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Recording temperature: Tympanic thermometers

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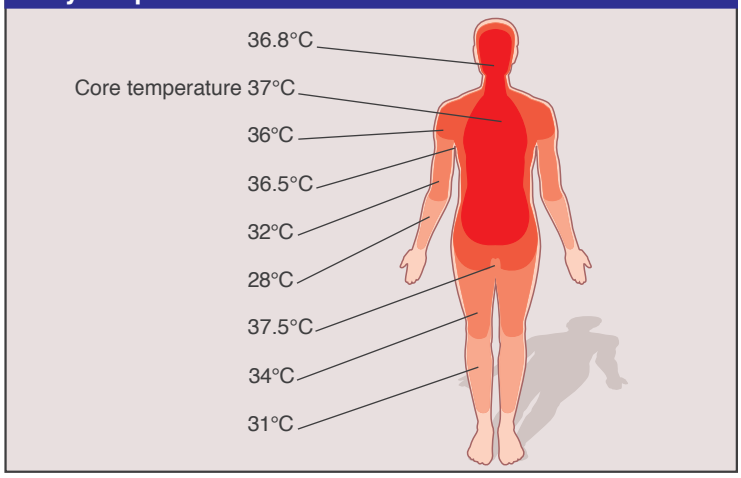
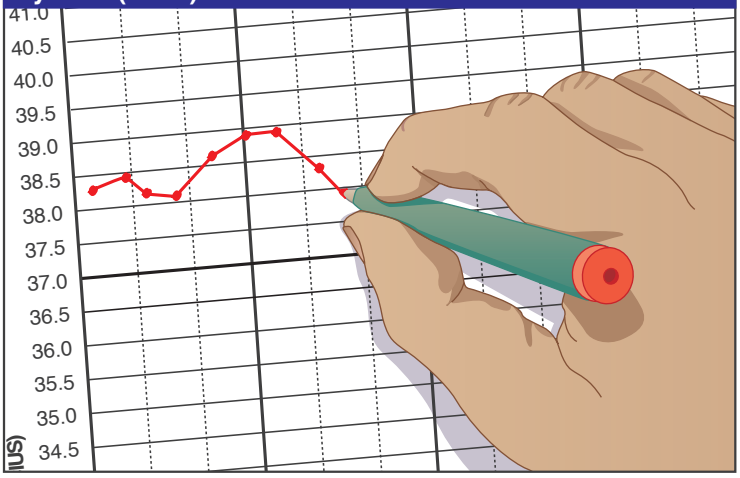
Recording a patient's temperature is one of the most commonly performed clinical skills. Modern devices for recording temperature are very easy to use. It is vital to perform the task carefully in order to obtain an accurate measurement, because the result will form part of a holistic assessment, influencing decisions about the patient's care and treatment, and helping staff to assess whether the patient's condition is improving or deteriorating. To allow comparison between recordings, use the same method and approach each time you measure a patient's temperature; for example, do not use a tympanic method and then an oral method. These pages show how to record temperature using a tympanic thermometer. If you are unfamiliar with the device, or it is a different model to the one you normally use, always refer to the manufacturer's instructions to ensure that you correctly perform each step. It may be helpful to ask the advice of a knowledgeable colleague.

Body temperature at different sites



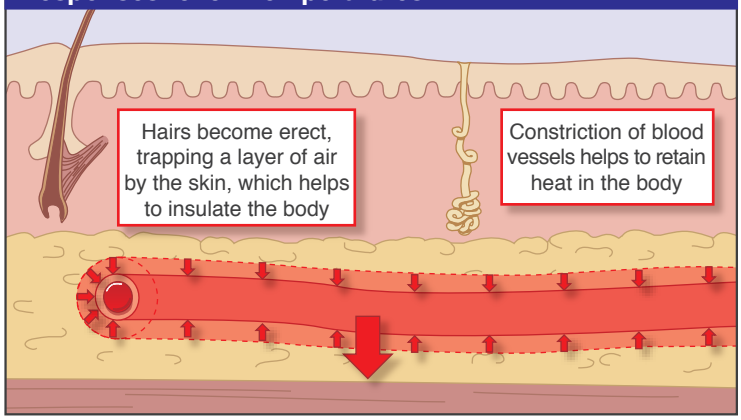
There is no clearly defined 'normal' body temperature. Temperature varies between individuals, age groups and gender (Sund-Levander *et al.*, 2002), and throughout the day. Core temperature is generally regarded as 37°C (Marieb, 2015). Oral temperature is slightly lower at around 36.8°C. Variations in temperature for different body sites are shown above. If you are recording temperature at these sites, you will need to take these variations into account. Always look at the trend of recordings, as well as individual figures.

