

EVIDENCE SEARCH REPORT

RESEARCH QUESTION: Is the use of thermometers an effective screening strategy for students in schools during COVID-19?	UNIQUE IDENTIFIER: EOC090201-01 ESR
CONTEXT: Schools re-opening	
RESOURCES USED:	
<ul style="list-style-type: none"> • CADTH • CDC (US) • CEBM • CORD-19 (Semantic Scholar) • bioRxiv • Embase • Evidence Check Australia • GOARN • Google • Google Scholar • HSE (Ireland) 	<ul style="list-style-type: none"> • LitCovid • Medline • medRxiv • National Academies of Sciences, Engineering Medicine • NCCMT • Norwegian Institute of Public Health • Trip Pro • WHO • WHO – Global Research Database
LIMITS/EXCLUSIONS/INCLUSIONS: English	REFERENCE INTERVIEW COMPLETED: None
DATE: September 2, 2020	
LIBRARIAN: Mark Mueller & Catherine Young	REQUESTOR: Gary Groot
TEAM: EOC	
SEARCH ALERTS CREATED: None	
CITE AS: Mueller, M; Young, C. Is the use of thermometers an effective screening strategy for students in schools during COVID-19? 2020 Sep 2; Document no.: EOC090201-01 ESR. In: COVID-19 Rapid Evidence Reviews [Internet]. SK: SK COVID Evidence Support Team, c2020. 6 p. (CEST evidence search report)	

LIBRARIAN NOTES/COMMENTS

As there was not much available in the published literature, the search was expanded to temperature monitoring in schools generally. The grey literature search was limited to the search question.

Let us know if the results don't meet your needs or if you'd like to try another search approach.

Kind regards,
Mark Mueller & Catherine Young

DISCLAIMER

This information is provided as a service by the Saskatchewan Health Authority and University of Saskatchewan Libraries. Professional librarians conduct searches of the literature. Results are subject to the limitations of the databases and the specificity, broadness and appropriateness of the search parameters presented by the requester. The Libraries do not represent in any matter that retrieved citations are complete, accurate or otherwise to be relied upon. The search results are only valid as of the date and time at which the search is conducted. The Libraries do not accept responsibility for any loss or damage arising from the use of, or reliance on, search results.

SEARCH RESULTS

To obtain the full-text articles or to request offsite access, email library@saskhealthauthority.ca.

SUMMARIES, GUIDELINES & OTHER RESOURCES

The Conversation

- Will School Temperature Checks Curb the Spread of Coronavirus? [Published July 24, 2020]. Accessed September 2, 2020. Available from <https://theconversation.com/will-school-temperature-checks-curb-the-spread-of-coronavirus-142999>

Center for Evidence-Based Medicine

- COVID-19: Accuracy of Strip-Like Forehead Thermometers. [March 18, 2020]. Available from <https://www.cebm.net/covid-19/accuracy-of-strip-like-forehead-thermometers/>

LIBRARIAN'S NOTE: See sections for recommendations for Young Children and Children. The authors conclude that evidence for the use of detecting fevers is variable at best. Please note that evidence is based on studies conducted prior to COVID-19.

Sick Kids Hospital (Toronto)

- COVID-19: Guidance for School Reopening. [July 29, 2020]. Available from <https://www.sickkids.ca/PDFs/About-SickKids/81407-COVID19-Recommendations-for-School-Reopening-SickKids.pdf>

LIBRARIAN'S NOTE: *“On-site temperature measurement or pulse oximeter checks are not recommended because fever and hypoxia are not consistent symptoms in children and youth (present in only a minority of cases) and would result in lines and delayed school entry, and has not been shown to be an effective screening strategy to date.”* Pg. 8.

