McMaster University | HEALTH FORUM

RISE Rapid-Improvement Support and Exchange

COVID-19 Rapid Evidence Profile #8 (14 May 2020)

Question

How effective is temperature taking at borders or in general as a screening tool to identify people who may have COVID-19 and need to take appropriate action?

What we found

Temperature taking as a screening tool can be used for those at high risk for COVID-19 (in this case travellers passing through air, land and sea borders) and for the entire population (e.g., on entering schools, stores and workplaces). It can be used alongside other potential screening tools (e.g., a list of COVID-19-related symptoms) and operationalized in different ways (e.g., by randomly selecting individuals for temperature taking and by varying the frequency of and settings for temperature taking). Appropriate follow-up actions for those with an elevated temperature can include self-isolating and seeking a diagnostic test, among others, however, such actions are not the focus of this rapid evidence profile.

We identified eight evidence documents that provide highly relevant evidence to answer the question:

- two guidelines developed using a robust process (e.g., GRADE);
- two rapid reviews;
- one guideline developed using some type of evidence; and
- three primary studies with additional important insights.

We also identified experiences related to the question from six countries (Australia, China, New Zealand, South Korea, Sweden and the United Kingdom) and all Canadian provinces and territories.

We provide below both a narrative summary of lessons learned from highly relevant evidence documents as well as from two jurisdictional scans (one for other countries and the other for Canadian provinces and territories). Additional details for those who want to know more are provided in Table 1 (an overview of the type and number of documents that were identified), Table 2 (the full list of evidence documents found including those

Box 1: Our approach

We identified research evidence addressing the question by searching the guide to key COVID-19 evidence sources on 13 May 2020 as part of a series of three rapid evidence profiles focused on different aspects of screening for COVID-19.

We searched for guidelines that were developed using a robust process (e.g., GRADE), full systematic reviews (or review-derived products such as overviews of systematic reviews), rapid reviews, protocols for systematic reviews, and titles/questions for systematic reviews or rapid reviews. Single studies were only included if no relevant systematic reviews were identified.

We appraised the methodological quality of full systematic reviews and rapid reviews using AMSTAR. AMSTAR rates overall quality on a scale of 0 to 11, where 11/11 represents a review of the highest quality. It is important to note that: 1) the AMSTAR tool was developed to assess reviews focused on clinical interventions, so not all criteria apply to systematic reviews pertaining to delivery, financial or governance arrangements within health systems; and 2) quality-appraisal scores for rapid reviews are often lower because of the methodological shortcuts that need to be taken to accommodate compressed timeframes.

We identified experiences from other countries and from Canadian provinces and territories by searching jurisdiction-specific websites (e.g., government ministries and web pages dedicated to COVID-19). Our scan of experiences from other countries focused on those that we identified as being further ahead in resuming regular activities within their health and social systems.

This rapid evidence response was prepared in three hours or less to inform next steps in evidence synthesis, guideline development and/or decision-making related to the question that was posed.

deemed of medium and low quality), Table 3 (for experiences from other countries), and Table 4 (for experiences from Canadian provinces and territories). In addition, we provide a detailed summary of our methods in Appendix 1, abstracts for highly relevant documents in Appendix 2, and hyperlinks for documents excluded at the final stage of reviewing in Appendix 3.

Lessons learned from evidence documents about temperature screening

The highly relevant guidelines that were developed using a robust process provide conflicting recommendations. Specifically, WHO technical guidance indicates that ill travellers may be screened through self-reporting, visual observation or temperature measurement (WHO technical guidance; last updated 19 March 2020), while the Emergency Care Research Institute (which is focused on healthcare facilities, not air, land and sea borders) indicates that temperature-screening programs using infrared alone or with a questionnaire for mass screening are ineffective for detecting infected staff or visitors presenting to healthcare facilities, and may create a false sense of security (U.S. - Emergency Care Research Institute (ECRI); last updated March 2020). Similarly, another guideline from Canadian Agency for Drugs and Therapeutics in Health (published on 6 May 2020) included evidence from ECRI showing that non-contact infrared temperature screening is ineffective to detect COVID-19 among travellers.

