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Severe Acute Respiratory Syndrome (SARS) in Children

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INTRODUCTION

Severe Acute Respiratory Syndrome (SARS) is a newly recognised and highly contagious respiratory infection. The disease frequently results in a rapidly downhill course in adults with very high mortality rate especially in the elderly, whereas, the severity is much milder in children. The infection was subsequently confirmed to be due to a novel strain of coronavirus. Early evidence suggested that this virus has jumped the species barrier from wild animals to humans resulting in SARS. The exact pathophysiology of SARS remains unclear and the treatment of SARS in children remains to be determined. Although there has not been any case fatality in infected children, adolescents tend to develop more severe disease than younger children. Early and proper isolation of infected adults, meticulous infection control measures in the hospital setting, exhaustive contact tracing are the important steps in limiting the spread of this infection. Pediatricians should be aware of the epidemiology, clinical presentation and management of children with SARS.

THE EPIDEMIOLOGY OF SARS IN CHILDREN

It is quite clear that SARS originates from Southern China. The World Health Organization (WHO) was first notified in February 2003 by the Chinese Ministry of Health of an outbreak of acute respiratory syndrome with 305 cases and 5 deaths that occurred in Southern China.1 Subsequently, there have been a number of major outbreaks in Mainland China, Hong Kong, Vietnam, Toronto, Singapore and Taiwan. The US Centers for Disease Control and Prevention (CDC) termed this condition Severe Acute Respiratory Syndrome (SARS)2 and patients are categorized into 'suspect' and 'probable' SARS cases.3

The outbreak in Hong Kong started in late February 2003 when an infected doctor came from Zhongshan county and checked into a hotel in Hong Kong.4 In just two days, many visitors and guests from the hotel were infected although exactly how they were infected remain a mystery. When these infected individuals from the index hotel returned to their home countries, they started the outbreaks in the hospital systems in Toronto, Singapore and Hanoi.5-8 Early in the outbreak, very little is known about the epidemiology and route of spread and unprotected healthcare workers were infected while caring for these patients. The infected hospital workers and visitors to the hospitals then spread the infection to the community.

With regards to the pediatric burden of this disease, only 6% of all SARS cases in Hong Kong were children or adolescents. In Hong Kong, many infected children were attending school up until they developed symptoms of the infection and there has not been any spread of SARS in the school setting in Hong Kong. This suggests that the infected children are non-infectious during the incubation period. Almost all infected children can be traced to an infected contact in their household.

THE SARS-ASSOCIATED CORONAVIRUS

The WHO laboratory network with 13 laboratories around the world work together in their effort of identifying the responsible infectious agent.9 SARS was confirmed to be caused by a novel strain of coronavirus called SARS-associated coronavirus.10 Subsequently, the similar strain of coronavirus was isolated in wild animals sold in the markets in the Guandong Province of Mainland China. Sera from workers in these markets were found to have antibodies against the novel strain of coronavirus.11 These preliminary results suggest that the virus has jump the species barrier resulting in human disease.

Despite the identification of the SARS-associated coronavirus, reliable laboratory test for early diagnosis is still not widely available. Although the virus can be detected in respiratory secretions, stool and urine using reverse-transcription-polymerase chain reaction (RT-PCR), many of our SARS cases (>50%) with coronavirus infection confirmed by serology were initially negative for RT-PCR. Serum antibody testing using enzyme immunoassay and indirect fluorescence antibody assay are also available as confirmatory tests but infected

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patients will not have a positive result until the third week of their illness. A history of close contact with known SARS patients will remain the most important clue to the diagnosis of this infection in children. Detection plasma SARS-Coronavirus viral load appeared to be a reliable method of early diagnosis. A preliminary study of our pediatric cases revealed that the detection rate was 87.5% to 100% within the first week after onset of illness.12

CLINICAL FEATURES AND TREATMENT OF SARS IN CHILDREN

The incubation period of SARS is between 5 to 10 days. Most infected children will present with fever, dry cough and a runny nose. These symptoms are clinically similar to those of other mild upper respiratory tract infections.13-15 Symptoms of myalgia, dizziness, chills and rigors found in adults are not common in children. The initial chest examination is usually normal in affected young children, whereas inspiratory crackles can be heard in adolescent patients. We have not documented any spread of this infection from children to children or children to adults in Hong Kong. However, such potential cannot be ruled out, as all infected children were isolated from the onset of their illness. Prompt and proper early isolation is still mandatory until more data concerning the infectivity in children are available. Radiographic changes such as unilateral or perihilar air space consolidation are more common in adolescent patients. Thoracic computed tomography may reveal poorly defined, ground glass opacifications of the lungs in about 20% of the cases. Lymphopenia was also found in almost all pediatric cases. Elevation of liver enzymes and mild thrombocytopenia are occasionally found. These clinical features and radiological findings are non-specific and any child with mild viral pneumonia may have similar features.

The disease in young children is self-limiting and many of them will not need supplemental oxygen. There have also been pediatric cases that were asymptomatic but subsequent serological screening confirmed the diagnosis of coronavirus infection. Only a small percentage of adolescent patients may have a slightly more severe course with progressive deterioration in the first week or two.13-15 There has not been any fatality among more than 100 pediatric cases of SARS in Hong Kong. Although we have treated the more severe adolescent cases with ribavirin, there is increasing evidence that this drug is ineffective against the SARS coronavirus. The use of steroid is even more controversial and we would not recommend this form of treatment until the efficacy and safety are proven in clinical trials. On the contrary, quantitative RT-PCR studies in our children revealed that the numbers of RNA viral copies showed no relationship with steroid or ribavirin treatment.12

CONCLUSION

In just 6 months, SARS has infected more than 8000 people and claimed almost 800 lives worldwide Further studies are needed to reveal the reasons why children have a much milder disease than adults. Strict infection control is of paramount importance in preventing nosocomial infection among healthcare workers. The natural reservoir for this new virus is still unknown although preliminary evidence suggested than it originates from wild animals. Intensive research is currently underway in the development of a rapid and reliable point-of-care diagnostic test. Until a rapid and reliable diagnostic test is widely, a history of contact with adult SARS cases remains as the most important clue for paediatricians to make an early diagnosis of this infection in children. The optimal treatment for SARS in children remains to be determined.

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