



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 a consensus on the cut off point for the definition of pyrexia for temperature screening?

IN A NUTSHELL

There is no clear consensus on the definition of pyrexia for temperature screening; however, several prominent organisations including the CDC² and NLM⁵ in the United States, the HSE¹ and the greater majority of the literature^{10, 11, 13, 15, 16, 17} state that a fever is deemed to be a measured temperature of 38°C or higher². NHS guidance³ defines fever as a temperature above 37.8°C. In a study of healthcare workers' symptoms of COVID-19 in two Dutch hospitals, Kluytmans-van Dr Bergh et al¹¹ designated fever as a body temperature of 38°C or higher. Wei-Jei et al defined fever as being an axillary temperature of 37.5°C or higher¹². A systematic review by Geneva et al⁶ concluded that when deciding normal body temperature, the most important patient factors remain site of measurement and patient age.

Older adults age ≥ 60 had a lower temperature than younger adults age < 60 by 0.23°C on average⁷. In a systematic review of published research from 1935 to 2017, Geneva et al⁶ found only insignificant gender difference.

Hsiao et al¹⁷ recommended that medical institutions with outpatient services should take patients' body temperature for a second time after the patients have acclimatised to being indoors.



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|--|---------------|
| 19 | >36°C |
| 14 | >37.3°C |
| 12,18 | >37.5°C |
| 6 | ~ >37.76°C |
| NHS | ≥37.8°C |
| 9 | >37.86±0.87°C |
| HSE | >38°C |
| CDC | >38°C |
| NLM | >38°C |
| NICE [paediatric] | >38°C |
| 10, 11, 13, 15, 16, 17 | >38°C |
| 8 | >38.2°C |
| ACCCM | >38.3°C |

IRISH AND INTERNATIONAL GUIDANCE

What does the HSE say?

[Health Service Executive \(2020\) Fever in Adults¹](#)

Your body's normal temperature is between 36 and 36.8 degrees Celsius. A high temperature or fever, for most people, is when your body temperature is 38°C or higher.

What do the Centers for Disease Control and Prevention (United States) say?

[Centers for Disease Control and Prevention \(2020\) Definitions of Symptoms for Reportable Illnesses²](#)

CDC considers a person to have a fever when he or she has a measured temperature of 100.4° F (38°C) or greater, or feels warm to the touch, or gives a history of feeling feverish. CDC note that even though measured temperature is the preferred and most accurate method to determine fever, it is not always possible to take a person's temperature.

[NHS England \(22 May 2020\) COVID-19: investigation and initial clinical management of possible cases³](#)

As part of its criteria requiring admission to hospital, NHS guidance defines fever ≥37.8°C and at least one of the following respiratory symptoms, which



must be of acute onset: persistent cough [with or without sputum], hoarseness, nasal discharge or congestion, shortness of breath, sore throat, wheezing, sneezing or a loss of or change in normal sense of taste or smell [anosmia] in isolation or in combination with any other symptoms.

[NHS Inform \(2020\) Fever in Adults⁴](#)

Your normal body temperature is approximately 37°C. A fever is usually when your body temperature is 37.8°C or higher. You may feel warm, cold or shivery.

[National Library of Medicine \(US\) \(2020\) Body Temperature Norms⁵](#)

Normal body temperature varies by person, age, activity and time of day. The average normal body temperature is generally accepted as 98.6°F (37°C). Some studies have shown that the 'normal' body temperature can have a wide range, from 97°F (36.1°C) to 99°F (37.2°C). A temperature over 100.4°F (38°C) most often means you have a fever caused by an infection or illness.

INTERNATIONAL LITERATURE

What does the international literature say?

[Geneva et al \(6 April 2019\) Normal Body Temperature: A Systematic Review⁶](#)

PubMed was searched from 1935 to December 2017 with a variety of search phrases among article titles. The references of the identified manuscripts were then manually searched. The inclusion criteria were as follows: 1. the paper presented data on measured normal body temperature of healthy human subjects ages 18 and older; 2. a prospective design was used; and 3. the paper was written in or translated into the English language. 36 articles met the inclusion criteria. This comprised 9,227 measurement sites from 7,636 subjects. The calculated ranges (mean \pm 2 standard deviations) were 36.32–37.76 (rectal), 35.76–37.52 (tympanic), 35.61–37.61 (urine), 35.73–37.41 (oral), and 35.01–36.93 (axillary). Older adults age \geq 60 had lower temperature than younger adults age $<$ 60 by 0.23°C on average. There was only insignificant gender difference. Compared with the currently established reference point for normothermia of 36.8°C, our means are



slightly lower but the difference likely has no physiological importance. We conclude that the most important patient factors remain site of measurement and patient's age.