The two highly relevant low-quality rapid reviews align with guidelines in not recommending temperature screening and indicate that:

- temperature-screening programs using infrared temperature-screening devices with or without questionnaires for mass screening of those entering health facilities is ineffective for detecting infected persons due to environmental temperatures, false answers, and the use of fever-reducing drug (AMSTAR rating 3/10; last updated 20 April 2020); and
- while asymptomatic subjects have similar viral loads than symptomatic patients, thermal infrared screening seems to lack sensitivity to detect COVID-19 cases when used in community settings (AMSTAR rating 2/10; search conducted on 9 April 2020).

Lessons learned from international and Canadian experiences with temperature screening

Two countries (China and South Korea) have implemented temperature screening at borders using 38 degrees Celsius as the threshold to indicate fever. Australia has mandated temperature screening for visitors and health professionals entering residential aged-care facilities, but not in other settings. China has widely implemented temperature screening using hand-held thermometers and calibrated non-contact thermometers in a range of transit hubs (e.g., buses and train terminals), workplaces, and institutions (e.g., childcare facilities, colleges and universities, social housing, among others). New Zealand, Sweden and the U.K. have not implemented temperature screening at their borders or in other settings.

In Canada, the use of temperature screening has not been broadly implemented at borders. In Alberta, Saskatchewan and the Northwest Territories temperature screening has been implemented for high-risk groups. In Alberta, it has been put in place for workers at the Cargill meat-packing plant following an outbreak. In Saskatchewan, it is being used for workers and visitors at healthcare facilities, and in the Northwest Territories it is being employed for oil and gas workers returning to work from other parts of Canada. Although not recommended by public-health authorities, some schools in Quebec have started using non-contact infrared thermometers to screen students.

Table 1: Overview of the type and number of documents that were identified

Type of document	All	Temperature screening at borders	Temperature screening in general
Guidelines developed using a robust process (e.g., GRADE)	2	1	1
Full systematic reviews	2	2	0
Rapid reviews	2	0	2
Guidelines developed using some type of evidence	1	0	1
Protocols for reviews that are underway	0	0	0
Titles/questions for reviews that are being planned	2	0	2
Single studies in areas where no reviews were identified	3	3	0

Table 2: Documents that address the question, organized by document type and sorted by relevance to the question and COVID-19

Type of document	Relevance to question	Focus	Recency or status
Guidelines developed using a robust process (e.g., GRADE)	• Temperature screening at borders	Ill travellers may be screened through self-reporting, visual observation, or temperature measurement (WHO technical guidance)	Last updated 19 March 2020
	• Temperature screening in general	Temperature-screening programs using infrared alone or with a questionnaire for mass screening are ineffective for detecting infected staff or visitors presenting to healthcare facilities, and may create a false sense of security (U.S. - Emergency Care Research Institute)	Last updated March 2020
Full systematic reviews	• Temperature screening at borders	Non-contact infrared thermometers have limited efficacy to detect symptomatic international travellers at airports during the early stages of pandemic influenza, and additional factors such as symptom masking, and asymptomatic travellers can impair temperature-screening strategies	Literature last searched August 2009
	• Temperature screening at borders	Exit and entry screening practices at borders have been relatively ineffective at detecting cases in previous pandemics (e.g., Ebola, H1N1 and SARS), however may have positive behavioural effects on discouraging travel of ill persons, raising awareness	Literature last searched May 2018