Centers for Disease Control and Prevention (US)

- Screening K-12 Students for Symptoms of COVID-19: Limitations and Considerations. [Updated July 23, 2020]. Available from <https://www.cdc.gov/coronavirus/2019-ncov/community/schools-childcare/symptom-screening.html>

LIBRARIAN'S NOTE: *“Some studies have tried to identify which symptoms may best predict whether an individual has COVID-19, although these studies have primarily focused on those over 18-years-old. ***In children, fever has been the most frequently reported symptom. However, fever is common in many other illnesses, and temperatures can be taken improperly and falsely interpreted as fever.*** Additionally, there is no symptom or set of symptoms that only occurs in children diagnosed with COVID-19.”*

- Interim Considerations for K-12 School Administrators for SARS-CoV-2 Testing. [Updated June 20, 2020]. Available from <https://www.cdc.gov/coronavirus/2019-ncov/community/schools-childcare/k-12-testing.html>

LIBRARIAN'S NOTE: *"One strategy to identify individuals with COVID-19 symptoms is to conduct symptom screenings, such as temperature screening and/or symptom checking of staff and students. These screenings are one of many different tools schools can use to help lower the risk of SARS-CoV-2 transmission. However, because symptom screenings are not helpful for identification of individuals with COVID-19 who may be asymptomatic or pre-symptomatic or if infected with an unrelated virus, symptom screening will not prevent all individuals with COVID-19 from entering the school."* (Approximately 8 screens down)

American Academy of Pediatrics

- COVID-19 Planning Considerations: Guidance for School Re-Entry. [Updated August 19, 2020]. Available from <https://services.aap.org/en/pages/2019-novel-coronavirus-covid-19-infections/clinical-guidance/covid-19-planning-considerations-return-to-in-person-education-in-schools/>

LIBRARIAN'S NOTE: *"School policies regarding temperature screening and temperature checks must balance the practicality of performing these screening procedures for large numbers of students and staff with the information known about how children manifest and transmit COVID-19 infection, the risk of transmission in schools, and the possible lost instructional time to conduct the screenings. At this time, the CDC currently does not recommend universally screening students at school, because screening may fail to identify a student who has a SARS-CoV-2 infection and may overidentify students with different common childhood illnesses. Schools should develop plans for rapid response to a student or staff member with fever who is in the school regardless of the implementation of temperature checks or symptom screening prior to entering the school building."* (Approximately 13 screens down).

National Academies of Sciences Engineering Medicine

- Reopening K-12 Schools During the COVID-19 Pandemic. [2020]. Available from <https://www.nap.edu/read/25858/chapter/1>

LIBRARIAN'S NOTE: *"Temperature and symptom screening is mentioned in two places in the CDC decision tree. While it is important to be sure that people who are infected do not enter the building, there is mounting evidence that people may be contagious before they show symptoms of COVID-19. This means that screening may not identify all individual who pose a risk for brining the virus into the school. In addition, temperature screening alone is less likely to identify individuals than temperature and symptom screening."* Pg. 64.

ARTICLES

Note: References are sorted by year (newest to oldest)

1. Soh SE, Cook AR, Chen MI, et al. Teacher led school-based surveillance can allow accurate tracking of emerging infectious diseases - evidence from serial cross-sectional surveys of febrile respiratory illness during the H1N1 2009 influenza pandemic in Singapore. *BMC Infect Dis.* 2012;12:336. DOI: 10.1186/1471-2334-12-336

ABSTRACT: BACKGROUND: Schools are important foci of influenza transmission and potential targets for surveillance and interventions. We compared several school-based influenza monitoring systems with clinic-based influenza-like illness (ILI) surveillance, and assessed the variation in illness rates between and within schools. METHODS: During the initial wave of pandemic H1N1 (pdmH1N1) infections from June to Sept 2009 in Singapore, we collected data on nation-wide laboratory confirmed cases (Sch-LCC) and daily temperature

