

Temperature Screenings to Delay the Spread of Disease: Literature Review as of September 22, 2020

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A rapid search of literature to identify relevant evidence related to temperature/symptom checking stations was conducted. Six systematic or rapid reviews covering entry/exit screening and thermal screening were found which included studies on past pandemic respiratory illnesses. Additionally, a few recent studies on specific populations in the current pandemic were identified. Articles describing effectiveness or procedural details of setting up a temperature/symptom checking station were not located as of this writing, though the CDC does provide guidance on this matter¹ and the FDA provides information about no-touch thermometers for screening purposes.²

Summary

Six systematic or rapid reviews were found that summarized evidence from entry/exit screening primarily done at airports or hospitals as they related to pandemics since about 2008, including H1N1, SARS, and Ebola.³⁻⁸ This summary focuses on only those results connected to H1N1 influenza and SARS given they are upper respiratory infections. Overall, there was significant overlap of studies included in all reviews and they agree that temperature screening is not an effective method to determine if someone has COVID-19. Of note, no cases of SARS were found through entry/exit screening; and though some cases of H1N1 were detected, the number of cases was extremely low compared to the number screened, ranging from 0.1 to 2.0 per 10,000 screened, with WHO reporting 4 cases detected per 1 million screened. Additionally, thermal scanning thermometers showed poor correlation to temperature measurements from more traditional devices, though fared better at higher temperatures. The review by Mouchtouri et al. reviewed many aspects of screening protocols, including how suspected cases were handled, some basic aspects of cost, and positive aspects such as discouraging ill people from traveling and positive psychological effects for travelers.⁵

Three recent analyses confirm the findings of the reviews. Myers et al. examined passenger screening in California early in the pandemic (February 5 through March 17, 2020).⁹ In that time, data collected by Customs and Border Protection agents via interviews about symptoms from 11,574 Chinese and Iranian passengers was received by the California Department of Public Health. Despite over 1600 hours of public health personnel time to process this data plus many more hours of contacting and tracing passengers, only three were connected to positive COVID-19 cases that existed as of April 15: two tested “several days after arrival” and one approximately 6 weeks after returning to the US. Though there were limitations connected to analyzing this particular situation, the authors note that extreme effort “did not effectively prevent introduction of COVID-19 into California.” Mitra et al. report a retrospective cohort study of 86 temperature measurements for 34 COVID-19 patients in Australia, calculating a sensitivity of only 19% at the time of initial testing, only increasing to 24% with repeat measurements.¹⁰ A recent report by Bielecki et al. measured temperatures of 84 young Swiss Army recruits (median age 21 years; mostly male) diagnosed with COVID-19. Measurements were taken over 14 days following diagnosis and using the typical cutoff of 100.4°F detected only 18% of cases. These authors state “screening for fever is

not sensitive enough to detect the vast majority of COVID-19 cases in the age group between 18 and 25 years.”¹¹

Modeling studies also suggest that temperature screening is not sufficient for detecting infections. One study that made common assumptions related to COVID-19 infections found that screening programs similar to those used for SARS or H1N1 would miss 46% of infections at entry screening.¹² Another recent modeling study aimed to estimate the expected effectiveness of screening and included risk factor screening in addition to monitoring for fever. This study found screening to be more effective when an epidemic is no longer growing. Assuming 25% of cases are subclinical, arrival screening was estimated to detect about one third of cases.¹³

Due to building evidence that COVID-19 is likely infectious prior to the symptomatic phase or even when the carrier is asymptomatic, there is potential to miss persons who are infectious with symptom screening. A recent report of 199 patients with COVID-19 across 16 states during the early months of the pandemic showed that of those who did show symptoms, nearly all (96%) exhibited at least one common symptom including fever, cough, or shortness of breath. However, older patients exhibited all three of these more commonly than younger patients.¹⁴

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