiratory symptoms, but have atypical symptoms, including weakness, confusion and falls. This leads to a failure in diagnosis, an increase in morbidity, the appointment of additional drugs and further nosocomial spread. Currently, it is necessary to introduce sensitive and rapid diagnostics at the place of medical care to detect all viruses and treat infected elderly patients. This will make it easier to understand the true burden of respiratory viruses. To protect the aging immune system, it is now important to combine this with the development of expanded vaccination strategies and new antiviral therapeutics

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## INTRODUCTION

With the world's population over the age of 60 projected to more than double over the next 35 years, the care of elderly patients is becoming a major global health issue. In 2016, more than 1 million people over the age of 70 died from lower respiratory tract infections, while 13-31% died due to viral infections.<sup>1</sup>

In old age, there is the greatest risk factor for morbidity and mortality, as revealed by the results of the coronavirus pandemic. Thus, the burden of respiratory viral infections in the elderly is becoming an increasingly unmet clinical need.

Special problems arise due to the interaction of many factors, including complex multimorbid conditions, a decrease in physiological reserve and aging of the immune system. Moreover, their atypical manifestation of symptoms can lead to a delay in the necessary care, the appointment of additional medications and a long stay in the hospital. This leads to morbidity and mortality and further intrahospital spread.<sup>2</sup>

Doctors currently have limited access to sensitive methods of diagnosing ARVI. In addition, one more negative factor is the lack of effective antiviral drugs.<sup>3</sup> However, in the modern period, it is extremely important to fully understand and assess the burden of respiratory viruses in the elderly. Doing this with the help of prospective screening studies for all respiratory viruses will help develop a preventive policy in this direction and justify clinical trials of new therapeutic agents. The aim of the study is to consider approaches to reducing the incidence of acute respiratory viral infections among elderly patients.

## MATERIALS AND METHODS

In the course of the study, materials devoted to the study of the problem under consideration were examined, comparative and analytical research methods were used in the processing of the data obtained.

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### KEYWORDS:

acute respiratory viral infections, elderly patients, morbidity reduction, prevention, patronage.

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## RESULTS

Ensuring the overall quality of life of our aging population is currently a serious global public health problem. Problems arise not only when working with their immune system and complex multimorbid conditions, but also when knowing how to identify, distinguish, prevent and treat infectious diseases that often exacerbate the morbidity of older people.<sup>4</sup>

The burden of respiratory viral infections in the elderly is evidenced by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which has infected millions of people worldwide and has had an unprecedented impact on health systems and society as a whole. It was found that age is the biggest risk factor for the development of severe COVID-19

However, other respiratory viruses, including influenza and respiratory syncytial virus (RSV), also lead to significant morbidity and mortality, especially among the elderly. Similarly, there is a growing understanding of the burden of human metapneumovirus (HMPV), human rhinovirus (HRV) and human parainfluenza virus (HPIV). Respiratory viral infections inhibit the ability of older people to function and perform their daily life tasks. Thus, having a significant impact on the elderly and their families. In addition, respiratory viruses are key factors of exacerbation of chronic diseases.<sup>5</sup>

Since the end of 2019, SARS-CoV-2 infection has caused 107.5 million COVID-19 cases and more than 2.3 million deaths worldwide. The complex interaction of factors leading to this increased risk has yet to be fully determined. Nevertheless, it is believed that the key factor is the high prevalence of chronic concomitant diseases and, consequently, the risk of infection with COVID-19 in elderly patients (discussed in more detail below). Elderly patients in long-term care institutions are a particularly vulnerable group of the population, they are often weakened and have concomitant chronic diseases, complex medical needs and the need for medical support.<sup>6</sup>

Particular difficulties in the diagnosis of COVID-19 arise due to the high prevalence of asymptomatic positive results of the diagnosis of SARS-CoV-2. Thus, the implementation of local and national monitoring systems for COVID-19 and other respiratory viral diseases is currently important for identifying infected patients, monitoring the disease and fully understanding the burden of COVID-19 in retirement homes and nursing homes. The risk of flu for the elderly should also be considered. Each year, influenza causes approximately 1.3-2.1 million hospitalizations and is associated on average with a significant number of deaths. Older people are exposed to influenza A and B throughout their lives. However, due to extensive antigenic drift and shift, they do not develop immunological immunity against circulating seasonal strains.<sup>7</sup> Due to the aging of the immune system and concomitant diseases, the elderly are particularly vulnerable: 90% of deaths associated with influenza are in this population group. Influenza infection can cause significant functional impairment in the elderly, and 67% and 25% are reported to become at least temporarily housebound and bedridden, respectively. The presence of common comorbidities in this population, including diabetes, respiratory and cardiovascular diseases, further increases the risk of morbidity and mortality from influenza.<sup>8</sup> Respiratory syncytial virus (RSV) causes 177,000 hospitalizations of adult patients annually. However, healthy