[Oxford University Centre for Evidence-Based Medicine \(18 March 2020\) Managing Fever in adults with possible or confirmed COVID-19 in Primary Care⁷](#)

A review of normal body temperature in adults¹⁰ including studies from 1935-1999 concluded the range of normal oral temperature was 35.6°C to 38.2°C. The American College of Critical Care Medicine defines fever as core body temperature greater or equal to 38.3°C. NICE consider an infant or child to have a fever if their temperature is 38°C or higher.

A systematic review of normal body temperature found that older adults age ≥ 60 had a lower temperature than younger adults age < 60 by 0.23°C on average.

[Sund-Levander et al \(2002\) Normal Oral, Rectal, Tympanic and Axillary Body Temperature in Adult Men and Women: A Systematic Literature Review⁸](#)

The purpose of this study was to investigate normal body temperature in adult men and women. Studies from 1935 to 1999 were included. Articles were classified as 1 strong, 2 fairly strong and 3 weak evidence. When summarizing studies with strong or fairly strong evidence the range for oral temperature was 33.2-38.2 degrees C, rectal: 34.4-37.8 degrees C, tympanic: 35.4- 37.8 degrees C and axillary: 35.5-37.0 degrees C. The range in oral temperature for men and women, respectively, was 35.7-37.7 and 33.2-38.1 degrees C, in rectal 36.7-37.5 and 36.8-37.1 degrees C, and in tympanic 35.5-37.5 and 35.7-37.5 degrees C. The ranges of normal body temperature need to be adjusted, especially for the lower values. When assessing body temperature it is important to take site of measurement and gender into consideration. Studies with random samples are needed to confirm the range of normal body temperature with respect to gender and age.

[Yang et al \(2020\) Clinical characteristics and imaging manifestations of the 2019 novel coronavirus disease \(COVID-19\): a multi-center study in Wenzhou city, Zhejiang, China⁹](#)

A retrospective cohort study of 149 RT-PCR confirmed positive patients. 114 patients had fever. The baseline recorded temperature was 37.86 ± 0.87 .



[**Buckner et al \(2020\) Clinical Features and Outcomes of 105 Hospitalized patients with COVID-19 in Seattle, Washington¹⁰**](#)

All laboratory-confirmed COVID-19 cases in adults admitted to an academic medical center in Seattle, WA between March 2 and March 26, 2020 were included. The total number of patients included was 105. The median age was 69.

Fever was defined as a recorded temperature of 38.0°C or higher. Only 39% had fever in the first 24 hours.

[**Kluytmans-van den Bergh et al \(2020\) Prevalence and Clinical Presentation of Health Care Workers With Symptoms of Coronavirus Disease 2019 in 2 Dutch Hospitals During an Early Phase of the Pandemic¹¹**](#)

A cross-sectional study of 9,705 HCWs who reported fever or respiratory symptoms.

Figure 3 included demographic characteristics, self-reported symptoms and outcomes. Fever was defined as a body temperature of 38.0 °C or higher.

[**Wei-Jie et al \(2020\) Clinical Characteristics of Coronavirus Disease 2019 in China¹²**](#)

Data for 1,099 hospitalized patients and outpatients with laboratory-confirmed COVID-19, as reported to the National Health Commission between December 11, 2019, and January 29, 2020. COVID-19 was diagnosed on the basis of the WHO interim guidance. Fever was defined as an axillary temperature of 37.5°C or higher. Lymphocytopenia was defined as a lymphocyte count of less than 1500 cells per cubic millimeter.

[**Richardson et al \(2020\) Presenting Characteristics, Comorbidities, and Outcomes Among 5700 Patients Hospitalized With COVID-19 in the New York City Area¹³**](#)

A case series of 5700 patients with COVID-19 admitted to 12 hospitals in New York City, Long Island and Westchester County, New York. The study included all sequentially hospitalized patients between March 1 and April 4, 2020 inclusive. Triage criteria defined high temperature as greater than 38°C.

[**Zhou et al \(2020\) Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study¹⁴**](#)

A retrospective cohort study of adult inpatients with laboratory confirmed COVID-19 from two hospitals in Wuhan, China, in January 2020. Fever was defined as axillary temperature of at least 37.3°C.



[**Arentz et al \(2020\) Characteristics and Outcomes of 21 Critically Ill Patients With COVID-19 in Washington State¹⁵**](#)

A series of 21 cases in which the authors describe the clinical presentation, characteristics and outcomes of incident cases of COVID-19 admitted to the ICU at Evergreen Hospital to inform other clinicians treating critically ill patients with COVID-19. Fever is defined as a temperature greater than 38.0°C.

