



# Recommendations for Individualized Rehabilitation of Syncope in Children and Adolescents during the COVID-19 Epidemic

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## ABSTRACT

Since December 2019, the outbreak of SARS-CoV-2 in Wuhan, Hubei province, has spread to the whole country and abroad. As a susceptible population, the number of children and adolescents is increasing day by day. Under the severe situation of epidemic prevention and control, pediatric department has successively launched the expert consensus and treatment recommendations on the prevention and control of novel coronavirus pneumonia (COVID-19) in related fields. Syncope is a common emergency in children and adolescents, recurrent syncope seriously affects the quality of life and mental health of children. It is difficult for children with syncope to seek medical treatment during the epidemic period. This paper puts forward some suggestions on the rehabilitation of children and adolescents with syncope during the epidemic period.

## DEAR EDITOR

Since December 2019, an outbreak of new coronavirus (SARS-CoV-2) in Wuhan, Hubei Province, China, and has now spread around the world. As a susceptible population, the number of children and adolescents is increasing day by day. Syncope is a common emergency in children and adolescents, mainly including Neurally Mediated Syncope (NMS), cardiac syncope, and unexplained syncope [1]. Recurrent syncope can seriously affect children's quality of life and mental health [2]. During the epidemic period, it is difficult for children with syncope to seek medical treatment or follow up clinic. Here are some suggestions on the individual rehabilitation of children and adolescents with different types of syncope, and drug selection in the case of SARS-CoV-2 infection.

## RECOMMENDATIONS OF HOME REHABILITATION AND REEXAMINATION OF CHILDREN AND ADOLESCENT NMS PATIENTS DURING THE COVID-19 EPIDEMIC

### Health education

- Avoiding incentives (such as quick position change, stuffy environment, prolonged standing) [2].

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- Correctly identify the presyncope symptoms, when dizziness, chest tightness, palpitation and unclear vision occurs, patients should adjust their position, such as changing to a squatting, sitting, and lying positions as soon as possible, transfer to a ventilated room and do physical anti-stress actions to avoid and delay syncope through physical anti-stress actions.
- Maintaining mental health: During the epidemic, children should avoid fear, anxiety and nervousness. Parents should pay attention to their mental health.
- Appropriate physical exercise: During the epidemic, aerobic exercise can be performed at home while reducing outdoor activities, but parents must accompany them [3].
- Getting enough sleep every day (more than 8 h/d).

#### Autonomic nervous function exercise

- Upright training [2]
- Skin autonomic nerve training
- Increase the intake of salt and water

#### Understand and be familiar with network platform for medical treatment: During the epidemic, to avoid cross-infection, many hospitals in China have carried out network experts free consultations

Children with syncope and their families can get individual rehabilitation and medication guidance through network consultation.

#### Follow-up clinic and reexamination: Children diagnosed with NMS for the first time and after treatment should be revisited within 1-3 months

The Head-Up Tilt Test (HUTT) is an important test for children with NMS. During the epidemic period, the HUTT indication should be strictly grasped during the HUTT inspection and the reexamination should be strictly performed in accordance with the pre-screening procedure for outpatients [2,4].

## HOME REHABILITATION AND MEDICATION RECOMMENDATIONS FOR CHILDREN AND ADOLESCENTS WITH CARDIAC SYNCOPE DURING THE COVID-19 EPIDEMIC

Cardiac syncope in children and adolescents is mainly caused by abnormal heart structure or abnormal electrical activity. Rapid onset, high risk, prone to sudden death [2].

#### Health education

- Take good measures to prevent infection [5]
- Avoid emotional excitement and strenuous exercise, and maintain adequate sleep and cheerful mood.

#### Drug selection suggestion

Patients with cardiac syncope caused by different reasons should be treated with different drugs. For children with cardiac syncope complicated with SARS-CoV-2 infection, pay attention to the side effects of drugs and the interaction between drugs.

- Children with arrhythmic cardiac syncope complicated SARS-CoV-2 infection: Antiarrhythmic drugs should be used to stop and prevent seizures, and pacemakers should be implanted if necessary. However, such children should be cautious when using antiviral drugs and antiarrhythmic drugs. Lopinavir / rilanavir and chloroquine phosphate are the recommended antiviral drugs in the current plan of COVID-19 diagnosis and treatment, but the drug has little experience in children, and rilanavir is clearly prohibited in patients who use drugs such as amiodarone and propafenone [1]. Chloroquine phosphate can cause bundle branch and third-degree atrioventricular block, and Asthma syndrome occurs in severe cases, and cardiomyopathy has been reported.
- Children with cardiomyopathy and heart failure complicated with SARS-CoV-2 infection: They should be treated with anti-heart failure, improvement of myocardial remodeling and myocardial nutrition, but drug management should be paid attention to when patients using Angiotensin-Converting Enzyme Inhibitor (ACEI), Angiotensin II Receptor Blocker (ARB) and digitalis preparation. Studies have shown that SARS-CoV-2 infection can reduce the expression of Angiotensin-Converting Enzyme 2 (ACE2), which leads to aggravation of the disease [6,7]. Yan, et al. [8] analyzed the full-length structure of ACE2 and found that ACE2 exists as a dimer with both open and closed conformational changes [9], and both conformations can recognize each other with SARS-CoV-2 and then infect target cells. At present, there is still controversy over the application of ACEI/ARB drugs. Ferrario, et al. [10] reported that the use of ACEI/ARB reflectivity to increases ACE2, thereby increasing the risk of SARS-CoV-2 infection. However, Sun, et al. [11] found that application of ACEI/ARB may reduce the pulmonary inflammation and mortality in patients with SARS-CoV-2 infection. Therefore, when using ACEI/ARB drugs, we should fully consider their safety and potential effects on diseases, but we should not change or stop using ACEI/ARB drugs at

will. The amount of digitalis treatment and poisoning is very close. SARS-CoV-2 can cause hypoxemia and hypoxemia can induce digitalis poisoning [5]. Children with SARS-CoV-2 infection should monitor digitalis concentration or stop using digitalis when they are treated with digitalis.

- Children with primary pulmonary hypertension with SARS-CoV-2 infection: They can be treated with nitric oxide, prostacyclin, vasodilator, sildenafil and bosentan. Oral anticoagulants can delay the progression of pulmonary hypertension. However, SARS-CoV-2 infection can cause abnormal blood coagulation function, so we should pay more attention to monitor blood coagulation function when using it [4].

## HOME REHABILITATION RECOMMENDATIONS FOR CHILDREN AND ADOLESCENTS WITH UNEXPLAINED SYNCOPE DURING THE COVID-19 EPIDEMIC

Because the cause of syncope is unknown in such children, family members should accompany them to avoid individual activities when they are isolated at home. At the same time, children and adolescents are prone to fear and anxiety of the virus, resulting in mental syncope occurs. Therefore, it is necessary to provide timely psychological counseling for children. And after the epidemic, you need to see a doctor in a higher hospital as soon as possible to determine the cause [4].

## AUTHOR CONTRIBUTIONS

Xin Wang and Cheng Wang conceptualized and designed the idea, drafted the initial manuscript and revised the manuscript. Haihui Xiao and Yi Xu reviewed and revised the manuscript. All authors approved the final manuscript as submitted and agree to be accountable for all aspects of work.

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