adults with a functioning mature immune system usually develop effective immunity against RSV. RSV causes significant morbidity among immunocompromised persons, infants and the elderly. However, geriatric specialists have little incentive to diagnose RSV infections in the elderly due to the lack of available sensitive diagnostic tests and treatment methods.

In addition, it is reported that RSV accounts for 5-15% of community-acquired pneumonia and 9-10% of hospitalizations for acute cardiorespiratory diseases. Experts found that 7.4% of elderly patients with influenza-like disease (ILD) were positive for RSV, which increased to 8.7% among people over 75 years of age and 12.5% of elderly patients requiring hospitalization.<sup>9</sup> Respiratory syncytial virus (RSV) is the leading cause of acute respiratory tract infections (RTI), including upper respiratory tract infections (URTI) and lower respiratory tract infections (LRTI). RSV infection is transmitted through direct or indirect contact, with the peak incidence usually occurring during the cold months in temperate climates. The clinical picture of RSV varies from a mild cold to a serious respiratory illness with complications comparable to those caused by influenza and other respiratory viruses. These complications may include pneumonia, the need for hospitalization in the intensive care unit (ICU) and ventilator, cardiopulmonary complications (in particular, exacerbations of congestive heart failure and COPD) and may lead to death. These complications are especially observed in hospitalized patients with RSV older than 60 years and in patients with concomitant diseases.<sup>10</sup>

Currently, there are no specific treatment options for RSV in adults, and, consequently, several vaccines and therapeutic candidates are under development. To guide this development, reliable data are needed on the epidemiology and clinical manifestations of RSV infection, as well as on the associated use of healthcare. Although the number of RSV studies has increased in recent years, more specific information is needed on the impact of RSV infection on the elderly and high-risk adults.

Human metapneumovirus (HMPV) is rarely diagnosed in young patients, but causes a significant burden of morbidity in the elderly, especially in those in specialized institutions, with concomitant weakness, immunosuppression or chronic cardiopulmonary diseases. HMPV can cause flu-like and lower respiratory tract symptoms, such as wheezing and shortness of breath. However, 40% of elderly patients infected with HMPV are reported to develop pneumonitis, and 2-4% of adults hospitalized with pneumonia are infected with HMPV.<sup>11</sup>

Rhinovirus infections are generally regarded as a more benign pathogen that has relatively low virulence and can cause an asymptomatic infection or mild illness, including cold symptoms, rhinorrhea, cough and sore throat. However, mild infection is less common in the elderly, and outbreaks of RVIs can lead to significant morbidity and mortality. RVI causes a particular burden in elderly patients due to exacerbations in patients with chronic obstructive pulmonary disease (COPD). One study on hospitalized patients with pneumonia unexpectedly found more complications of pneumonia, the need for oxygen therapy, and a higher mortality rate in patients with RVI than in patients with influenza.

Elderly people living in long-term care institutions (LTCI) make up an important part of the elderly population at high

risk of respiratory infections. About 5% or more of people over 65 are in LTCI in developed countries, and the use of LTCI is growing rapidly in developing countries. People live in close quarters in the LTCI, which is an important factor in infectious respiratory infections. The immediate neighborhood of residents, combined with advanced age, multimorbidity and weakness in the LTCI, probably predisposes older people to even greater susceptibility to infections and their complications. In addition, the accumulation of infirm elderly residents of LTCI in cramped living quarters contributes to a faster spread of infection. Elderly patients have a high level of complex multimorbid conditions and symptoms of pre-existing diseases and are more susceptible to respiratory viral infections than healthy young people due to a variety of factors. Thus, elderly people with a respiratory viral infection may have respiratory distress or pneumonia. However, elderly patients may also have an atypical course without fever or respiratory symptoms. Often, elderly people instead experience an exacerbation of chronic diseases, including heart failure, chronic kidney disease, COPD or diabetes. C-reactive protein (CRP) and procalcitonin levels are useful biomarkers of inflammation and respiratory infections. However, difficulties were found in the diagnosis of pneumonia or respiratory viral infections in the elderly.<sup>12</sup>

