

The Prevention and Treatment of the Non-communicable Diseases (NCDs) in Covid-19

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Abstract. Communicable diseases and non-communicable diseases (NCDs) are the two major diseases that affect human health. The former has a wide range of influence and involves a large number of people, while the latter has a long onset time and is difficult to recover once the disease develops. Since 2019, covid-19 has become a global pandemic, killing and infecting millions of people. For patients with NCDs, no matter when vaccinating or taking drugs, there are more things to pay attention to in the prevention and treatment during the covid-19 pandemic. According to many studies, people with hypertension, coronary heart disease, obesity and some other chronic diseases are more likely to have covid-19 diagnosed. This paper aims to analyze the prevention, treatment and management strategies of covid-19 for patients with hypertension, diabetes, obesity, cardiovascular disease, and Chronic obstructive pulmonary disease (COPD). Dispensing regimens during pandemic are discussed as well to minimize exposure and avoid contamination of the population.

Keywords: Non-communicable diseases (NCDs), Covid-19, Prevention and treatment.

1. Introduction

Since 2019, covid-19 has become a worldwide pandemic and led to 617 million infections and 6.5 million deaths in the world. The numbers keep rising dramatically. From September 17th to 30th (14 days), 6243451 new cases were found [1]. The mortality rate of covid-19 varies in different countries due to different medical conditions and covid-19 prevention policies. Globally, the mortality rate is 3.4%, and gradually diseases [2]. But due to the strong infectivity of covid-19, the death toll is still very high. Covid-19 is a common disease that occurs in both immunocompetent people and immunocompromised people. The disease will progress comparatively more quickly and is more serious in immunocompromised people, like the elderly, gravidas, and those with liver and renal disease.

Non-communicable diseases, communicable diseases and injuries are currently three main types of diseases that threaten human health. NCDs often have a long onset time, and lack of obvious etiology. Every year, 74% of deaths are caused by NCDs and the number is still increasing [3]. Treatment of non-communicable diseases (NCDs) in communicable disease epidemic is always a problem. NCDs includes cancer, coronary heart disease, diabetes, hypertension, obesity, and many other diseases. In China, hypertension and stroke have become prominent public health problems. In addition, the incidence shows a trend of younger. According to statistics from Chinese Center for Disease Control and Prevention, in China, the prevalence of hypertension among people who are older than 15 is 24%, the prevalence of diabetes among adults aged 18 and over is 11.6%, and the number of stroke patients is at least 7 million [4].

Covid-19 patients usually have complex states of the illness which are likely to change rapidly at any time, and they may also have comorbid conditions, the most common of which are hypertension, coronary heart disease, obesity, and chronic obstructive pulmonary disease (COPD) [5]. These people with comorbid conditions should be more cautious and be treated differently when treatment was implemented. This article explores the management of chronic diseases during the epidemic outbreak from the perspective of chronic diseases.

2. Vaccination

Vaccination is one of the most efficient methods of preventing covid-19. Generally, the covid-19 vaccine is a relatively mild vaccine that most people, including people with NCDs, can get. However, it still depends on the physical condition of the recipient that whether the covid-19 vaccine can be vaccinated [6].

2.1. Hypertension

The disease known as hypertension is characterized by the pressure in the blood vessels continues to increase. Patients may experience morning headaches, nosebleeds, irregular heartbeats, vision changes, and buzzing in the ears. Some patients have even worse conditions, with weariness, nausea, vomiting, dizziness, anxiety, discomfort in the chest, and trembling in the muscles. And if treatment is not taken in time, it may cause angina pectoris, heart disease, arrhythmia, cardiac failure, and possibly sudden death [7]. Moreover, the number of hypertensive patients is quite large. In China, 245 million people have hypertension, and the annual incidence of hypertension in adults over the age of 40 is about 3%. The proportion of children and adolescents with high blood pressure keep increasing and has reached about 15%. Meanwhile, 30% of obese children have high blood pressure [5]. Many published articles pointed out that hypertension, as the most common comorbidity of covid-19, increases both the chance of getting covid-19 and the mortality risk [8]

2.2. Coronary heart disease (CHD)

CHD is the most prevalent kind of cardiovascular disease (CVD). The World Health Organization (WHO) estimates that every year, 17.9 million people worldwide pass away from cardiovascular illnesses, of which about 7.4 million succumb to CHD [5]. People with CHD often experience symptoms such as chest pain (angina), shortness of breath, generalized body pain, dizziness, and feeling sick (nausea). Evidenced by a meta-analysis, CHD increases the risk of infection with severe covid-19, which is related to the effect of hypertension [10].