Type of document	Relevance to question	Focus	Recency or status
Rapid reviews	• Temperature screening in general	Temperature-screening programs using infrared temperature screening devices with or without questionnaires for mass screening of those entering health facilities is ineffective for detecting infected persons due to environmental temperatures, false answers, and the use of fever-reducing drug	Last updated 20 April 2020
	• Temperature screening in general	While asymptomatic subjects have similar viral loads to symptomatic patients, thermal infrared screening seems to lack sensitivity to detect COVID-19 cases when used in community settings	Search conducted on 9 April 2020
Guidance developed using some type of evidence synthesis and/or expert opinion	• Temperature screening in general	Evidence from ECRI showed that non-contact infrared temperature screening is ineffective to detect COVID-19 among travellers	Published on 6 May 2020
Protocols for reviews that are underway	• None identified		
Titles/questions for reviews that are being planned	• Temperature screening in general	What is the most effective Covid-19 screening strategy?	Question in development (added 25 March 2020)
	• Temperature screening in general	Population screening as an option for the long-term isolation of COVID-19 in the entire population	Question in development (added 25 March 2020)
Single studies in areas where no reviews were identified*	• Temperature screening at borders	Thermal screening at airports has a 54% COVID-19 detection rate as compared to 72% with COVID-19 infection having a positive sputum test (3.5% with a positive sputum test will not have COVID-19), and therefore the thermal scan screening technique should be complemented with rapid sputum testing	Published 29 March 2020 (letter to the editor)
	• Temperature screening at borders	Screening for temperature with a non-contact infrared thermometer using wrist measurements may be more stable than forehead measurements, although both are suitable for indoor patients	Posted 6 March 2020 (pre-print)

Type of document	Relevance to question	Focus	Recency or status
	• Temperature screening at borders	Exit or entry screening at airports for initial symptoms, via thermal scanners or similar, is unlikely to prevent passage of infected travellers into new countries or regions where they may seed local transmission	Published 6 February 2020

Table 3: International experiences with temperature screening at borders and more generally

Country	Experiences
Australia	• Australia's borders are currently closed, but citizens, residents and immediate family members can travel to Australia and may undergo enhanced health screening on arrival, which includes questions related to the following symptoms: fever; cough; sore throat; tiredness or shortness of breath; chills; body aches; runny nose; and muscle pain. However, no systematic temperature screening is currently being conducted at borders. • The Aged Care Quality and Safety Commission's Chief Clinical Advisor has mandated that routine screening questions and temperature screening are applied to visitors for all residential aged-care facilities
China	• Temperature-monitoring equipment (hand-held thermometers or calibrated non-contact temperature-monitoring equipment) is set up in China to take the temperature of people entering the settings listed below (and only those with a normal temperature are allowed to enter): o civil aviation (with temperature taking for all passengers entering or leaving the airport, as well as on board based on flight risk levels and the needs of epidemic prevention and control); o road passenger transport (at bus stations); o urban rail transport (at urban rail transit stations); o waterway passenger transport (at ferry terminals); o enterprises (for external personnel, at registration); o government departments and other public institutions (for staff and external personnel, at the entrance of the unit); o childcare institutions (for staff, children and visitors, at the entrance); o primary and secondary schools (for teaching staff, students and external personnel, at the entrance); o colleges and universities (for teaching staff, students and external personnel, at the entrance); o pension facilities; o welfare houses/social housing (for working staff, nursing staff and external personnel, at the entrance); o prisons ('closed-off' management); o mental healthcare facilities (for staff and external personnel, at the entrance); o medical waste disposal centres; and o property-management centres. • Temperature-monitoring equipment (hand-held thermometer or calibrated non-contact temperature-monitoring equipment) is required for some public transportation. along with emergency areas set up to temporarily quarantine passengers with symptoms such as fever and cough, which is required for: o trains (hand-held thermometer); o regular buses above Class-III and chartered buses (hand-held thermometer); o ships (hand-held thermometer); and o terminal buildings (calibrated non-contact temperature-monitoring equipment).