#### **Elderly patients also show atypical manifestations of the incidence of respiratory viruses.**

A recent study found that only 30% and 7% of hospitalized patients with influenza or RSV infection, respectively, had a viral infection listed as the primary diagnosis. Instead, primary diagnoses of dehydration, altered mental state, falls or exacerbations of chronic diseases were often found. Patients also had confusion, anorexia, or decreased communication with the environment. The complexity of diagnosing respiratory viral infections in the elderly has implications for the health of patients, as well as for the rapid introduction of appropriate control measures to contain outbreaks of respiratory viruses. Experts point out that the incidence associated with influenza has been greatly underestimated, especially among the weakened elderly. Thus, data on morbidity and mortality from respiratory viruses may represent only the tip of the iceberg. The aging of the immune system is increasingly recognized as an important factor that increases the susceptibility of the elderly population to respiratory viral infections, while the immune system is even more dysregulated in patients with concomitant respiratory diseases such as COPD. Immune aging and inflammation are increasingly understood as leading to an imbalance of the immune system during aging. Immune aging is a multifactorial aging process characterized by a gradual violation of regulation and deterioration of the immune system. This affects its ability to function and develop long-term immune memory against respiratory viral infections.<sup>13</sup>

Inflammation is another intertwining process in which the aging immune system produces elevated inflammatory mediators. This can potentially lead to numerous adverse changes and the development of diseases, including malignant neoplasms and autoimmune diseases. In addition, they may indirectly increase the susceptibility of older people to respiratory viral infections. It was found that concomitant diseases are a key risk factor for the development of severe forms of ARVI. It is also reported

that the most vulnerable elderly people are 60 times more at risk of hospitalization due to influenza infection compared to healthy adults aged 65-75 years. Key risk factors include very old age, previous hospitalization for influenza infection and chronic diseases; especially those that require monthly medical supervision. Institutionalization, immunosuppression, and chronic cardiopulmonary diseases are also known risk factors for severe disease caused by HMPV. Thus, with an aging population and an increase in the prevalence of chronic diseases, multiple diseases can be an important indirect factor in morbidity and mortality from respiratory viral infections. The weakening is characterized by a polysystemic decrease, a reduction in the physiological reserve, a violation of homeostasis, dependence and premature mortality. Senility has been reported to occur in 7% of the elderly population and is associated with an increased risk of influenza infection due to a weakened post-influenza response to the vaccine. Thus, infection of these vulnerable patients can cause significant functional disorders that can persist for several months without returning to baseline or mortality. Active screening of weakened patients with exacerbations of chronic diseases may be important for the diagnosis and treatment of respiratory viral infections in this vulnerable population group.<sup>14</sup>

Reduced mobility and changes in the physiology, structure and function of the lungs as a result of aging can also play an important role in affecting the respiratory pump and the host's response to respiratory viral infection. Similarly, a decrease in functional reserve may reduce their ability to cope with increased airway resistance and decreased lung compliance due to lower respiratory tract infection. Malnutrition can increase the susceptibility of older people to respiratory viral infections. It has been reported that malnutrition in hospitalized patients and the risk of nosocomial infections are also interrelated. The number of elderly patients with multimorbidity is increasing, and more patients are prescribed several medications. Upon admission to the hospital with a respiratory viral infection, these medications may be discontinued or changed, which may affect the underlying condition of the patient. In addition, the incidence of viral infection can be aggravated by prescribed medications, including diuretics and nephrotoxic drugs, which can lead to kidney failure.<sup>15</sup>

Immunosuppressive therapy, including steroids, anti-cancer drugs and drugs for the treatment of chronic inflammatory diseases, has many side effects that can worsen chronic diseases, and can also directly increase susceptibility to viruses, as well as affect the response to vaccination.

Polypragmasia can lead to the appointment of inappropriate medications, drug interactions, an increased risk of non-compliance with the treatment regimen and adverse reactions to medications (AR) and is a special problem in older people due to their altered metabolism, reduced clearance of drugs and, consequently, an increased risk of AR. Elderly patients are also more likely to be prescribed antibiotics in the presence of a respiratory viral infection, which can lead to complications of the underlying disease. In connection with the development of new antiviral and immunomodulatory drugs, the effect of polypragmasia requires further consideration.