Pyrexia (fever)



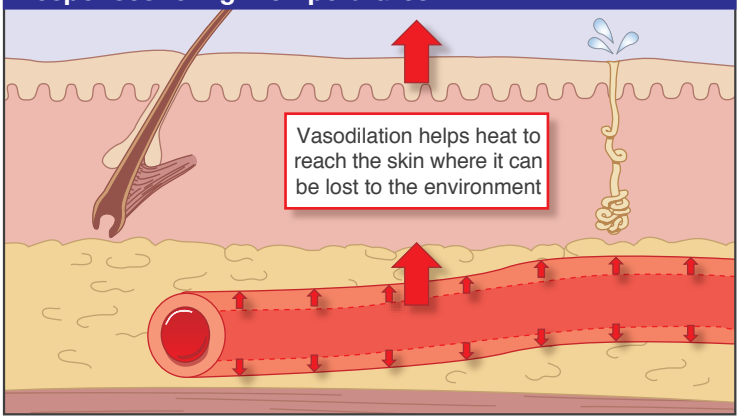
Pyrexia (fever) is defined as a rise in body temperature above the normal range for the patient. The body raises its thermoregulatory point in order to fight infection, causing pyrexia with accompanying clinical signs such as shivering. Hyperthermia, by contrast, simply means a high temperature: causative factors may be external, such as hot weather or exercise, or internal, such as pyrexia. Raised temperatures up to 38°C are defined as a low-grade pyrexia; 38–40°C constitutes moderate to high-grade pyrexia. When temperature is elevated, you will be asked to monitor it at regular intervals and the medical and nursing team will consider the cause. Usually no action will be needed for a low-grade pyrexia, which is regarded as a healthy reaction of the body to infection. Follow medical advice and current best practice for reducing pyrexia.

Responses to low temperatures



The body maintains its core temperature within normal limits (normothermia) by responding to temperature fluctuations. If body temperature drops, short-term responses include shivering and vasoconstriction (Marieb, 2015). Shivering creates heat from muscle movement. Blood vessels under the skin constrict to retain warm blood in the centre of the body and prevent it cooling further.