	• Before resuming work in the following industries, non-contact thermometers and other anti-epidemic supplies (e.g., masks, liquid hand soap, disinfectants) need to be reserved, and emergency areas need to be set up to temporarily quarantine those with symptoms: o enterprises (in low-, medium- and high-risk areas); o construction industry (in low-, medium- and high-risk areas); o postal and express delivery industry (in low-, medium- and high-risk areas); o government departments and other public institutions (in low-, medium- and high-risk areas); o childcare institutions; o primary and secondary schools; o pension facilities (in medium- and high-risk areas); o welfare houses/social housing (in low-, medium- and high-risk areas); o prisons (in low-, medium- and high-risk areas, and if there is a confirmed case of COVID-19 in a prison, symptom screening is conducted for all prisoners and police officers as soon as possible); and o property-management centres (in low-, medium- and high-risk areas).
New Zealand	• Every traveller entering New Zealand is screened for symptoms (but does not have their temperature checked) on arrival and: 1) if they are symptomatic they will be tested and placed in a quarantine facility for 14 days; and 2) if they are not symptomatic they will be placed in an approved managed isolation facility for 14 days • At the end of the 14 days, a final health check is carried out, which includes taking their temperature to ensure it is below 38 degrees Celsius, and confirming a non-positive test for COVID-19, no symptoms of COVID-19 are present, and that a suitable travel plan is in place
South Korea	• All inbound passengers to South Korea are required to pass through infrared cameras and then have their temperatures taken using electronic thermometers (and if they show symptoms of a fever they are required to be tested for COVID-19)
Sweden	• Temperature screening has not been implemented at borders or in other settings in Sweden
U.K.	• U.K. borders remain closed and as a result temperature screening has not been implemented

Table 4: Canadian provinces' and territories' experiences with temperature screening at borders and more generally

Province/ territory	Experiences
Pan-Canadian	• Temperature screening has not been implemented at Canadian borders • Current screening approaches include a self-assessment questionnaire administered via an app or by a government official
B.C.	• Temperature screening has not been implemented at B.C. borders • If COVID-19 transmission rates remain low, the province will resume post-secondary institutions for some in-class learning, and as a preventive measure will introduce daily screening for all staff and students, including a temperature check
Alberta	• Temperature screening has not been implemented at Alberta borders • As part of Alberta's relaunch phase one plan they will be putting in place stronger international border controls and airport screening for international travellers (additional details were not provided) • Following the outbreak of COVID-19 at the Cargill meat-packing plant in Alberta, the chief medical officer of health outlined additional safety measures requiring temperature and symptom checks before entering the workplace
Saskatchewan	• Temperature screening has not been implemented at Saskatchewan borders • Saskatchewan Health Authority has implemented temperature checks for staff and visitors upon entering the facility using either a no-touch digital thermometer or tympanic thermometer o If the temperature registers as over 39 degrees Celsius the individual is not permitted to work and is required to return to home and contact the established health line
Manitoba	• Temperature screening has not been implemented at borders or in other settings in Manitoba; symptoms screening relies instead on self-assessments and on questionnaires administered by employees, volunteers, and government officials
Ontario	• Temperature screening has not been implemented at borders or in other settings in Ontario; symptom screening relies instead on self-assessments and questionnaires
Quebec	• Although not recommended by public-health authorities, some schools are screening students with non-contact infrared thermometer and other approaches • There are also other organizations exploring additional ways to support screening, including some 'certificate' or 'passport' indicating that they have completed a questionnaire/self-evaluation • Other screening relies on self-assessments of symptoms or screening questionnaires administered by government officials at check points or by employers at the entry to select workplaces
New Brunswick	• Temperature screening has not been implemented at borders or in other settings in New Brunswick
Nova Scotia	• Temperature screening has not been implemented at borders or in other settings in Nova Scotia
Prince Edward Island	• Temperature screening has not been implemented at borders or in other settings in Prince Edward Island
Newfoundland and Labrador	• Temperature screening has not been implemented at borders or in other settings in Newfoundland and Labrador
Yukon	• Temperature screening has not been implemented at borders in the Yukon or in other settings in the Yukon
Northwest Territories	• Temperature screening has not been implemented at borders in the Northwest Territories