If patients with coronary heart disease have been actively treated and their conditions are well controlled, they can go to regular hospitals to take the covid-19 vaccine. If patients with coronary heart disease are in the acute onset stage, they will generally show symptoms such as angina pectoris, chest tightness, dyspnea, etc. At this time, the covid-19 vaccine should not generally be taken, otherwise it will easily lead to aggravation of the uncomfortable symptoms of coronary heart disease, and it will affect the production of antibodies in the body of the covid-19 vaccine as well.

2.3. Diabetes

Diabetes is a dangerous illness marked by elevated blood glucose levels. Normal blood sugar levels are less than 140 mg/dL (7.8 mmol/L) while diabetics have blood sugar levels above 200 mg/dL (11.1 mmol/L) 2 hours after a meal. A person has prediabetes if his/her blood sugar level is between 140 and 199 mg/dL (7.8 mmol/L and 11.0 mmol/L) [11]. Type 1 and type 2 diabetes are the most prevalent varieties. Type 1 diabetes is caused by absolute insulin deficiency due to the destruction of beta cells by autoimmune processes. Type 1 diabetes strikes more than 95% of sufferers before they turn 25. Type 2 diabetes, which is the most common one, is due to insulin resistance in peripheral organs and poor insulin production by beta cells. It is highly associated with family history of diabetes, advanced age, obesity, and physical inactivity [12]. Both type 1 and type 2 patients can have symptoms, such as frequent urination, feeling thirsty or hungry—even if they eat and drink a lot, feeling extremely tired, have blurred vision, and have slow-healing cuts and bruises. In particular, patients with type 1 diabetes lose weight even when they consume large amounts of food, whereas those with type 2 diabetes may have tingling, discomfort, or numbness in their hands and feet. [13].

Diabetic patients can take the covid-19 vaccine, if their blood sugar control is stable, within a reasonable range, and there are no complications. The fasting blood sugar should be controlled at

about 7.0mmol/L, and the 2h postprandial blood sugar level should be at about 10.0mmol/L. All drugs used to treat diabetes are not contraindicated for vaccination.

It is not suitable for vaccination, if the patient's blood sugar control is unstable or the postprandial blood sugar is >13.9mmol/L, or they are accompanied by ketoacidosis, hyperosmolar state, lactic acidosis, combined with severe liver and kidney disease, malignant tumor, or have serious diabetic complications, such as diabetic nephropathy, diabetic retinopathy, etc. Because if these diabetic patients are vaccinated, their blood sugar may be affected or the original comorbidities may be aggravated, and the safety and effectiveness of the covid-19 vaccine for them is still unclear. It is safer to vaccinate after blood sugar control is stable and maintained at a reasonable level.

2.4. Obesity

Obesity is characterized by excess body fat in body and is a complex disease that can increase the risk of health problems and other chronic diseases like cardiovascular disease, diabetes, hypertension, and even some malignancies. WHO divides obesity into three classes: body mass index (BMI) class I is defined as 30 to 34.9; class II as 35 to 39.9; and class III as 40 or higher [8]. A prospective study of chronic diseases in China showed that maintaining a healthy BMI could prevent 5.8% of major CHD events and 34.4% of type 2 diabetes. Moreover, for kids and teenagers, obesity is the main risk factor for developing essential hypertension. [5].

Obese patients can be injected with the covid-19 vaccine. But if they have some liver and kidney diseases or have severe abnormal liver and kidney function caused by other factors, they cannot be vaccinated. Obese patients' immunity is lower than that of the normal population, and the effectiveness of the covid-19 vaccine will be lower than that of the normal population. Thus, it is best to exercise and eat properly before vaccination to improve their own immunity.