Responses to high temperatures

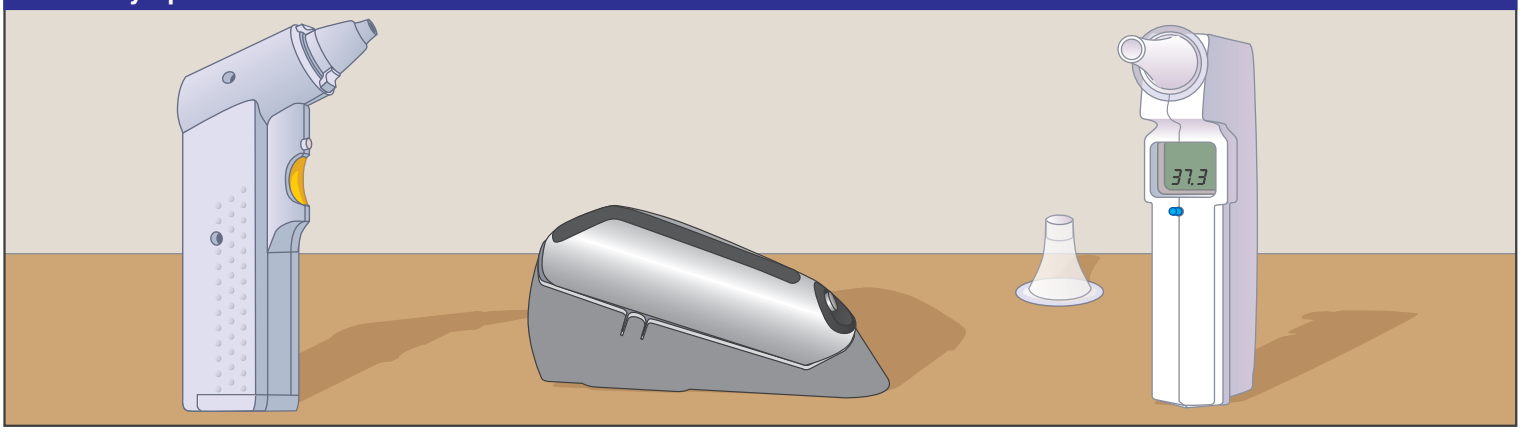


To allow the body to cool, blood vessels dilate, allowing heat loss through the skin (Marieb, 2015). Sweating cools the body via water evaporation. The body loses heat via four main methods: convection, conduction, radiation and water evaporation.

Do not undertake or attempt any procedure unless you have been assessed and signed off as competent by a properly trained, experienced and competent mentor. Always first explain the procedure to the patient and obtain their consent, in line with the policies of your employer or educational institution.

Recording temperature: Tympanic thermometers Page 2

Infrared tympanic thermometers

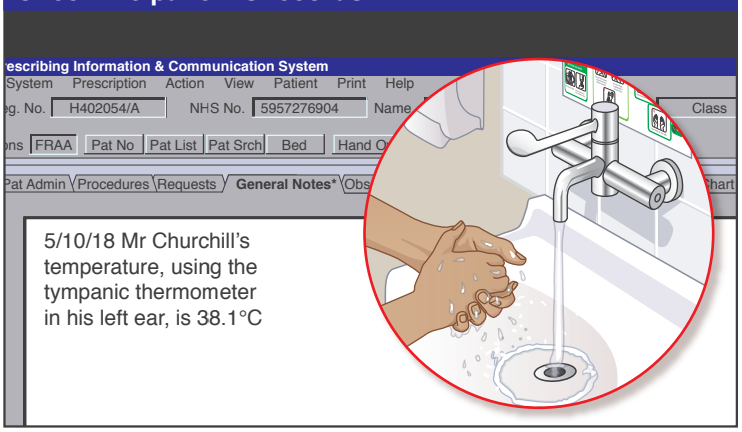


A tympanic thermometer measures the reflected infrared emissions from the tympanic membrane of the ear through a probe placed in the external auditory canal (McCallum & Higgins, 2012; Davie & Amoore, 2010). The device converts this data into a digital display of the temperature value. Researchers continue to evaluate the accuracy of these devices (Zhen *et al.*, 2014; Gasim *et al.*, 2013; Haugan *et al.*, 2013). Although some studies urge caution, the results generally support clinical use of tympanic thermometers. These devices must be regularly calibrated in accordance with manufacturers' instructions.

Explain the procedure to the patient

Explain to the patient what you would like to do and gain their consent. If the patient complains of ear ache or ear discharge, or if you suspect a build-up of ear wax, do not use this method. If unable to take temperature using the tympanic method, please consider other methods of taking a temperature if trained to do so, or inform the doctor or nurse that you are unable to perform a temperature recording. If the patient wears a hearing aid, remove it and then wait, usually for 10 minutes, before taking the recording: follow the manufacturer's instructions.