	• Oil and gas workers, before returning to their workplace, are required to complete a workplace risk-assessment form as well as complete a health screening that includes a temperature check and COVID-19 symptom inquiry • In addition, a daily symptom inquiry is administered prior to the start of each shift
Nunavut	• Temperature screening has not been implemented at borders in Nunavut

Wilson MG, Waddell K, Gauvin FP, Mansilla, C, Moat KA, Wang Q, Lavis JN. COVID-19 rapid evidence profile #8: How effective is temperature taking at borders or in general as a screening tool to identify people who may have COVID-19 and need to take appropriate action? Hamilton: McMaster Health Forum, 14 May 2020.

The McMaster Health Forum is one of the three co-leads of RISE, which is supported by a grant from the Ontario Ministry of Health to the McMaster Health Forum. To help Ontario Health Team partners and other health- and social-system leaders as they respond to unprecedented challenges related to the COVID-19 pandemic, the Forum is preparing rapid evidence responses like this one. The opinions, results and conclusions are those of the McMaster Health Forum and are independent of the ministry. No endorsement by the ministry is intended or should be inferred.

The authors declare that they have no professional or commercial interests relevant to the rapid evidence profile. The funders played no role in the identification, selection, assessment, synthesis, or presentation of the research evidence or experiences profiled in the rapid evidence profile.

Appendix 1: Methodological details

We use a standard protocol for preparing each rapid evidence profile (REP) to ensure that our approach to identifying research evidence as well as experiences from other countries and from Canadian provinces and territories are as systematic and transparent as possible in the time we were given to prepare the profile.

Identifying research evidence

For each REP, we search our continually updated guide to key COVID-19 evidence sources for:
1) guidelines developed using a robust process (e.g., GRADE);
2) full systematic reviews;
3) rapid reviews;
4) guidelines developed using some type of evidence synthesis and/or expert opinion;
5) protocols for reviews or rapid reviews that are underway;
6) titles/questions for reviews that are being planned; and
7) single studies (when no guidelines, systematic reviews or rapid reviews are identified).

Each source for these documents is assigned to one team member who conducts hand searches (when a source contains a smaller number of documents) or keyword searches to identify potentially relevant documents. A final inclusion assessment is performed both by the person who did the initial screening and the lead author of the rapid evidence profile, with disagreements resolved by consensus or with the input of a third reviewer on the team. The team uses a dedicated virtual channel to discuss and iteratively refine inclusion/exclusion criteria throughout the process, which provides a running list of considerations that all members can consult during the first stages of assessment.

During this process we include published, pre-print and grey literature. We do not exclude documents based on the language of a document. However, we are not able to extract key findings from documents that are written in languages other than Chinese, English, French or Spanish. We provide any documents that do not have content available in these languages in an appendix containing documents excluded at the final stages of reviewing.

Identifying experiences from other countries and from Canadian provinces and territories

For each rapid evidence profile we collectively decide on what countries to examine based on the question posed. For international jurisdictions we search relevant sources included in our continually updated guide to key COVID-19 evidence sources. These sources include government-response trackers that document national responses to the pandemic. In addition, we conduct searches of relevant government and ministry websites. In Canada, we search websites from relevant federal and provincial governments, ministries and agencies (e.g., Public Health Agency of Canada).

While we do not exclude countries based on language, where information is not available through the government-response trackers, we are unable to extract information about countries that do not use English, Chinese, French or Spanish as an official language.

Assessing relevance and quality of evidence

We assess the relevance of each included evidence document as being of high, moderate or low relevance to the question and to COVID-19. We then use a colour gradient to reflect high (darkest blue) to low (lightest blue) relevance.