## DISCUSSION

Influenza vaccination has been recommended as the main method of preventing influenza infection in people over 65 years of age since the 1960s and not only prevents influenza infection, but also plays a key role in preventing secondary events and complications, including cardiovascular diseases and mortality. Vaccination of healthcare workers can also be important to protect elderly patients from viral infections and complications, it was widely used during the COVID-19 pandemic. Vaccination has been extremely successful in reducing morbidity and mortality associated with influenza infection among the general population. However, data on the comparative effectiveness of vaccines in people over 65 years of age are limited. Serological studies have revealed lower and weakening humoral reactions in the elderly. Thus, clinical protection is unlikely to be maintained throughout the year, which underscores the need for more immunogenic vaccines. Existing flu vaccines need to be administered annually to cover circulating strains. Further work on effective vaccines for the elderly is necessary for both influenza and other respiratory viruses.

Vaccination is necessary for the prevention of respiratory viral infections and provides not only protection for individuals, but also collective immunity for others; this is especially important for elderly patients in a hospital or in nursing homes.<sup>16</sup> Vaccines against COVID-19 are currently under development, and promising results have been demonstrated in providing 94% protection in people over 65 years of age. However, widespread availability is still far away, and the ability to induce long-term protection in elderly patients has yet to be demonstrated.

Although flu vaccines exist, there are still no vaccines against other respiratory viruses, such as RSV. Nevertheless, significant progress has been made in understanding the burden and immunobiology of RSV, and more than 60 candidate vaccines are currently undergoing preclinical and clinical trials using various platforms. Early strategies for improving the immune response in elderly people after vaccination included increasing the dose of antigen or co-administration with an adjuvant. There is a growing understanding that the site of vaccine administration can affect the resulting immune response and the effectiveness of the vaccine. Advances in less invasive delivery systems mean that delivering vaccines to the lungs may be possible in the future. However, due to the problems of vaccination of the elderly, other new approaches to the development of vaccines for this population group are being developed. The basis of flu treatment is to start taking antiviral drugs as early as possible. Clinical trials have shown the effectiveness of antiviral drugs when prescribed to patients with uncomplicated influenza infection within 48 hours. Given the frequency of complicated influenza infections and the late diagnosis of influenza in the elderly, the effectiveness of antiviral drugs in the elderly requires further evaluation. New antiviral compounds for the treatment of influenza are also being investigated; they include the development of monoclonal and polyclonal antibodies against influenza, convalescent plasma and low molecular weight polymerase inhibitors.<sup>17</sup>

As in the case of influenza infection, treatment of elderly patients with other acute respiratory viruses is carried out

mainly through maintenance therapy.<sup>18</sup> This is an active process with frequent monitoring, as well as hydration, additional oxygen as needed, treatment of fever and the use of bronchodilators until the patient recovers. Antihistamines and nonsteroidal anti-inflammatory drugs can alleviate some of the symptoms of a viral infection. However, they are often contraindicated in elderly patients due to underlying kidney disease, the risk of gastrointestinal bleeding and confusion.

## CONCLUSION

Acute respiratory infections (ARI) are a group of conditions that cover various clinical diagnoses, such as rhinopharyngitis, acute sinusitis, acute laryngitis, bronchitis, chronic obstructive pulmonary disease (COPD), asthma exacerbations, acute respiratory distress syndrome (ARDS) and pneumonia. The main viruses associated with VP in ARI patients are picornaviruses, influenza A and B viruses, human coronaviruses, respiratory syncytial virus, human metapneumovirus, parainfluenza virus and adenovirus. The direct relationship between viral infections and the severity of the disease remains difficult due to the rapid progression of initial asymptomatic infections and frequent secondary bacterial or fungal coinfections. COVID-19 has already caused the deaths of more than 2.3 million people and highlighted the consequences and global burden of respiratory viral infections, especially among the elderly. Although influenza is also a key respiratory pathogen, the importance of other respiratory viruses is beginning to become apparent. Compared with young people, respiratory viral infection in people over 65 years of age is associated with increased morbidity and mortality. Elderly patients may have severe lower respiratory tract infections, pneumonia, or exacerbation of chronic multimorbid conditions. Additional problems arise due to the fact that elderly patients often do not have fever or respiratory symptoms, but have atypical symptoms, including weakness, confusion and falls. This leads to a failure in diagnosis, an increase in morbidity, the appointment of additional drugs and further nosocomial spread. Currently, it is necessary to introduce sensitive and rapid diagnostics at the place of medical care to detect all viruses and treat infected elderly patients. This will make it easier to understand the true burden of respiratory viruses. To protect the aging immune system, it is now important to combine this with the development of expanded vaccination strategies and new antiviral therapeutics.

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