SHORT REPORT

Mandatory temperature monitoring in schools during SARS

S Y Chng, F Chia, K K Leong, Y P Kwang, S Ma, B W Lee, R Vaithinathan, C C Tan

Arch Dis Child 2004;**89**:738–739. doi: 10.1136/adc.2003.047084

During the SARS outbreak, temperature monitoring was mandatory for all Singapore schoolchildren. None of the Singapore children with SARS were detected through school temperature screening. However, temperature monitoring procedures have a powerful psychological effect of reassuring parents and the public that schools are safe during a SARS outbreak.

During the severe acute respiratory syndrome (SARS) outbreak in Singapore, there was concern that SARS could spread rapidly in schools. Since SARS patients are infectious only when febrile, twice daily temperature monitoring of all schoolchildren from 6 to 16 years of age was made mandatory in Singapore during the period 30 April to 25 July 2003. All pupils were issued with a personal thermometer and trained to take their own temperatures under the supervision of teachers. Students were not allowed to attend school if their temperature reading was >37.8℃ for students ⩽12 years old or >37.5℃ for students >12 years old.[1] As a consequence of this policy, some otherwise asymptomatic children were turned away from school because of high temperatures.

The objectives of this study were to determine the incidence and causes for persistently high temperature readings in asymptomatic Singapore schoolchildren.

PATIENTS AND METHODS

All asymptomatic children who had (a) persistently increased temperature readings (defined as ⩾2 temperature readings above the cut-off temperatures per week for >2 consecutive weeks) and (b) no contact history with SARS and/or travel history to a country with SARS within the previous 10 days, were identified by the Ministry of Education and referred to the Ministry of Health for evaluation.

All students were seen by a panel of three doctors and a dental officer, and their temperature logs studied. All children were investigated with full blood count, peripheral blood film, C reactive protein, erythrocyte sedimentation rate, urine microscopy, and chest radiograph. Additional tests were performed if indicated. The panel of three doctors discussed each case and assigned a final diagnosis.

RESULTS

A total of 499 778 children had mandatory temperature screening in the period 30 April to 25 July 2003, of which 67 students fulfilled referral criteria. The referral rate was 1.07 children per 100 000 children-weeks of screening.

Table 1 summarises the demographic characteristics and diagnoses of these students. The majority (89.5%) did not have an identifiable pathological cause and were classified as normal variants with high basal body temperatures. Of these, 12 (20.0%) had infrequent (high temperature readings <30% of all readings) while 11 (18.3%) had frequent temperature spikes (high temperature readings >70% of all readings) respectively. There was no relation between the occurrence of the temperature spike and the time of day. None of the children had SARS by clinical assessment based on the WHO case definition.[2] Of the six children with a pathological cause, their high temperatures settled with treatment.

All 67 children were followed up for three months and all have remained well. None required hospitalisation and none were diagnosed with a life threatening illness.

DISCUSSION

This is a large scale nationwide study involving nearly 500 000 children. To our knowledge, this is the first community study on asymptomatic children with persistently increased body temperatures. Only 9.0% of the children referred had an identifiable pathological cause. The pathologies were mild, ranging from dental to respiratory infections.

Parents whose children have persistently increased temperatures as high as 38.2℃ on screening but are otherwise well with no abnormalities on medical review can be reassured that their children are healthy with no serious pathologies. We postulate that these children have high basal body temperatures secondary to decreased thermoregulatory abilities.

None of the Singapore children diagnosed with SARS were detected through school temperature screening. As was observed with temperature screening of travellers at points of entry into a country, there were only two SARS cases detected among 36 million travellers screened in Hong Kong;[3]

Table 1 Demographic characteristics and diagnoses of the students seen at the temperature assessment clinic (n = 67)