Check the patient's records

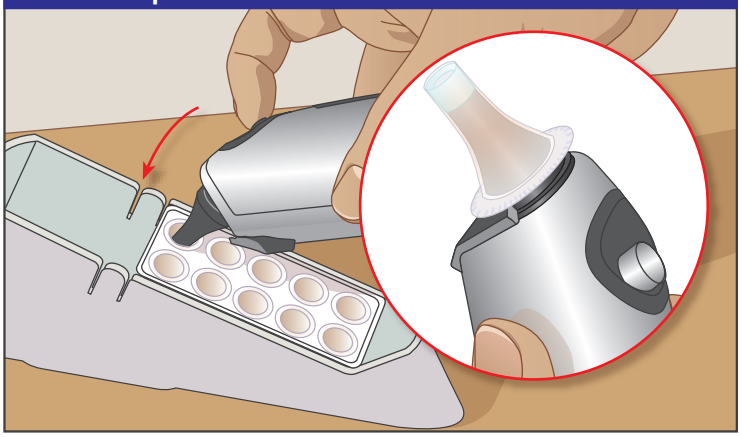


Before undertaking the procedure, check the patient's records. Note which ear you use to record the temperature when using a tympanic thermometer, so that the same side is used each time in that patient, for consistency and to allow you to compare readings. Hammond & Spurgeon (2015) recommend taking recordings from both ears and using the higher reading. Follow any local policy. Before beginning the procedure, decontaminate your hands.

Remove the device from its base

There are many different models and makes of tympanic thermometer. Make sure you are familiar with the manufacturer's instructions for the model you are using. Remove the device from its storage base. Check that it is clean. If not, follow the instructions on how to clean the device, and then decontaminate your hands again. Certain solutions may be contraindicated.

Attach the probe cover



Push the head of the device into a probe cover inside the base until it clicks into place. In order to reduce the possibility of cross-infection, do not touch the probe cover.

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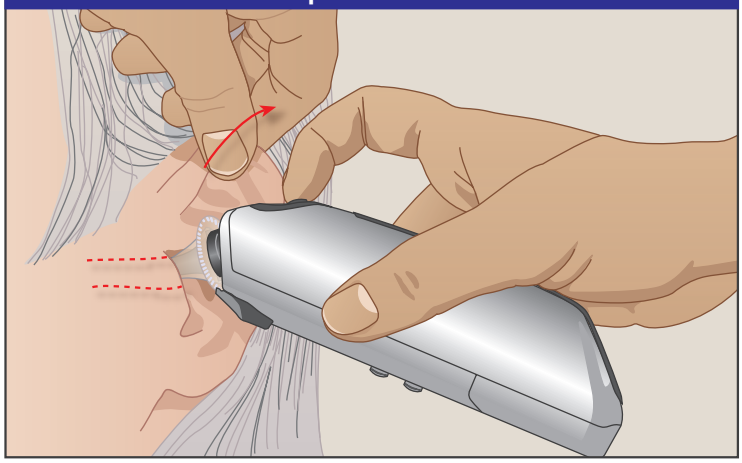
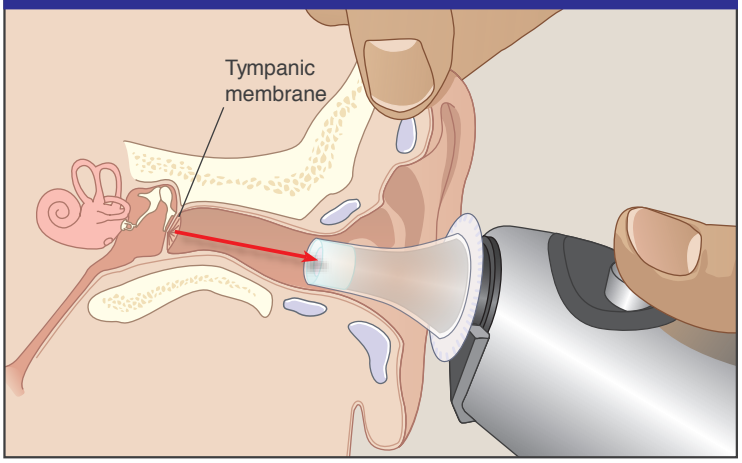
Recording temperature: Tympanic thermometers Page 3

Place the device in the patient's ear



Reassure the patient and explain again what you are going to do. Grasp the pinna of the ear and pull it gently up and back, in order to straighten the ear canal. In children, pull back the pinna. Push the device gently but firmly into the ear canal. Ensure a good fit. If the patient has been lying on their side, always take the temperature in the ear that was uppermost.

