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Updated Diagnosis and Management of Adult Asthma in Coronavirus Disease-19 Cases

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ABSTRACT

Asthma is one of the most common chronic diseases found in primary and emergency care worldwide. Since novel coronavirus disease-19 (COVID-19) became pandemic, the diagnosis and management of asthma was affected. Assessment of asthma is a real challenge due to the overlapped respiratory symptoms among COVID-19, asthma in early stages, and other upper respiratory tract infections. Moreover, this pandemic encouraged minimal face-to-face interaction unless urgent or emergency. There is also arising controversy whether asthma will develop more severe symptoms of COVID-19. Moreover, the use of corticosteroid as mainstay therapy in asthma with COVID-19 needs to be reviewed. In this article, we will discuss about the updated assessment and management of asthma in COVID-19 pandemic.

Keywords: management, asthma, exacerbations, COVID-19

INTRODUCTION

Asthma is one of the most common chronic diseases found in primary and emergency care worldwide. Asthma has affected 272 million people worldwide in 2014. [1,2] So far, the mortality of asthma has decreased significantly since inhaled corticosteroid (ICS) was introduced. [3] However, asthma control proportion is still low in many countries. [4] In Indonesia, although the prevalence of asthma only reached 2.4%, the recurrence rate was 57.5% in 2018. [5]

In this 2020, the novel Coronavirus disease-2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infections has become one of the biggest global burden. Since this pandemic era, chronic diseases including asthma had been affected in its diagnosis and management. Assessment of asthma is a real challenge due to the overlapped respiratory symptoms among COVID-19, asthma in early stages, and other upper respiratory tract infections. Moreover, the condition also tends the physicians to encourage telemedicine and minimize the need for face-to-face interactions. [6,7]

Since COVID-19 is still recent, there is very limited evidence on asthma in COVID-19 cases. Hence, it is very important to discuss the diagnosis and management of asthma further. This review will provide information about the updated assessment and management of asthma in COVID-19 patients whether it is recommended or not to do in the COVID-19 infection pandemic era.

RISK OF GETTING COVID-19 INFECTION IN ASTHMA PATIENTS

There is also arising controversy whether moderate and severe asthma will develop more severe symptoms of COVID-19. [8-10] In early report of comorbidities in COVID-19, asthma was under diagnosed in China. This leads to low risk of reported COVID-19 in asthma cases. [11] In contrast, study by Williamson et al found most

comorbidities are associated with severe COVID-19 infections, including severe asthma (Hazard Ratio = 1.13 and 1.55 with no and recent oral corticosteroid (OCS) use respectively). [12] Center for Disease Control and Prevention in its page also stated that moderate to severe asthma may have higher risk of developing COVID-19[10]. Another cohort study, Zhu et al, also found the association of asthma with severe COVID-19 in UK. The study showed significant result on non-allergic asthma (odds ratio [OR], 1.44; 95% CI, 1.18-1.76; P <.001), but not in allergic asthma (P = 0.09). [13]

This was associated with ACE2 receptors which allows SARS-CoV-2 virus to infect host cells. The ACE2 receptor was found lowest in those with high level of allergic sensitization. [14] This finding was also supported by the case series of Bhatraju PK et al in which the asthma outpatients receiving systemic corticosteroid were presented to ICU week later. Previous studies regarding similar viral infections, such as, SARS-CoV (2003) and Middle East respiratory syndrome coronavirus (MERS-CoV) also shown similar results. [15] The corticosteroid treatment in these cases were associated with worse clinical outcomes. [16,17]

Respiratory viruses are most common triggers for asthma exacerbations, but not all these viruses affect asthma equally. Rhinovirus was identified as the main cause of exacerbations, unlike coronavirus. [18] To this date, there are no exact mechanisms regarding these viruses. No conclusions also could be drawn regarding COVID-19 with asthma control or severity. [19]

HOW TO DIFFERENTIATE ASTHMA AND COVID-19 INFECTION

Physician should start by assessing symptoms and clinical history of patient. If the patient suffers from shortness of breath, immediate emergency action should be considered initially before proceeding further. In this case, asthma exacerbation or COVID-19 may be assumed. The asthma diagnosis should be considered if the patient had wheeze, previously the same asthma symptoms, known triggers of shortness of breath, absence of fever, and coexisting hay fever symptoms. [7]

Meanwhile, COVID-19 may be suspected if the patient had history of close contact with confirmed or suspected case. Most COVID-19 patients will have fever, dry cough, dyspnea, and flu-like symptoms. Dyspnea symptoms of COVID-19 are also not relieved by inhalers. Wheeze had only been reported in few patients of confirmed COVID-19. [20] In some cases, silent hypoxia may be one of the symptoms. [7]

DIAGNOSING ASTHMA IN COVID-19 ERA

The diagnosis of asthma is made from a combination of history, physical examination, and supportive tests. History and physical examination should be distinguished as mentioned above. For confirmatory diagnosis of asthma, it is recommended to find the evidence of variable expiratory airflow limitation. This could be done by spirometry. Asthma is diagnosed if force expiratory volume in the first second to the force vital capacity (FEV1/FVC) ratio is below the lower limit of normal or FEV1 increases > 200 mL and 12% of the baseline value after inhaling a bronchodilator. [21] However, in the pandemic, the routine spirometry testing should be postponed reducing the risk of COVID-19 transmission. [22]