2.5. Chronic obstructive pulmonary disease (COPD)

Chronic obstructive pulmonary disease (COPD) is a set of lung diseases that make breathing difficult. Common symptoms include chronic cough, expectoration, shortness of breath or difficulty breathing, wheezing, and chest tightness, especially if the patient is particularly active. Its pathogenesis is associated to the aberrant inflammatory response of harmful gases and particles, and the morbidity and fatality rate are very high. Mild COPD symptoms do not affect vaccination, but severe COPD symptoms, such as COPD with asthma, may not be suitable for vaccination. Patients with COPD with asthma in the stable stage can take the vaccine against covid-19. They must not do exercise vigorously after vaccination, but should rest more, avoid spicy food, and prohibit drinking.

3. Daily care and physical exercise

People with NCDs should eat balanced and reasonable, sufficient quantum physical exercise, keep good feelings and life attitude, set up healthy and scientific lifestyle. Unhealthy diets, smoking and physical inactivity all increase the risk of developing NCDs.

It is generally recognized that limiting cholesterol and saturated fatty acids in diet, increasing unsaturated fatty acids, supplementing vitamin C, B, E, etc., and limiting the intake of salt and carbohydrate can prevent atherosclerosis. Besides, smoking plays a pathogenic role in CHD. It has been reported that among people aged 35 to 54 who died of CHD, smokers have a 4–5 times increased risk of dying from CHD compared to non-smokers [14]. After quitting smoking, the incidence of myocardial infarction and the mortality rate of CHD are significantly reduced, and the longer they quit smoking, the greater the effect is.

In addition, physical exercise plays a good role in controlling risk factors (reducing blood fat, reducing hypertension, and reducing weight) and improving blood circulation of patients. The incidence of coronary heart disease of those who engage in certain physical labor and insist on physical exercise is lower than that of those who work in a sitting position for a long time and lack physical activity. For patients with NCDs, moderate exercise is very important, and excessive exercise may be

counterproductive, especially for patients with CHD. If the amount of exercise is too small, it can only play a comfort role, but cannot achieve the purpose of increasing cardiac function; If the amount of exercise is too large, it will cause angina pectoris, and even induce myocardial infarction, heart failure, etc. Therefore, the amount of exercise should be controlled according to self-perception and heart rate per minute after exercise. Feeling relaxed and having good mental state, strong energy, appetite for food and good sleep, indicating that the amount of exercise is appropriate. If the sense of fatigue does not disappear, insomnia, anorexia, dizziness, chest tightness, and continuous heart rate increase after exercise, it indicates that the amount of exercise is too large, and the amount of exercise should be reduced or stopped. For healthy people, the heart rate of adults after maximum exercise should be less than 200 times per minute. The heart rate per minute should be less than 180 times for people aged 45-59 years after the maximum exercise. After exercise, the heart rate of the elderly over 60 years old should be less than 120 beats per minute [15]. For patients with CHD, the heart rate should not exceed 110 times per minute during exercise. The heart rate is about 60 times per minute in quiet time, and 80-90 times per minute after exercise. If patients count the pulse before exercise, and the number of pulses can return to the level before exercise within 5-10 minutes after exercise, it means that the exercise is moderate. Exercise should proceed in an orderly way and step by step. Exercise time is 20-30 minutes plus 5-10 minutes of preparation and relaxation. Exercise 3 times a week is better, and less than 2 times is invalid. The curative effect generally appears after 4-6 weeks.

Detection, screening, palliative care, and treatment of NCDs are important measures in the treatment of NCDs. For example, people with hypertension are supposed to measure their blood pressure every day. It is recommended that all hypertensive patients monitor their heart rate while measuring their blood pressure. The best resting heart rate is 60 to 75 beats per minute. Then they can take antihypertensive drugs to control their blood pressure index and eat a light diet. As for diabetic patients, generally, it is recommended to measure the blood glucose once a week or every month and adjust the drug dosage appropriately according to the blood sugar and doctor's advice. But if diabetic patients often have abnormally high blood sugar, or blood sugar fluctuations are more obvious, they should measure blood sugar every day in order to know the patient's condition in time and take effective treatment.