Press the scan/activation button

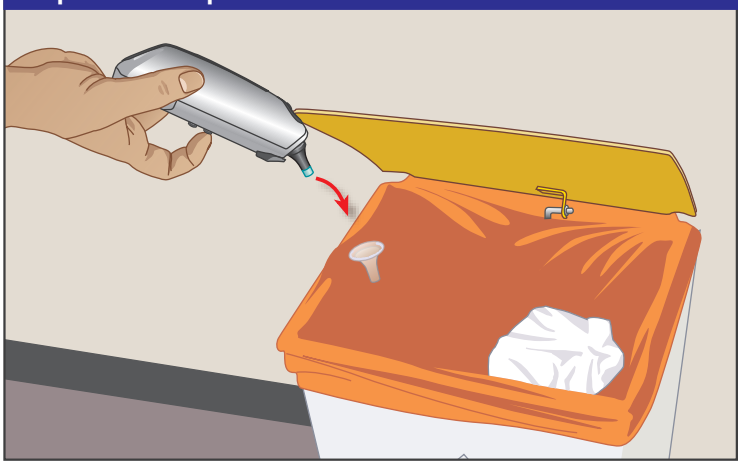


Once in place, press the button to active the scan. (The appearance of this button will vary according to the device you are using.) The measurement becomes available very quickly; the device will beep when the reading is ready.

Read the temperature value

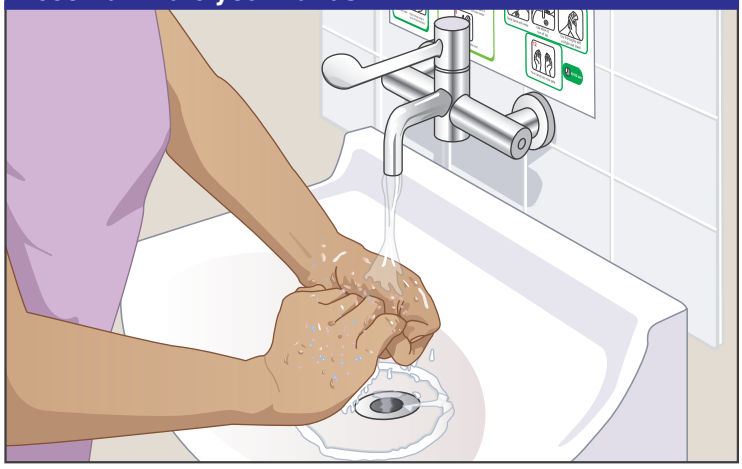
Remove the device from the ear canal and read the temperature display immediately. You should normally wait at least 2 minutes before repeating the reading if using the same ear; refer to the manufacturer's guidelines.

Dispose of the probe cover



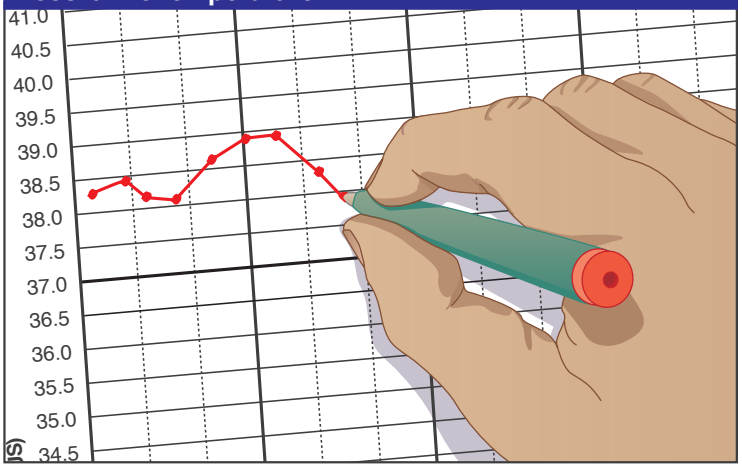
Dispose of the probe cover by pressing the eject button and allowing it to fall into the bin. Check the device is clean, switch off as needed and replace it in the base.

Decontaminate your hands



Decontaminate your hands according to local policy.

Record the temperature



Record the temperature carefully in the notes. Assess the temperature reading, its trend and other parameters. Consider any actions that may need to be taken, such as informing another member of clinical staff. Ensure that the patient is comfortable and provide them with information about their clinical status as required.

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