The following information resources have been selected by the National Health Library and Knowledge Service Evidence Virtual Team in response to your question. The resources are listed in our estimated order of relevance to practicing healthcare professionals confronted with this scenario in an Irish context. In respect of the evolving global situation and rapidly changing evidence base, it is advised to use hyperlinked sources in this document to ensure that the information you are disseminating to the public or applying in clinical practice is the most current, valid and accurate. For further information on the methodology used in the compilation of this document—including a complete list of sources consulted—please see our National Health Library and Knowledge Service Summary of Evidence Protocol.

YOUR QUESTION

Is there evidence that temperature checks for healthcare workers (HCWs) reduce the transmission of COVID-19 in healthcare settings?

IN A NUTSHELL

In a recent clinical evidence assessment, ECRI[1] concluded that the weight of evidence does not favour screening programmes using temperature screening devices alone or in combination with a questionnaire, concluding that such programmes are ineffective in detecting infected persons. Under best-case scenarios, simulation studies suggest such screening will miss more than half of infected individuals[1]. Real-world data show detection rates around 19%[20].

Absence of fever at the time of testing, inconsistent technique by operators, environmental temperatures, false answers to questionnaires and use of fever-reducing drugs are all cited as factors mitigating the effectiveness of mass temperature screening. Based on conservative assumptions on sensitivity, Quilty et al[18] found that 46% of infected travellers passing through mass temperature screening at airports will enter undetected. ECRI concludes that using such an approach to reduce infection risk from visitors and HCWs entering healthcare facilities could provide a false sense of safety.

The WHO[4] includes temperature screening of employees among a range of measures to prevent transmission of SARS-CoV-2 infection; however, the ECDC[6] notes that it is improbable that exit or entry screening will detect a sufficient number of cases to make the screening procedures effective or efficient in preventing disease transmission.

Similarly, the HSE[3] has advised against mass temperature screening for the following reasons:

— It has not proved to be effective in past outbreaks: eg SARS.
— It has unintended consequences.
— People with fever may attempt to conceal high temperatures by taking anti-pyretic drugs: ie paracetamol.
— Temperature screening can give a false sense of security, eg showing a negative result simply because the temperature has been suppressed.

Chow et al[11] note that screening only for fever, cough, shortness of breath or sore throat might have missed 17% of symptomatic HCWs at the time of illness onset; expanding criteria to include myalgias and chills may still have missed 10%. The data indicate that HCWs worked for several days while symptomatic, and according to a growing body of evidence may transmit SARS-CoV-2 to vulnerable patients and other HCWs. Interventions to prevent transmission from HCWs include expanding symptom-based screening criteria, furloughing symptomatic HCWs, facilitating testing of symptomatic HCWs, and creating sick leave policies that are non-punitive, flexible, and consistent with public health guidance.

Although data regarding the effectiveness of mass screening programmes remain equivocal, surveillance may be particularly important in the containment phase of the pandemic in order to help reduce potential healthcare-associated transmission and sustain good staff morale. An integrated surveillance strategy and encouraging individual responsibility were successful in early detection of clusters of COVID-19 among HCWs in one study from Singapore[16].

In summary:

— Fever is absent in 52% of confirmed cases.
— IR thermometers may not give an accurate reading.
— Normal temperature readings may give a false sense of security and may diminish the effects of other important interventions.
— Data from previous similar outbreaks show little evidence of benefit from mass temperature screening.

IRISH AND INTERNATIONAL GUIDANCE

ECRI (2020) ECRI Clinical Evidence Assessment: Infrared Temperature Screening to Identify Infected Staff or Visitors Presenting to Healthcare Facilities During Infectious Disease Outbreaks[1]

Temperature monitoring during infectious disease outbreaks has become commonplace, and various monitoring approaches have been taken at public entry points such as health systems and airports. A common method has been the use of temperature screening devices with or without questionnaires for visitors and staff entering healthcare facilities to identify those who may have potentially infectious disease and prevent their entry into the facility. This report focuses on the accuracy of these systems for identifying infected visitors or staff.

Overall, ECRI found that screening programs using temperature screening devices alone or in combination with a questionnaire are ineffective in detecting infected persons based on a review of evidence from 2 large systematic reviews, 3 simulation studies and 6 diagnostic cohort studies not included in the systematic reviews. 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 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.