4. Drugs

Covid-19 pandemic has been prevalent for a long time, the number of confirmed cases per day continues to rise, so the demand for drugs to treat covid-19 also surges. So far, antiviral drugs and traditional Chinese medicine (TCM) are the two main drugs to treat covid-19.

The antiviral drugs of covid-19 are still being developed. Currently, recommended drugs include Remdesivir, Baricitinib, Molnupiravir, Tofacitinib etc. However, antiviral drugs usually have some side effects. For example, respiratory failure and organ dysfunction are Remdesivir adverse effects that occur most frequently. Patients may have gastrointestinal discomfort, elevated levels of transaminases (liver enzymes) in the blood, and injection site reactions. Symptoms of hypotension, nausea, vomiting, sweating, and chills may be observed during the injection of remdesivir. It may also show signs of inflammation or liver cell damage [16]. Meanwhile, antiviral drugs may interact with other drugs. If the confirmed patient is taking medicine of chronic diseases, it is better to send the chronic disease drug list to the community drug bureau for professional assistance to ensure the safety of taking together.

TCM is a type of medication that is gathered, processed, and made under the direction of traditional Chinese medicine theory to clarify the action mechanism and direct clinical application. It was evidenced to be effective in alleviating the symptoms of covid-19, reducing patient suffering, and improving covid-19 cure rates. At present, the main Chinese herbal medicines include Maxingshigan Decoction, Lianhua Qingwen, Xuanfei Baidu, etc. A study reports that Lianhua Qingwen can effectively improve the conditions of fever, cough and weariness, and raise the recovery rate of covid-19 patients. Furthermore, compared with taking only western medicine or TCM, the experimental

group whose patients took both western medicine and TCM (Huoxiang Zhengqi Dropping Pill and Lianhua Qingwen) at the same time has the best effect in treating nausea, vomiting, limb pain, etc., which indicates that the combination of TCM and western medicine has the potential to treat covid-19 more effectively and may become a new treatment method. In addition, TCM is relatively mild and has no strong side effects, which makes it more suitable for covid-19 patients suffering from long-term conditions like hypertension and coronary heart disease.[17]

5. Conclusions

In order to reduce the probability of cross infection of covid-19 between outpatients and inpatients during drug collection, it is essential to formulate and strengthen drug monitoring management and improve the drug delivery process. Drug delivery outside the hospital, robot drug delivery, and special delivery are useful ways to avoid crowd gathering. The characteristics and dispensing process of drugs are combined to ensure drug safety of patients, reduce the rate of out of stock, and improve the rationality of drug use, so as to reduce crowd aggregation and avoid infection. During the pandemic, follow-up services can also be provided for patients to remind them of the way of medication and understand the medicine effect, so that adjustment can be made in time.

In isolated residential areas, committees can investigate and know about the health needs of residents, cooperate with local hospitals and pharmacies, establish drug distribution demand accounts, and implement classified management.

For the medication of common and chronic diseases of residents, the community can arrange volunteers to purchase and distribute drugs for them. The community health service center can also implement a long-term prescription policy for patients with chronic diseases who take drugs for a long time and can dispense drugs for up to three months. For professional drugs that cannot be dispensed by primary medical institutions, such as psychotropic drugs, tumor treatment drugs and other professional drugs, committee can also organize volunteers to register and summarize the relevant dispensing information of residents, establish an agent dispensing team, and dispense drugs at the special window of the designated hospital.

At the same time, health department can give full play to the advantages of the Internet and provide residents with Internet hospital consulting and dispensing services. However, due to factors such as the sealing of drug warehouses, the demise of express stations, and the isolation of couriers, time of drug delivery has been extended compared with the past, so it is more efficient to purchase drugs by community volunteers. The health department can also dock with the logistics platform to establish a specialized team dedicated to drug distribution.

When developing covid-19 treatment strategies, health department can combine the different characteristics and advantages of TCM and western medicine and optimize and coordinate the resources of drugs in the region. For patients with chronic diseases diagnosed with covid-19, the role of emergency medical rescue base should be played, and a special isolation area can be set up for these patients to facilitate management. Drugs for treatment and regular examination for patients in the isolation area should be guaranteed to ensure that chronic diseases can also be well controlled during the pandemic.

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