

Susceptibility of children with congenital heart disease to coronavirus disease 2019: A potential challenge as schools reopen

Sir,

Given the tendency of coronavirus disease 2019 (COVID-19) to cause critical disease in individuals with predisposing conditions, comorbid cardiac conditions – including congenital heart disease (CHD) – may increase disease severity in COVID-19. As schools around the world reopen, this letter highlights mechanisms by which children with CHD may be at increased risk of severe COVID-19, particularly in lower-middle-income countries.

Otherwise “benign” viral respiratory illnesses in CHD patients carry a high risk of critical hypoxemia due to the altered baseline cardiorespiratory status of children with CHD, predisposing to low cardiac output, ventilation-perfusion mismatch, or pulmonary hypertensive crises.^[1] In addition, CHD patients may also have decreased immunocapabilities, which may result in higher susceptibility to viral respiratory illnesses. As seen with respiratory syncytial virus infection, a mostly self-limiting disease in healthy infants, infection may result in severe bronchiolitis and pneumonia in infants with CHD, with greater rates of hospitalization,

mechanical ventilation, intensive care unit admission, and perioperative mortality.^[2]

Although 1% of children with COVID-19 have shown progression to acute respiratory distress syndrome,^[3] 77% of hospitalized children have preexisting conditions.^[4] Although few studies have evaluated the clinical course of COVID-19 in pediatric patients with CHD, Sabatino *et al.* from Italy showed that potential cardiac complications in pediatric CHD patients with COVID-19 included heart failure, pulmonary hypertension, pericardial effusion, and myocardial injury.^[5] Of particular concern is the risk of Multisystem Inflammatory Syndrome in Children, a hyperinflammatory syndrome that occurs in pediatric COVID-19 patients that may cause cardiac involvement resulting in acute heart failure and ventricular dysfunction.

With school resuming worldwide, it is inevitable that COVID-19 outbreaks such as those in the US, England, France, and Israel will occur in schools, particularly when precautionary measures are followed suboptimally, and may possibly lead to worse outcomes for children with CHD. Developing countries, which harbor more than

90% of the global burden of pediatric CHD (a significant proportion of which is repaired CHD), lack adequate diagnostic and treatment facilities for cardiac care, and will face a particularly significant challenge.

Therefore, it is important that health systems and schools strictly adhere to COVID-19 prevention guidelines and also remain wary about the additional risk children with CHD may face with COVID-19. Measures should include:

- School doctors and nurses must ensure accurate knowledge of the health status of students with CHD
- In case of cardiac emergencies, educators must be trained in recognizing danger signs and cardiopulmonary resuscitation
- Automated external defibrillators should be present on school premises and emergency medical services readily contactable
- Educate parents and caregivers to reinforce COVID-19 prevention guidelines at home, along with prompt recognition of signs and symptoms of illness, particularly in high-risk populations.

Finally, the lack of literature regarding COVID-19 in children with CHD is an urgent call for research regarding clinical course and management in different settings around the world.

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