The procedure of spirometry requires patients to repeatedly have forced expiratory manoeuvres which frequently induce cough and spreads aerosols and droplets. [23]If spirometry is essential, preventive control measure must be taken. [22,23] All patients must be assumed to be positive for COVID-19. Full personal protective equipment (PPE) must be equipped properly. Strict procedure for air circulation and room cleaning must be performed. [23]

Since the pandemic, remote medical consultation is encouraged, especially people with controlled asthma. Although it

is probably to misdiagnose, it is important for physician to determine whether the patient need emergency and face-to-face assessment and intervention. In some cases, physician may not rely based on objective measurements only, but also clinical judgement as well. [7]

On the other hand, if COVID-19 was suspected, then further diagnosis measures as local guidance should be performed. Patients will be managed as per our most updated national COVID-19 guideline with Polymerase Chain Reaction (PCR) as the confirmatory diagnosis tools for COVID-19. [24]

MANAGEMENT OF ASTHMA IN COVID-19 ERA

Nebulizers the most widely used in emergency settings of asthma exacerbation should be restricted due to the increased risk of spreading aerosol. [22,23,25] Nebulizers are considered as aerosol-generating procedures which produces 1–5 μm size of particles and possibly carries microorganisms into deep lung. [26] In severe exacerbation, pressurized metered dose inhaler (pMDI) via a spacer is preferred. [22]

There are some concerns regarding the use of corticosteroids to treat asthma exacerbation in the pandemic. Previous studies about the use of corticosteroids in influenza and other coronavirus infections have been associated with increased mortality. [15,17] As in the guideline, ICS is one of the recommended treatments for bronchial asthma. Previously, there had been some debate over the use of ICS during COVID-19 pandemic. A previous systematic review of 17 randomized controlled trials in people with asthma found that high dose of ICS treatment was associated with a significantly increased risk of upper respiratory tract infections (Odds ratio [OR] 1.24, 95% CI 1.08 to 1.42). However, in these studies, it is difficult to rule out the confounding factors and it is not specifically addressed COVID-19. [27]

In this pandemic era, a systematic review by Boyce et al (2020) found no evidence of ICS with risk of getting COVID-19 infection at present. ICS are generally considered a safe treatment for controlling asthma symptoms and discontinuing ICS was associated with increased risk of exacerbations (RR= 2.34 , 95% CI; 1.88 to 2.92). [28] It is assumed ICS when used as prescribed will reduce asthma exacerbation risk. The *Global Initiative for Asthma (*GINA) recommended to use ICS treatment as soon as possible once the diagnosis is established. The recommended dosage for budesonide in adult asthma patients is ≤ 400 mcg budesonide or equivalent is considered low dose, >400 mcg to 800 mcg budesonide or equivalent is considered medium dose, >800 mcg budesonide is considered high dose. [7,21]

Low dose provides most of clinical benefit for most patients. However, some patients may need moderate dose if asthma is uncontrolled despite good adherence and correct inhaler techniques with low dose of ICS. High dose ICS may be needed for very few patients. Even severe exacerbations were reduced about 60% with low dose of budesonide-formoterol compared with Short-Acting β-Agonist (SABA) only. GINA current evidence supports up to quadrupling ICS from standard doses until symptoms improve in adults. [29]

The World Health Organization (WHO) recommended against the use of systemic corticosteroid unless strongly indicated for another reason, such as exacerbation of asthma. [8] GINA also encouraged the use of short course oral corticosteroid for acute asthma attacks. In rare cases, patients with severe asthma might require long treatment with oral corticosteroids. The treatment should be continued as in the lowest possible dose. [22]

For mild or moderate exacerbation, patients should have 4-10 puffs of SABA by pMDI and spacers (repeat every 20 minutes for 1 hour if necessary), prednisolone 40-50 mg with target of oxygen saturation 93-95%. [21] While treated for exacerbation, maintenance inhaled asthma treatment should be continued (at home and hospital).

[22] Antibiotics are not routinely recommended in asthma exacerbations. [7]

If there is no improvement, further treatment may be necessary at emergency room to get more intervention and evaluate for possibility of COVID-19. All patients with moderate symptoms should be followed up via remote assessment within 24 hours. [7] If discharged is planned, patients must also be educated about the preemptive measure for incoming exacerbation risk, avoidance of exposure to tobacco smoke and appropriate food avoidance. [21] If COVID-19 infection is also suspected, advise patients to isolate for 10 days from onset of symptoms and arrange testing, according to our latest guidance. [24]

CONCLUSION

Diagnosis of asthma is challenging in COVID-19 cases. Asthma could be temporarily diagnosed by history taking and physical diagnosis. Routine spirometry testing should be postponed for reducing the risk of COVID-19 transmission unless essential. Nebulizer should not be used in the pandemic era. In contrast, pMDI via spacer is recommended. ICS is safe to use in asthma with COVID-19 patients. Short course and lowest dose of systemic corticosteroid may be used in acute asthma exacerbation.

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