Characteristic	Number
Gender	
Female	43 (64.2%)
Race	
Chinese	32 (47.8%)
Malay	24 (35.8%)
Indian	10 (14.9%)
Japanese	1 (1.5%)
Age (years)	
Mean	10.2
Standard deviation	2.5
Range	6–16
Maximum temperature recorded (℃)	
Mean	38.2
Standard deviation	0.2
Range	37.8–38.7
Diagnoses	
High basal temperature	60 (89.5%)
Thermometer fault	1 (1.5%)
Dental problems (caries or erupting teeth with pericoronitis)	3 (4.5%)
Sinusitis	1 (1.5%)
Pneumonia (non-SARS)	1 (1.5%)
Autoimmune thyroiditis and positive antinuclear antigen	1 (1.5%)

our experience with mandatory temperature monitoring in schools is that it is of low yield. However, temperature monitoring procedures have a very powerful psychological effect of reassuring parents and the public that schools are safe during a SARS outbreak. This is an important consideration which cannot be discounted. With the simplification and streamlining of procedures to reduce inconvenience to students and schools, temperature monitoring remains a useful community response in the event of an outbreak.

ACKNOWLEDGEMENTS

The authors thank the Ministry of Education (Singapore) for their assistance during the course of this study.

Authors' affiliations

S Y Chng, B W Lee, Department of Paediatrics, The Children's Medical Institute, National University Hospital, Singapore
F Chia, K K Leong, Y P Kwang, R Vaithinathan, School Health Service Division, Health Promotion Board, Singapore
S Ma, C C Tan, Ministry of Health, College of Medicine Building, Singapore

Funding: Ministry of Health, Singapore

Ethical approval was obtained from the Ministry of Health (Singapore)

Correspondence to: Dr S Y Chng, Department of Paediatrics, The Children's Medical Institute, National University Hospital, 5 Lower Kent Ridge Road, Singapore 119074, Singapore; paev18@nus.edu.sg

Accepted 15 December 2003

REFERENCES

1 **Brayden RM**, Daley MF, Brown JM. Ambulatory and community pediatrics. In: Hay WW, Hayward AR, Levin MJ, Sondheimer JM, eds. *Current pediatric diagnosis and treatment*, 16th edn. McGraw-Hill, 2003:237.
2 **World Health Organisation**. Case definitions for surveillance of severe acute respiratory syndrome (SARS). URL: http://www.who.int/csr/sars/casedefinition/en.
3 **SARS Expert Committee**. SARS Expert Committee Report, Appendix IV: Facts and figures on the SARS epidemic in Hong Kong. URL: http://www.sars-expertcom.gov.hk/english/reports/reports/files/e_app4.pdf.

ARCHIVIST

Hypoxaemia in sickle cell disease

Hypoxaemia, generalised or local, causes sickling of red cells in people with sickle cell disease and there is evidence that nocturnal hypoxaemia may be a cause of central nervous system complications and vaso-occlusive crises. Researchers in Philadelphia (BM Yamaja Setty and colleagues. *Lancet* 2003;**362**:1450–5) have shown that children with severe sickle cell disease may be hypoxaemic both by night and by day and that the hypoxaemia is related to the degree of anaemia and associated with changes likely to lead to tissue damage.

They studied 37 patients aged 3–19 years with sickle cell disease (28 HbSS, 9 Hb SC) and ten controls, measuring daytime and overnight blood oxygen saturation (SaO_2) by pulse oximetry. Blood was taken for measurement of concentrations of vascular cell adhesion molecule 1 (VCAM-1) and markers of activation of neutrophils (L-selectin and leukotriene B4), and platelets (P-selectin). Fifteen (54%) of the children with HbSS, but none of the Hb SC group, had sleeping hypoxaemia, defined as mean sleeping SaO_2 93% or less. There was no significant difference between sleeping and waking SaO_2.

Daytime and night-time hypoxaemia was demonstrated in over half of the children with HbSS and was associated with a greater degree of anaemia, increased red cell adhesion to endothelium, and an increase in markers of neutrophil and platelet activation. Is the hypoxaemia the cause or the result of the observed changes? These researchers have previously published evidence that the hypoxaemia in their patients is not due to lung disease. In severe sickle cell disease greater anaemia is associated with a greater shift to the right of the haemoglobin dissociation curve and they propose that it is this that leads to cellular activation and sickle cell complications. Clinicians, they say, may need to take more notice of modest levels of hypoxaemia and be prepared to intervene more readily.