monitoring (Sch-DTM), and teacher-led febrile respiratory illness reporting in 6 sentinel schools (Sch-FRI). Comparisons were made against age-stratified clinic-based influenza-like illness (ILI) data from 23 primary care clinics (GP-ILI) and proportions of ILI testing positive for pdmH1N1 (Lab-ILI) by computing the fraction of cumulative incidence occurring by epidemiological week 30 (when GP-ILI incidence peaked); and cumulative incidence rates between school-based indicators and sero-epidemiological pdmH1N1 incidence (estimated from changes in prevalence of A/California/7/2009 H1N1 hemagglutination inhibition titers ≥ 40 between pre-epidemic and post-epidemic sera). Variation in Sch-FRI rates in the 6 schools was also investigated through a Bayesian hierarchical model. RESULTS: By week 30, for primary and secondary school children respectively, 63% and 79% of incidence for Sch-LCC had occurred, compared with 50% and 52% for GP-ILI data, and 48% and 53% for Sch-FRI. There were 1,187 notified cases and 7,588 episodes in the Sch-LCC and Sch-DTM systems; given school enrollment of 485,723 children, this represented 0.24 cases and 1.6 episodes per 100 children respectively. Mean Sch-FRI rate was 28.8 per 100 children (95% CI: 27.7 to 29.9) in the 6 schools. We estimate from serology that 41.8% (95% CI: 30.2% to 55.9%) of primary and 43.2% (95% CI: 28.2% to 60.8%) of secondary school-aged children were infected. Sch-FRI rates were similar across the 6 schools (23 to 34 episodes per 100 children), but there was widespread variation by classrooms; in the hierarchical model, omitting age and school effects was inconsequential but neglecting classroom level effects led to highly significant reductions in goodness of fit. CONCLUSIONS: Epidemic curves from Sch-FRI were comparable to GP-ILI data, and Sch-FRI detected substantially more infections than Sch-LCC and Sch-DTM. Variability in classroom attack rates suggests localized class-room transmission.

URL: <https://www.ncbi.nlm.nih.gov/pubmed/23206689>

DOI: 10.1186/1471-2334-12-336

2. Kwang YP, Ma S, Chng SY, et al. A cross-sectional study on reference ranges of normal oral temperatures among students in Singapore. *Ann Acad Med Singap.* 2009;38(7):613-8.

ABSTRACT: INTRODUCTION: During the 2003 Severe Acute Respiratory Syndrome (SARS) outbreak, all schools in Singapore implemented twice-daily temperature monitoring for students to curtail the spread of the disease. Students were not allowed to attend school if their temperature readings were >37.8 degrees C for students $<$ or $=12$ years old, or $>$ or $=37.5$ degrees C for students >12 years old. These values had been arbitrarily determined with professional inputs. The aim of this study is to determine the reference ranges of normal oral temperatures of students in Singapore and recommend the cut-off values for febrile patients. This may be used in another similar outbreak of an infectious disease with fever. MATERIALS AND METHODS: Four co-ed primary schools and 4 co-ed secondary schools were selected for this study. Four thousand and two hundred primary 1 to secondary 3 students responded (96.8%) and participated in this cross-sectional study. The mean ages of the students in the lowest (primary 1) and highest educational levels (secondary 3) were 7.4 years old and 15.3 years old, respectively. Twelve oral temperature readings per student (i.e. measurements taken 4 times a day in 3 consecutive days) were collected. Forty-six thousand seven hundred and eighty-three (92.8%) out of 50,400 temperature readings were used for the analysis as missing data were excluded. A quantile regression model was applied to estimate reference ranges of normal oral temperatures for students with adjustment for potential confounding factors. RESULTS: The age-specific reference ranges of normal oral temperature from this study for students $<$ or $=12$ years old and >12 years old were 35.7 degrees C to 37.7 degrees C and 35.6 degrees C to 37.4 degrees C, respectively. Temperatures of 37.8 degrees C and 37.5 degrees C are therefore recommended as the oral temperature cut-offs for those $<$ or $=12$ years old and >12 years old, respectively. CONCLUSION: This study has provided empirical data on normal oral temperature cut-offs which could be used during temperature screening in schools.