Centers for Disease Control and Prevention (29 May, 2020) Interim US Guidance for Risk Assessment and Work Restrictions for Healthcare Personnel with Potential Exposure to COVID-19[2]

This interim guidance is intended to assist with assessment of risk and application of work restrictions for asymptomatic healthcare personnel with potential exposure to patients, visitors, or other HCP with confirmed COVID-19. Separate guidance is available for travel- and community-related exposures. The community-related exposure guidance can be used to inform risk assessment for patients and visitors exposed to SARS-CoV-2

in a healthcare setting. CDC has also released guidance about return to work criteria for HCP with COVID-19 and strategies for mitigating HCP staffing shortages.

Because of their often extensive and close contact with vulnerable individuals in healthcare settings, a conservative approach to HCP monitoring and applying work restrictions is recommended to prevent transmission from potentially contagious HCP to patients, other HCP, and visitors. Occupational health programs should have a low threshold for evaluating symptoms and testing HCP.

IBEC (2020) [Webpage] COVID-19 OHS FAQs[3]

What is the current advice on screening employees?

The HSE have not updated their position on temperature checking since a meeting with the stakeholders group on the March 9. At that time, Dr Tony Holohan, the Chief Medical Officer, advised against temperature screening for the following reasons:

— It has not proved to be effective in past outbreaks: eg SARS.
— It has unintended consequences.
— People with fever are more likely to conceal this by taking anti-pyretic drugs: ie paracetamol.
— Temperature screening can give a false sense of security showing a negative simply because the temperature has been suppressed.
— It was not recommended by the WHO and it is not recommended by the ECDC or HSE. [Note: The WHO Situation Report 65 now references temperature checking in the workplace].

WHO (March 2020) Coronavirus disease 2019 (COVID-19) Situation Report 65[4]

Preventing Transmission of COVID-19 between Employees

— Implement remote work practices.
— Social distancing measures in the workplace when on-site presence is required: at least 1 metre.
— Hold fewer in-person meetings.
— Restrict the number of visitors entering the workplace.
— Limit travel beyond non-essential travel.
— Ensure people with symptoms or with family members with symptoms self-quarantine for 14 days.
— Check the body temperature of employees daily so that employees with fever don't come to work.

— Facilitate access to reliable information for employees to promote understanding of the disease and its symptoms and the personal preventative measures: respiratory etiquette, hand washing, self-isolation if sick.
— Check and follow the advice from the authorities in the community before holding a meeting or event.

WHO (2020) Getting your workplace ready for COVID-19[5]
This document gives advice on: simple ways to prevent the spread of COVID-19 in your workplace; how to manage COVID-19 risks when organizing meetings and events; things to consider when you and your employees travel; and getting your workplace ready in case COVID-19 arrives in your community.

ECDC (12 June 2020) [Technical Report] Considerations relating to passenger locator data, entry and exit screening and health declarations in the context of COVID-19 in the EU/EEA and the UK[6]
Exit or entry screening of passengers, particularly at international airports, is frequently considered as the go-to measure to implement for health security in order to safeguard countries from the introduction of a communicable disease. These procedures usually include some type of thermal screening —contactless thermometers, thermal scanners and others— to detect exiting or entry passengers with fever: ie body temperature >38°C. An additional secondary screening is frequently added to this procedure with a health declaration form or health questionnaire, potentially administered and assessed by a health professional to determine the need to test for the particular pathogen.
As regards COVID-19, based on what we know so far, several of its characteristics make it unlikely that exit or entry screening will detect a sufficient number of cases to make the screening procedures effective and/or efficient in preventing introduction and onward transmission of the disease. These include the following:
— In the case of COVID-19 fever is frequently, but not consistently, reported in symptomatic cases. According to ECDC's weekly epidemiological report for week 20–2020, fever was only reported for 48% of over 65,000 laboratory-confirmed COVID-19 cases entered in the European Surveillance System.
— In addition, fever is a symptom that can be temporarily concealed by using antipyretic drugs.

Some imported COVID-19 cases have been detected through entry screening at destination airports: eg in Taiwan, where there is a permanent airport screening system in place.
In a recent US-CDC review of the public health response, data from incoming passengers at selected US airports show that as of 21 April 2020, screening of 268,000 returning travellers discovered 14 COVID-19 cases: approximately 5/100,000 screened passengers.

