In Brief

Key Messages

• Overall, there was insufficient evidence to suggest that non-contact infrared temperature screening is effective for detecting infected individuals.

• The limitations of non-contact infrared temperature screening methods include (but are not limited to) inconsistent sensitivity; the fact that test result accuracy can be affected by the temperature of the surrounding environment, the distance from the individual being screened, and medications or other factors that may alter an individual’s temperature; and the impact of disease factors on test results (such as variation in periods of latency and incubation and the time to onset of clinical symptoms, as well as whether the epidemic is stable or spreading).

• If non-contact infrared temperature screening methods were to be utilized during an outbreak or pandemic, an implementation approach would need to consider the previously outlined limitations, in addition to considering the subsequent steps that would need to be taken following temperature testing to help mitigate the actual spread of the infection.

• These findings are based on an ECRI Clinical Evidence Assessment review that was published in March 2020.

Context

In recent years, non-contact infrared temperature screening devices have been used with the goal of helping to contain viral outbreaks such as severe acute respiratory syndrome (SARS), H1N1, and the Ebola virus. The non-contact aspect of infrared temperature screening offers convenience and speed of measurement by not requiring sterilization between uses. As a result, this method could be suitable to situations where the screening of large numbers of people is required, such as with viral outbreaks.

There has been interest in using infrared temperature screening as a potential means to help flatten the curve of the COVID-19 pandemic. In March 2020, the ECRI published a Clinical Evidence Assessment evaluating the accuracy of infrared temperature screening devices for identifying visitors or staff entering health care facilities who may have an infectious disease. CADTH has critically appraised and summarized the findings from this report.

Technology

Non-contact temperature screening devices may be used to measure the temperature of a person's skin as a surrogate of core body temperature. Specifically, they are equipped with infrared sensors that quickly measure surface temperature without making any direct contact with the skin. Examples of such devices include handheld thermometer guns and infrared cameras.

Issue

Evaluating the evidence on the accuracy of infrared temperature screening devices for detecting infectious disease will help to inform decisions around their potential use during the COVID-19 pandemic.

Methods

CADTH’s Focused Critical Appraisal examined the methodology, scientific rigour, and findings of the ECRI Clinical Evidence Assessment.

Results

In total, 16 studies were included in the ECRI Clinical Evidence Assessment. These included two systematic reviews, three simulation studies, six diagnostic cohort studies, three case-control studies, and two case series.
Overall, there was insufficient evidence to suggest that non-contact infrared temperature screening methods were effective for detecting infected individuals. In addition to considering the limitations of non-contact infrared temperature screening from an accuracy standpoint, anyone considering implementing this strategy would also need to contemplate what subsequent steps would be taken following temperature screening to help mitigate the actual spread of infection.

Nine guidelines and guidance documents relevant to fever screening were identified. However, only one of these (US FDA guidance) provided specific guidance for using non-contact infrared temperature devices (related to the COVID-19 outbreak in the US). An in-depth evaluation of the FDA guidance was beyond the scope of this review.

The main strengths of the ECRI Clinical Evidence Assessment included its large number of included studies and its recent publication date (March 2020). Some of the weaknesses, however, were that a few of the included studies had potentially confounding factors (such as concurrent measurement of heart rate and respiratory rate in addition to temperature). Additionally, the ECRI Clinical Evidence Assessment did not provide any direct comparative effectiveness information for the different types of non-contact temperature screening devices.

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