URL: <https://www.ncbi.nlm.nih.gov/pubmed/19652853>

3. Tan CC. SARS in Singapore--key lessons from an epidemic. *Ann Acad Med Singap.* 2006;35(5):345-9.

ABSTRACT: The rapid containment of the Singapore severe acute respiratory syndrome (SARS) outbreak in 2003 involved the introduction of several stringent control measures. These measures had a profound impact on the

healthcare system and community, and were associated with significant disruptions to normal life, business and social intercourse. An assessment of the relative effectiveness of the various control measures is critical in preparing for future outbreaks of a similar nature. The very "wide-net" surveillance, isolation and quarantine policy adopted was effective in ensuring progressively earlier isolation of probable SARS cases. However, it resulted in nearly 8000 contacts being put on home quarantine and 4300 on telephone surveillance, with 58 individuals eventually being diagnosed with probable SARS. A key challenge is to develop very rapid and highly sensitive tests for SARS infection, which would substantially reduce the numbers of individuals that need to be quarantined without decreasing the effectiveness of the measure. Daily temperature monitoring of all healthcare workers (HCWs) in hospitals was useful for early identification of HCWs with SARS. However, daily temperature screening of children in schools failed to pick up any SARS cases. Similarly, temperature screening at the airport and other points of entry did not yield any SARS cases. Nevertheless, the latter 2 measures probably helped to reassure the public that schools and the community were safe during the SARS outbreak. Strong political leadership and effective command, control and coordination of responses were critical factors for the containment of the outbreak.

URL: <https://www.ncbi.nlm.nih.gov/pubmed/16830002>

4. Chng SY, Chia F, Leong KK, et al. Mandatory temperature monitoring in schools during SARS. Archives of disease in childhood. 2004;89(8):738-9. DOI: 10.1136/adc.2003.047084

ABSTRACT: 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.

URL: <https://www.ncbi.nlm.nih.gov/pubmed/15269074>

DOI: 10.1136/adc.2003.047084

SEARCH STRATEGIES

CINAHL

S5	S1 AND S2 AND S3	Limiters - English Language	29
S4	S1 AND S2 AND S3	30	
S3	(MH "Schools+") OR TI (school* or kindergarten) OR AB (school* or kindergarten)		188,917
S2	(MH "Health Screening+") OR TI (screening or monitoring) OR AB (screening or monitoring)		277,797
S1	(MH "Body Temperature+") OR (MH "Thermography") OR TI (temperature or thermomet* or thermography or infrared) OR AB (temperature or thermomet* or thermography or infrared)		38,628

Embase <1974 to 2020 September 01>

- 1 exp body temperature/ or exp thermography/ or infrared radiation/ or (temperature or thermomet* or thermography or infrared).ti,ab. (758891)
- 2 exp mass screening/ or (screening or monitoring).ti,ab. (1508592)
- 3 exp school/ or (school* or kindergarten).ti,ab. (593969)
- 4 1 and 2 and 3 (492)
- 5 limit 4 to (english language and exclude medline journals) (45)

Ovid MEDLINE(R) ALL <1946 to September 01, 2020>

- 1 Body Temperature/ or Thermography/ or Infrared Rays/ or (temperature or thermomet* or thermography or infrared).ti,ab. (735082)

- 2 exp Mass Screening/ or (screening or monitoring).ti,ab. (1048753)
- 3 exp Schools/ or (school* or kindergarten).ti,ab. (351251)
- 4 1 and 2 and 3 (112)
- 5 limit 4 to english language (106)

Search terms for other resources used in various combinations:

COVID | COVID-19 | Coronavirus

School | Kindergarten | Grade-School | Middle-School | Junior-High | High-School | K-12 | Student | Pupil

Temperature | Thermography | Thermometer | Infrared

Check | Screen | Mass-Screen | Monitor | Test | Testing | Surveillance | Biosurveillance

Value | Validity | Accuracy | Sensitivity | Specificity | Prediction