ECDC (2020) Operational Considerations for the Identification of Healthcare Workers and Inpatients with Suspected COVID-19 in non-US Healthcare Settings[7]

See in full Section 5: Identification of Healthcare Workers with Suspected COVID-19

While there is limited evidence for the benefit of active healthcare worker monitoring, active strategies will theoretically result in increased healthcare worker adherence to self-evaluation of symptoms, thus enhancing patient protection.

Australian Government. Department of Health (2020) Working arrangements for the health and aged care workforce during COVID-19[8]

Temperature Checks in the Workplace
Temperature checks of workers and visitors may be useful as an added precaution in high-risk places such as hospitals and aged care facilities. This helps protect the vulnerable people in those settings.
But temperature checks aren't always an accurate way of knowing whether someone has COVID-19. This is because:

1. people with COVID-19 don't always have a fever
2. various other medical conditions or infection can cause a fever, not just COVID-19
3. fever can go up and down during an infection or after taking medication — it might be down at the time of the check

POINT-OF-CARE TOOLS

What does UpToDate say?

UpToDate (2020) Coronavirus disease 2019 (COVID-19): Infection control in health care and home settings[9]

The approach to screening health care workers entering the health care setting depends upon the institution's policies. In general, health care workers should monitor themselves for fever and symptoms of COVID-19 and stay home if they are ill. In one report of 48 health care workers with confirmed COVID-19 in King County, Washington, 65 percent reported working for a median of two days while exhibiting symptoms of COVID-19. In addition, symptom screening alone did not identify all cases. Thus, additional measures, such as universal use of masks, are recommended.

INTERNATIONAL LITERATURE

Yombi, JC et al (2020) Symptom-based screening for COVID-19 in health care workers: The importance of fever[10]

Our results show that fever has a positive impact on the yield of RT-PCR for SARS-CoV-2. However, a proportion of COVID-19-positive cases, even when symptoms are combined, will be missed if fever is required as a criterion for testing. This was acknowledged by Chow et al who recently showed that screening HCWs based on fever and respiratory symptoms is insufficient. Among 48 symptomatic HCWs who tested positive for SARS-CoV-2, approximately 17% did not report fever, cough, shortness of breath, or sore throat. Among this group, chills, myalgia, coryza and malaise were the most common symptoms. The researchers concluded that screening only for fever, cough, shortness of breath or sore throat might have missed 17% of symptomatic HCWs and that adding criteria such as myalgia and chills may still have missed 10%. These data are very interesting especially for HCWs working in home-care facilities or geriatric wards where an outbreak could have devastating effects on the fragile older population.

Chow, EJ et al (2020) Symptom Screening at Illness Onset of Health Care Personnel With SARS-CoV-2 Infection in King County, Washington[11]

Screening only for fever, cough, shortness of breath or sore throat might have missed 17% of symptomatic HCP at the time of illness onset; expanding criteria to include myalgias and chills may still have missed 10%. The data indicate that HCP worked for several days while symptomatic, and according to a growing body of evidence may transmit SARS-CoV-2 to vulnerable patients and other HCP. Interventions to prevent transmission from HCP include expanding symptoms-based screening criteria, furloughing symptomatic HCP, facilitating testing of symptomatic HCP, and creating sick leave policies that are non-punitive, flexible, and consistent with public health guidance. Face mask use by all HCPs for source control might prevent transmission from mildly symptomatic and asymptomatic HCPs. This may be particularly important in long-term care facility settings and regions with widespread community transmission.

Wu E, Qi D (2020) Masks and thermometers: Paramount measures to stop the rapid spread of SARS-CoV-2 in the United States[12]

"Another quick measure to mitigate COVID-19 rapid spreading is the non-contact handheld cutaneous infra-red thermometer for fever screening. Research shows that 98.6% of COVID-19 patients tested had a fever … Therefore, although it will not screen in every individual, a temperature check can be used as a quick screening tool that is cost-efficient and useful. When people enter public spaces, we must measure their body temperature to make sure that those identified with a fever get further confirmation by coronavirus test kits, stay at home or obtain appropriate medical care if needed."