[**Aggarwal et al \(2020\) Clinical features, laboratory characteristics, and outcomes of patients hospitalized with coronavirus disease 2019 \(COVID-19\): Early report from the United States¹⁶**](#)

A retrospective study investigating the clinical features and characteristics of all patients hospitalized with SARS-CoV2 infection in a community hospital in the Mid-West region of the US. Vital signs on admission were extracted from ER notes and EMR query. Fever was defined as forehead temperature >38°C (>100.4 F).

[**Hsiao et al \(2020\) \[Letter\] Measurement of body temperature to prevent pandemic COVID-19 in hospitals in Taiwan: repeated measurement is necessary¹⁷**](#)

In March 2020, 40,887 patients attended Kaohsiung Municipal Da-Tung Hospital, Taiwan, for medical services. Five patients were found to have fever (>38°) at the outdoor quarantine station. However, a further 37 patients were identified with fever when a second temperature recording was made inside. As such, it is recommended that medical institutions with outpatient services should take patients' body temperature for a second time after they have acclimatized to being indoors.

[**Colaneri et al \(2020\) Clinical characteristics of coronavirus disease \(COVID-19\) early findings from a teaching hospital in Pavia, North Italy, 21 to 28 February 2020¹⁸**](#)

A study of 44 patients admitted to a single hospital in Pavia, Italy, 21 to 28 February, 2020. Fever was defined as a body temperature > 37.5°C.

[**Chen et al \(2020\) Investigation of the Impact of Infrared Sensors on Core Body Temperature Monitoring by Comparing Measurement Sites¹⁹**](#)

This study evaluated the performance of two types of tympanic infrared thermometers and an industrial infrared thermometer. The results showed



that these infrared thermometers provide good precision. A fixed offset between tympanic and forehead temperature were found. The measurement values for wrist temperature show significant offsets with the tympanic temperature and cannot be used to screen fevers. A standard operating procedure for the measurement of body temperature using an infrared thermometer was proposed. The suggestion threshold for the forehead temperature is 36 °C for screening of fever. The body temperature of a person who is possibly ill is then measured using a tympanic infrared thermometer for the purpose of double checking.



Produced by the members of the National Health Library and Knowledge Service Evidence Team[†]. Current as at 26 May 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:

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| | PYREXIA OR FEVER |
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The following search strategy was used:

(2019-NCOV OR 2019NCOV OR COVID-19 OR SARS-COV-2 OR ((WUHAN AND CORONAVIRUS) AND 2019/12[PDAT] : 2030[PDAT]))
PYREXIA[MESH TERMS] OR FEVER"[MESH TERMS]
FEVER OR HIGH TEMPERATURE OR PYREXIA:
CLINICAL CHARACTERISTICS OR CLINICAL FEATURES OR CLINICAL PRESENTATION

