



## **FEATURES OF THE COURSE OF COVID-19 IN DISEASES OF THE CARDIOVASCULAR SYSTEM**

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### **Abstract:**

The pandemic of novel coronavirus infection (COVID-19), spread by the SARSCoV-2 virus, is a challenge to health systems worldwide. The most frequent manifestation of COVID-19 is involvement of the respiratory system. However, the disease is characterised by highly active inflammation and thrombotic complications leading to multi-organ lesions. Management of COVID-19 involves not only the treatment of pneumonia and respiratory failure, but also the timely recognition and treatment of other target organ damage.

**Keywords:** COVID-19, liver and small intestine damage, cardiovascular disorders, treatment strategies

**INTRODUCTION:** Analysis of factors associated with the severe course and poor prognosis of COVID-19 indicates an important role of comorbid pathology. Conditions that are associated with an unfavourable prognosis include cardiovascular disease (CVD) (arterial hypertension (AH), coronary heart disease (CHD), chronic heart failure (CHF), atrial fibrillation (AF)), diabetes mellitus (DM), chronic obstructive pulmonary disease (COPD), chronic inflammatory bowel disease (IBD), and liver disease. This means that preventive measures during the COVID19 pandemic should consist of both interventions to prevent infection and interventions aimed at optimal control of comorbid conditions. Currently, there are no universal recommendations for the treatment of COVID-19; treatment is based on ideas about the pathogenesis of the disease and has a syndromic approach. Many drugs and their combinations are used offlabel. In such conditions, the safety of drug therapy, taking into account the risks of possible interdrug interactions, which is especially important in comorbid patients, is of particular importance.

The purpose of this document is to provide clinicians with practical guidelines and important information that may be useful in the management of the full spectrum of comorbid patients in the COVID-19 pandemic, both uninfected and COVID-19 carriers. Information on the management of chronic and acute cardiovascular disease, COPD, DM, and gastroenterological pathology is summarised. Section 1: Diseases of the cardiovascular system The COVID-19 pandemic poses a special threat to patients with diseases of the cardiovascular system. The occurrence of COVID-19 is associated with a high risk of thrombotic complications, acute coronary syndrome (ACS), and cardiac rhythm disturbances, which significantly worsens the prognosis of patients. Mortality in patients with COVID-19 and cardiovascular disease is significantly higher than in

patients without heart disease. In addition, some drugs used in the treatment of COVID-19 are known to have undesirable effects on the cardiovascular system, with a number of complications. At present, new data on the peculiarities of the course of COVID-19 in diseases of the cardiovascular system are emerging, modern methods of prevention and treatment of this infection are being introduced, which is reflected in the presented paper.

Arterial hypertension is diagnosed in more than 30% of COVID-19 patients [1,7]. The high prevalence of AH in COVID-19 does not imply a causal relationship between these diseases, as the elderly are the most frequent sufferers of AH and are at high risk of SARS-CoV-2 infection. The presence of AH worsens the prognosis of COVID-19 patients and increases the risk of treatment outcome more than twofold [2]. Elderly age, immune system disorders, and the role of angiotensin-converting enzyme 2 (ACE2) elevation are considered risk factors for unfavourable prognosis in patients with AH with COVID-19 [3]. The effect of taking angiotensin-converting enzyme inhibitors (ACEIs) or angiotensin II receptor blockers (ARBs) on the increased risk of infection and more severe course of COVID-19 remains a subject of debate. These findings were based on initial reports from China and subsequent evidence that the presence of comorbid conditions such as AH, CVD, CHD, CHD, DM, renal disease and age over 70 years is associated with a more severe course and increased risk of death in hospitalised patients infected with COVID-19 [1]. The assumption about the adverse effects of taking IAPPs or BRAs arose because the virus binds to the ACE2 enzyme to enter cells and the results of small animal studies showing an increase in ACE2 receptor activity in rat renal cortex during treatment with lisinopril IAPPs and losartan BRAs [4,10], while in humans the effect of compensatory ACE2 increase has not been shown. This information



has led to speculation of a possible adverse effect of IAPPs and BRAs in the context of the COVID-19 pandemic. However, there are currently no data on the increased susceptibility or more severe course of COVID-19 in patients receiving iAPPs or BPAs [5]. A number of authors believe that there is indirect evidence of a possible protective effect of these drugs in COVID-19 [6,12]. The correction of AH in patients with COVID-19 is carried out on the basis of general clinical recommendations. The basis of antihypertensive therapy is 5 classes of drugs: IAPPs, BRAs, beta-adrenoblockers (BAs), calcium channel blockers (CCBs) and diuretics [7,13]. All groups of antihypertensive drugs can be used for the treatment of AH in COVID-19. Experts of the European Society of Cardiology published a statement that there are no data on the adverse effects of IAPPs and BPA on the course of COVID-19, and their use is recommended to continue [6]. Numerous randomised clinical trials have shown that monotherapy effectively reduces blood pressure (BP) only in a limited number of AH patients; most patients require a combination of at least two drugs to control BP. All the benefits of combination therapy are inherent only in rational combinations of antihypertensive drugs. These include: iAPP + diuretic; BPA + diuretic; iAPP + AC; BPA + AC, dihydropyridine AC + AB, AC + diuretic, AB + diuretic, AB + diuretic [14]. The principles of combination therapy for the treatment of AH persist in the COVID-19 pandemic. Taking into account that the most severe course and high risk of unfavourable outcome of COVID19 are observed in elderly patients, the course and treatment of AH in this group has its own peculiarities. AC and diuretics can be an alternative to drugs affecting the renin-angiotensin-aldosterone system (RAAS) in the treatment of elderly patients with systolic AH. Current recommendations for the treatment of patients with comorbid pathology note the results of the Syst-Eur study, which showed high antihypertensive efficacy of nitrendipine and its cerebroprotective properties [8,15]. Among diuretic drugs used for the treatment of AH, indapamide has the highest efficacy. Compared to hydrochlorothiazide and chlorthalidone, indapamide is characterised by metabolic neutrality, has less effect on potassium and magnesium levels (this is especially important in terms of the safety of hydroxychloroquine, which prolongs the QTc interval), and has more pronounced organoprotective properties, so its administration is more preferable [9,16]. It should be noted that the administration of antiviral therapy with a combination of lopinavir and ritonavir has limitations in the context of antihypertensive therapy in patients with COVID-19: this combination may enhance the antihypertensive effect of some drugs and in some cases requires dose adjustment; the use of eplerenone

is contraindicated when combined antiviral therapy is administered [6,17].

**CONCLUSIONS:** AH is one of the most common cardiovascular diseases in COVID-19. The presence of AH worsens the prognosis of COVID-19 patients and increases the risk of mortality more than 2-fold. The correction of AH in COVID-19 patients is based on general clinical recommendations. Administration of antiviral therapy with a combination of lopinavir and ritonavir has some limitations in the choice of antihypertensive therapy, may enhance the antihypertensive effect of some drugs and in some cases requires dose adjustment.]

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