Two reviewers independently appraise the methodological quality of systematic reviews and rapid reviews that are deemed to be highly relevant. Disagreements are resolved by consensus with a third reviewer if needed. AMSTAR rates overall methodological quality on a scale of 0 to 11, where 11/11 represents a review of the highest quality. High-quality reviews are those with scores of eight or higher out of a possible 11, medium-quality reviews are those with scores between four and seven, and low-quality reviews are those with scores less than four. It is important to note that the AMSTAR tool was developed to assess reviews focused on clinical interventions, so not all criteria apply to systematic reviews pertaining to health-system arrangements or to economic and social responses to COVID-19. Where the denominator is not 11, an aspect of the tool was considered not relevant by the raters. In comparing ratings, it is therefore important to keep both parts of the score (i.e., the numerator and denominator) in mind. For example, a review that scores 8/8 is generally of comparable quality to a review scoring 11/11; both ratings are considered 'high scores.' A high score signals that readers of the review can have a high level of confidence in its findings. A low score, on the other hand, does not mean that the review should be discarded, merely that less confidence can be placed in its findings and that the review needs to be examined closely to identify its limitations. (Lewin S, Oxman AD, Lavis JN, Fretheim A. SUPPORT Tools for evidence-informed health Policymaking (STP): 8. Deciding how much confidence to place in a systematic review. *Health Research Policy and Systems* 2009; 7 (Suppl1):S8.

Preparing the profile

Each included document is hyperlinked to its original source to facilitate easy retrieval. For all included guidelines, systematic reviews, rapid reviews and single studies (when included), we prepare declarative headings that provide a brief summary of the key findings and act as the text in the hyperlink. Protocols and titles/questions have their titles hyperlinked given that findings are not yet available. We then draft a brief summary that highlights the total number of different types of highly relevant documents identified (organized by document), as well as their key findings, date of last search (or date last updated or published), and methodological quality.

Appendix 2: Abstracts for highly relevant documents

Note that the table below only includes the abstracts for the documents that we identified in Table 1 as being highly relevant to the question.

Type of document	Relevance to question	Abstract and link to full text
Rapid reviews	• Temperature screening in general	Temperature-screening programs using infrared temperature screening devices with or without questionnaires for mass screening of those entering health facilities is ineffective for detecting infected persons due to environmental temperatures, false answers, and the use of fever-reducing drug **Key messages** Temperature-screening programs using IR alone or with a questionnaire for mass screening are ineffective for detecting infected persons, based on our review of evidence from two large systematic reviews (SRs), three simulation studies, and six diagnostic cohort studies (not included in the SRs). Under best-case scenarios, simulation studies suggest such screening will miss more than half of infected individuals. They are ineffective for mass screening because of the low number of infected individuals who have fever at the time of screening and inconsistent technique by operators. Several authors concluded that IR thermometry even when used with a questionnaire was not reliable for screening due to environmental temperatures, false answers to questionnaires, and use of fever-reducing drugs. Using such an approach to reduce infection risk from visitors and staff entering healthcare facilities could provide a false sense of safety. Evidence limitations and strengths: The evidence base is fairly large and up to date. The effectiveness of airport screening with IR devices has been examined in a recent SR with 27 studies, and the effectiveness of IR device screening has been examined in an SR with 20 studies and 11 additional studies identified in our searches. Most of the studies were conducted outside the United States, but two of the newest diagnostic cohort studies were conducted in the United States. Variations across studies are due primarily to variations in the devices used both for noncontact IR measurements and standard reference temperature measurements.
	• Temperature screening in general	While asymptomatic subjects have similar viral loads to symptomatic patients, thermal infrared screening seems to lack sensitivity to detect COVID-19 cases when used in community settings **In brief** • Infrared thermal detection systems have been used to quantify skin temperature and provide an assessment of internal body temperature; they have been shown to be accurate in identifying people with no fever, but much less so in identifying people with fever.