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- ¹HSE. Fever in Adults. [www.hse.ie https://www2.hse.ie/conditions/fever-in-adults.html](https://www2.hse.ie/conditions/fever-in-adults.html) Updated 18/3/2020. [Accessed 26/5/2020]
- ²Centres for Disease Control & Prevention (CDC) Definitions of Symptoms for Reportable Illnesses <https://www.cdc.gov/quarantine/air/reporting-deaths-illness/definitions-symptoms-reportable-illnesses.html> [Accessed 25.5.2020]
- ³NHS Guidance COVID-19: investigation and initial clinical management of possible cases <https://www.gov.uk/government/publications/wuhan-novel-coronavirus-initial-investigation-of-possible-cases/investigation-and-initial-clinical-management-of-possible-cases-of-wuhan-novel-coronavirus-wn-cov-infection> [Accessed 26/5/2020]
- ⁴NHS Inform: Fever in Adults, 24th March 2020 <https://www.nhsinform.scot/illnesses-and-conditions/infections-and-poisoning/fever-in-adults> [Accessed 25/5/2020]
- ⁵US National Library of Medicine Medline Plus. Body Temperature Norms <https://medlineplus.gov/ency/article/001982.htm> Updated 7/5/2020. [Accessed 26/5/2020]
- ⁶Geneva II, Cuzzo B, Fazili T, Javaid W. Normal Body Temperature: A Systematic Review. *Open Forum Infect Dis.* 2019;6(4):ofz032. Published 2019 Apr 9. doi:10.1093/ofid/ofz032 <https://pubmed.ncbi.nlm.nih.gov/30976605/> [Accessed 25/5/2020]
- ⁷Park S., Brassey J., Heneghan C., Mahtani K. Managing Fever in adults with possible or confirmed COVID-19 in Primary Care. Centre for Evidence Based Medicine (18 March 2020) <https://www.cebm.net/covid-19/managing-fever-in-adults-with-possible-or-confirmed-covid-19-in-primary-care/> [Accessed 25/5/2020]
- ⁸Sund-Levander M, Forsberg C, Wahren LK. Normal oral, rectal, tympanic and axillary body temperature in adult men and women: a systematic literature review. *Scand J Caring Sci.* 2002;16(2):122-128. doi:10.1046/j.1471-6712.2002.00069.
- ⁹Yang W, Cao Q, Qin L, et al. Clinical characteristics and imaging manifestations of the 2019 novel coronavirus disease (COVID-19): A multi-center study in Wenzhou city, Zhejiang, China. *J Infect.* 2020;80(4):388-393. doi:10.1016/j.jinf.2020.02.016 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7102539/> [Accessed 25/5/2020]
- ¹⁰Buckner FS, McCulloch DJ, Atluri V, et al. Clinical Features and Outcomes of 105 Hospitalized patients with COVID-19 in Seattle, Washington [published online ahead of print, 2020 May 22]. *Clin Infect Dis.* 2020;ciaa632. doi:10.1093/cid/ciaa632 [Accessed 25/5/2020]
- ¹¹Kluytmans-van den Bergh MFQ, Buiting AGM, Pas SD, et al. Prevalence and Clinical Presentation of Health Care Workers With Symptoms of Coronavirus Disease 2019 in 2 Dutch Hospitals During an Early Phase of the Pandemic. *JAMA Netw Open.* 2020;3(5):e209673. doi:10.1001/jamanetworkopen.2020.9673 <https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2766228> [Accessed 25/5/2020]
- ¹²Wei-Jie G, Zheng-yi N., Yu H. et al. Clinical Characteristics of Coronavirus Disease 2019 in China 30th April 2020 *N Engl J Med* 2020; 382:1708-1720 DOI: 10.1056/NEJMoa2002032 <https://www.nejm.org/doi/full/10.1056/NEJMoa2002032> [Accessed 25/5/2020]
- ¹³Richardson S, Hirsch JS, Narasimhan M, et al. Presenting Characteristics, Comorbidities, and Outcomes Among 5700 Patients Hospitalized With COVID-19 in the New York City Area. *JAMA.* Published online April 22, 2020. doi:10.1001/jama.2020.6775 <https://jamanetwork.com/journals/jama/fullarticle/2765184> [Accessed 25/5/2020]
- ¹⁴Zhou F, Yu T, Du R, et al. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study [published correction appears in *Lancet.* 2020 Mar 28;395(10229):1038] [published correction appears in *Lancet.* 2020 Mar 28;395(10229):1054-1062. doi:10.1016/S0140-6736(20)30566-<https://pubmed.ncbi.nlm.nih.gov/32171076/> [Accessed 25/5/2020]
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- ¹⁶Aggarwal S, Garcia-Telles N, Aggarwal G, Lavie C, Lippi G, Henry BM. Clinical features, laboratory characteristics, and outcomes of patients hospitalized with coronavirus disease 2019 (COVID-19): Early report from the United States. *Diagnosis (Berl).* 2020;7(2):91-96. doi:10.1515/dx-2020-0046 <https://www.degruyter.com/view/journals/dx/7/2/article-p91.xml> [Accessed 26/5/2020]
- ¹⁷Hsiao SH, Chen TC, Chien HC, Yang CJ, Chen YH. Measurement of body temperature to prevent pandemic COVID-19 in hospitals in Taiwan: repeated measurement is necessary [published online ahead of print, 2020 Apr 9]. *J Hosp Infect.* 2020;50195-6701(20)30179-1. doi:10.1016/j.jhin.2020.04.004v <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7195063/> [Accessed 26/5/2020] Letter
- ¹⁸Colaneri M, Sacchi P, Zuccaro V, et al. Clinical characteristics of coronavirus disease (COVID-19) early findings from a teaching hospital in Pavia, North Italy, 21 to 28 February 2020. *Euro Surveill.* 2020;25(16):2000460. doi:10.2807/1560-7917.ES.2020.25.16.2000460 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7189652/> [Accessed 26/5/2020]
- ¹⁹Chen HY, Chen A, Chen C. Investigation of the Impact of Infrared Sensors on Core Body Temperature Monitoring by Comparing Measurement Sites. *Sensors (Basel).* 2020;20(10):E2885. Published 2020 May 19. doi:10.3390/s20102885 <https://www.mdpi.com/1424-8220/20/10/2885> [Accessed 26/5/2020]