Htun, HL et al (2020) Responding to the COVID-19 outbreak in Singapore: Staff Protection and Staff Temperature and Sickness Surveillance Systems[13]

A total of 10,583 staff were placed on hospital-wide fever and sickness surveillance, with 1,524 frontline staff working in COVID-19 areas under close surveillance. Among frontline staff, a median of eight staff illness episodes was seen per day, and almost 10% (n=29) resulted in hospitalization. None of the staff was found to be infected with COVID-19.
Conclusions: A robust staff protection and health surveillance system that is routinely implemented during non-outbreak periods and enhanced during

the COVID-19 outbreak is effective in protecting frontline staff from the infection.

Chung, YT et al (2020) Continuous temperature monitoring by a wearable device for early detection of febrile events in the SARS-CoV-2 outbreak in Taiwan[14]

Thermal screening for all visitors at the entrance of hospital buildings has become a standard protocol in Taiwan to response since the SARS epidemic. Among patients with pneumonia caused by SARS-CoV-2, fever was a common symptom, 47.4%–100%. Body temperature measurements once daily for healthcare workers and twice daily for people in isolation or quarantine are important measures to reduce the risk of cross infections. However, the use of ear or forehead thermometers has the risk of close contact.

Bwire, GM, Paulo, GS (2020) Coronavirus disease-2019: is fever an adequate screening for the returning travelers?[15]

A published study on the clinical characteristics of 138 hospitalized patients with COVID-19 in Wuhan, China, documented that fever was present in 98.6% (136/138) of hospitalized patients, whereas 2 non-intensive care unit patients (1.4%) did not present with fever. In this regard, body temperature might not be an adequate screening as it can potentially miss travellers incubating the disease or travellers concealing fever during travel and contribute to the importation of the virus to the countries of destination. Therefore, travel restrictions to and from high risk areas and/or 14-day quarantine of people coming from high risk areas are recommended to prevent possible importation of COVID-19. Currently, RT-PCR is a reliable test in detecting both symptomatic and asymptomatic COVID-19. Lastly, in previous experience from other viral outbreaks such as dengue virus and Ebola, fever screening especially at airports had a positive effect on partially blocking the importation of cases. Kuan et al reported that airport fever screening was successful in identifying 45% (244/542; 95% confidence interval 33.1–57.8%) of imported dengue cases with fever.

Wee, LE et al (2020) Containment of COVID-19 cases among healthcare workers: The role of surveillance, early detection, and outbreak management[16]

Staff surveillance is crucial during the containment phase of a pandemic to help reduce potential healthcare-associated transmission and sustain good staff morale.

An integrated surveillance strategy and encouraging individual responsibility were successful in early detection of clusters of COVID-19 among HCWs. With ongoing local transmission, vigilance must be maintained for intra-hospital spread in nonclinical areas where social mingling of HCWs occurs. Because most individuals with COVID-19 have mild symptoms, addressing presenteeism is crucial to minimize potential staff and patient exposure.

Depending on the context of utilization [hospital vs border], the volume of measurements to be carried out and the age of the person to be measured, it might be imperative to use infrared thermometers over more accurate and/or more invasive thermometers. Therefore, tympanic thermometers and thermal scanners might be the only effective and accurate tools to detect fever under certain circumstances. However, one has to keep in mind that screening for fever and screening for a virus are two different issues.

In conclusion, evidence retrieved from sixteen non-randomized studies and four systematic reviews favours the accuracy of tympanic thermometers and, more cautiously, of thermal scanners. Evidence for the accuracy of infrared skin thermometers is equivocal and requires more research. The generalizability of the evidence found is nevertheless uncertain.

Duong, A (2017) Rapid Temperature Screening for Workplace Health[17]

The introduction of a screening system to prevent infected individuals from spreading pathogens could have a real, positive impact on public health by mandating employee absenteeism during illness. In this study, it was found that most subjects believe their own health to be better than average; and that they are less susceptible to illness than others. Measurement of the subjects' temperatures using the WelloStationX and the tympanic ear thermometer demonstrated that most subjects were within normal body temperature ranges, and that there was much agreement between both instruments [mean temperatures of 36.9˚C and 36.7˚C for the WelloStationX and ear thermometer, respectively]. However, there was greater intra-measurement variability for the ear thermometer compared to the

WelloStationX [SD=0.165 and 0.037, respectively]. The adoption of a new technology to provide high-throughput, self- service temperature screening of individuals in public spaces could dramatically reduce the spread of disease.