Type of document	Relevance to question	Abstract and link to full text
		• Thermal detection systems have been used in border screening at airports for COVID-19 and in previous pandemics. • While fever is a common symptom of COVID-19, early estimates of asymptomatic infections are between 18-42% of patients. • According the World Health Organization (WHO), the virus can initially be detected in upper respiratory samples one to two days prior to symptom onset, suggesting potential pre-symptomatic transmission. • Completely asymptomatic subjects display viral loads similar to those of symptomatic patients. • A recent study of airport screening for COVID-19 estimated that using thermal screening, 46% of infected travellers would not be detected. Thermal screening will lack sensitivity to reliably detect COVID-19 cases in community settings.
Primary studies of particularly innovative models	• Temperature screening at borders	Thermal screening at airports has a 54% COVID-19 detection rate as compared to 72% with COVID-19 infection having a positive sputum test (3.5% with a positive sputum test will not have COVID-19), and therefore the thermal scan screening technique should be complemented with rapid sputum testing No abstract available
	• Temperature screening at borders	Screening for temperature with a non-contact infrared thermometer using wrist measurements may be more stable than forehead measurements, although both are suitable for indoor patients **Abstract** Aims: Temperature screening is important in the population during the outbreak of 2019 Novel Coronavirus (COVID-19). This study aimed to compare the accuracy and precision of wrist and forehead temperature with tympanic temperature under different circumstances. Methods: We performed a prospective observational study in a real-life population. We consecutively collected wrist and forehead temperatures in Celsius (C) using a non-contact infrared thermometer (NCIT). We also measured the tympanic temperature using a tympanic thermometer (IRTT) and defined fever as a tympanic temperature ≥37.3C. Results: We enrolled a total of 528 participants including 261 indoor and 267 outdoor participants. We divided outdoor participants into four types according to their means of transportation to the hospital as walk, bicycle, electric vehicle, car, and inside the car. Under different circumstance, the mean difference ranged from -1.72 to -0.56C in different groups for the forehead measurements, and -0.96 to -0.61C for the wrist measurements. Both measurements had high fever screening abilities in inpatients (wrist: AUC 0.790; 95% CI: 0.725-0.854, P <0.001; forehead: AUC 0.816; 95% CI: 0.757-0.876, P <0.001). The cut-off value of wrist measurement for

Type of document	Relevance to question	Abstract and link to full text
		detecting tympanic temperature ≥37.3C was 36.2C with an 86.4% sensitivity and a 67.0% specificity, and the best threshold of forehead measurement was also 36.2C with a 93.2% sensitivity and a 60.0% specificity. Conclusions: Wrist measurement is more stable than forehead measurement under different circumstance. Both measurements have great fever screening abilities for indoor patients. The cut-off value of both measurements was 36.2C.
	• Temperature screening at borders	Exit or entry screening at airports for initial symptoms, via thermal scanners or similar, is unlikely to prevent passage of infected travellers into new countries or regions where they may seed local transmission We evaluated effectiveness of thermal passenger screening for 2019-nCoV infection at airport exit and entry to inform public-health decision-making. In our baseline scenario, we estimated that 46% (95% confidence interval: 36 to 58) of infected travellers would not be detected, depending on incubation period, sensitivity of exit and entry screening, and proportion of asymptomatic cases. Airport screening is unlikely to detect a sufficient proportion of 2019-nCoV-infected travellers to avoid entry of infected travellers.

Appendix 3: Documents excluded at the final stages of reviewing

Type of document	Focus
Guidelines developed using a robust process (e.g., GRADE)	Not applicable
Full systematic reviews	Not applicable
Rapid reviews	Not applicable
Guidance developed using some type of evidence synthesis and/or expert opinion	Not applicable
Protocols for reviews that are underway	Not applicable
Titles/questions for reviews that are being planned	Not applicable
Single studies in areas where no reviews were identified	Responding to the COVID-19 outbreak in Singapore: Staff protection and staff temperature and sickness surveillance systems