

POPULATION-BASED SCREENING OF INFECTIOUS DISEASES: NON-CONTACT INFRARED THERMOMETERS AND INFRARED THERMOGRAPHS

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Question

What is the best available evidence regarding use of non-contact infrared thermometers and infrared thermographs for population-based screening of infectious diseases?

Clinical Bottom Line

Non-contact and non-invasive infrared thermal cameras (IRT) and non-contact infrared thermometers (NCIT) are temperature measurement tools that allow mass screening at times of infectious disease pandemics, like the recent COVID-19 outbreak, Ebola virus outbreak, severe acute respiratory syndrome and Influenza A (H1N1).¹ Detection of infrared emissions helps estimate body temperature in real-time and allows for early identification of infectious individuals and facilitates prompt quarantine.² The non-contact technique prevents cross-contamination and minimizes the risk of disease spread.¹

- A rapid review conducted by the Canadian Agency for Drugs and Technologies in Health assessed the clinical effectiveness of mass thermography screening for infection and prevention. The data suggests that non-contact infrared temperature measurements are equivalent to conventional thermometers for screening for temperature.¹ (Level 3)
- A systematic review analyzed the agreement between conductive and infrared means of assessing skin temperature in clinical, occupational, sports medicine, and public health settings. Differences of ± 0.5 °C between conductive and infrared devices were found. In addition, the review demonstrated that the presence of sweat and environmental heat results in poor agreement between devices.² (Level 1)
- A systematic review assessed the implementation and effectiveness of entry and exit screening measures at ports and ground crossings for infectious diseases among travelers. The study noted that handheld NCIT or thermal imaging scanners and/or ear/oral thermometers for secondary screening were used for temperature measurement. The study concluded that calibration and accuracy checks of the equipment and training of staff in correct use are critical during screening measure implementation.³ (Level 1)
- A cross-sectional study compared three IRT detection systems among patients who sought care at an emergency department in a hospital. The study found that two systems - Opto-Therm (Opto-Therm Thermal Imaging Systems and Infrared Cameras Inc., Sewickley, PA, USA), and FLIR (FLIR Systems Inc., Boston, MA, USA) more accurate than patient self-reported fever for detecting fever and predicted fever.⁴ (Level 3)
- Three pediatric studies assessed the use of NCIT to screen for fever in the hospital. The studies found infrared thermography to be an accurate and non-invasive method of screening fever in the pediatric population.^{5,6,7}(Level 3)

Characteristics Of The Evidence

This evidence summary is based on a structured search of the literature and selected evidence-based health care databases. The evidence in this summary comes from:

- A rapid review including two prospective and five retrospective studies.¹
- A systematic review including 16 articles with 245 participants.²
- A systematic literature review including 27 articles.³
- A cross-sectional study that recruited 2,843 participants, 476 patients reported a fever, and 64 had a confirmed fever.⁴
- Three pediatric observational studies assessing the effectiveness of non-contact infrared temperature measurement systems.^{5,6,7}

Best Practice Recommendations

- Infrared non-contact thermography can be used to screen for population-based screening of fever. (Grade B)
- If using infrared non-contact thermography all staff should be adequately trained to use the equipment, and the equipment should be routinely calibrated as per the manufacturer's recommendations. (Grade A)
- Healthcare staff should be aware that perspiration or ambient environment temperature may affect the accuracy of infrared non-contact thermography. (Grade B)

References

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Archived Publications

1. JBI-ES-1707-1 (Published at 12 October 2021)

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For details on the method for development see Munn Z, Lockwood C, Moola S. The development and use of evidence summaries for point of care information systems: A streamlined rapid review approach. *Worldviews Evid Based Nurs*. 2015;12(3):131-8.

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