Quilty, BJ et al (2020) Effectiveness of airport screening at detecting travellers infected with novel coronavirus (2019-nCoV)[18]

Despite limited evidence for its effectiveness, airport screening has been previously implemented during the 2003 SARS epidemic and 2009 influenza A(H1N1) pandemic to limit the probability of infected cases entering other countries or regions. Here we use the available evidence on the incubation time, hospitalisation time and proportion of asymptomatic infections of 2019-nCoV to evaluate the effectiveness of exit and entry screening for detecting travellers entering Europe with 2019-nCoV infection. We also present an online tool so that results can be updated as new information becomes available.

We estimate that the key goal of syndromic screening at airports to prevent infected travellers from entering countries or regions with little or no ongoing transmission is only achievable if the rate of asymptomatic infections that are transmissible is negligible, screening sensitivity is almost perfect, and the incubation period is short. Based on early data from Li et al, 2019-nCoV appears to have a shorter incubation period than severe acute respiratory syndrome (SARS), and a higher rate of asymptomatic infections. Under generally conservative assumptions on sensitivity, we find that 46 of 100 infected travellers will enter undetected.

Entry screening is an intuitive barrier for the prevention of infected people entering a country or region. However, evidence on its effectiveness remains limited and given its lack of specificity, it generates a high overhead of screened travellers uninfected with the targeted pathogen. For example, when entry screening was implemented in Australia in response to the 2003 SARS outbreak, 1.84 million people were screened, 794 were quarantined, and no cases were confirmed. While some cases of 2019-nCoV infection have been identified through airport screening in the current outbreak, our estimates indicate that likely more infected travellers have not been detected by screening.

Tan CC (2006) SARS in Singapore: key lessons from an epidemic[19]

Daily temperature monitoring of all healthcare workers 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.

Mitra, B et al (2020) Temperature screening has negligible value for control of COVID-19[20]

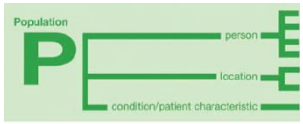
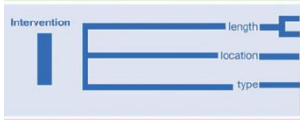
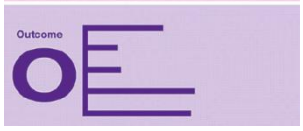
A retrospective cohort study of patients who tested positive for SARSCoV-2 at a single centre. Temperature at time of testing and on repeat testing within 24 hours were collected.

At time of testing, fever was detected in 16 of 86 (19%; 95% CI: 11–28) episodes of positive tests for SARS- CoV- 2. With repeat testing, fever was detected in 18 of 75 (24%; 95% CI: 15–35) episodes.

Conclusions: in an Australian hospital, screening for fever lacked sensitivity for detection of people with SARS- CoV- 2.

Produced by the members of the National Health Library and Knowledge Service Evidence Team†. Current as at 29 June 2020.This evidence summary collates the best available evidence at the time of writing and **does not replace clinical judgement or guidance**. Emerging literature or subsequent developments in respect of COVID-19 may require amendment to the information or sources listed in the document. Although all reasonable care has been taken in the compilation of content, the National Health Library and Knowledge Service Evidence Team makes no representations or warranties expressed or implied as to the accuracy or suitability of the information or sources listed in the document. This evidence summary is the property of the National Health Library and Knowledge Service and subsequent re-use or distribution in whole or in part should include acknowledgement of the service.

The following PICO(T) was used as a basis for the evidence summary:

	HEALTHCARE WORKERS
	TEMPERATURE SCREENING
	
	

The following search strategy was used:

"COVID-19" OR CORONAVIRUS OR "WUHAN VIRUS" OR "2019-NCOV" OR "SEVERE ACUTE RESPIRATORY SYNDROME CORONAVIRUS 2" OR "2019 NOVEL CORONAVIRUS" OR "2019 NEW CORONAVIRUS"OR SARS-COV-2
AND TEMPERATURE OR THERMOMETER* OR INFRARED OR INFRA-RED OR THERMAL OR FEVER OR"OR SCREENING OR SCREEN* CHECKING OR MONITORING

AND

HEALTHCARE WORKER OR HCW'S OR HEALTH CARE WORKER* OR HEALTHCARE PERSONNEL OR HEALTH CARE STAFF

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