Tishik International University

Nursing Department

Fundamental of Nursing

Vital signs- Temperature

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Introduction

- Vital signs are body temperature, pulse, respirations, and blood pressure.
- Many agencies such as the Veterans Administration, American Pain Society, and The Joint Commission have designated pain as a fifth vital sign, to be assessed at the same time as each of the other four.

- Oxygen saturation is also commonly measured at the same time as the traditional vital signs.
- Vital signs, are checked to monitor the functions of the body.
- When and how often to assess a specific client's vital signs are chiefly nursing judgments, depending on the client's health status.

- Some agencies have policies about when to take clients' vital signs. The primary care provider may specifically order a vital sign (e.g., "Blood pressure every 2hrs").
- A nurse should assess vital signs more often if the client's health status requires it. For example
- On admission to a health care agency to obtain baseline data

- When a client has a change in health status or reports symptoms such as chest pain or feeling hot or faint
- Before and after surgery or an invasive procedure
- Before and/or after the administration of a medication that could affect the respiratory or cardiovascular systems; for example, before giving a digitalis preparation.

Foxgloves

- Before and after any nursing intervention that could affect the vital signs (e.g., ambulating a client who has been on bed rest)

Body temperature

- Body temperature reflects the balance between the heat produced and the heat lost from the body, and is measured in heat units called degrees.
- There are two kinds of body temperature: **core temperature** and **surface temperature.**

- **Core temperature** is the temperature of the deep tissues of the body, such as the abdominal cavity and pelvic cavity. It remains relatively constant. The normal core body temperature is **36-37.5c**
- **The surface temperature** is the temperature of the skin, the subcutaneous tissue, and fat. It, by contrast, rises and falls in response to the environment

- The body continually produces heat as a by-product of metabolism.
- When the amount of heat produced by the body equals the amount of heat lost, the person is in heat balance

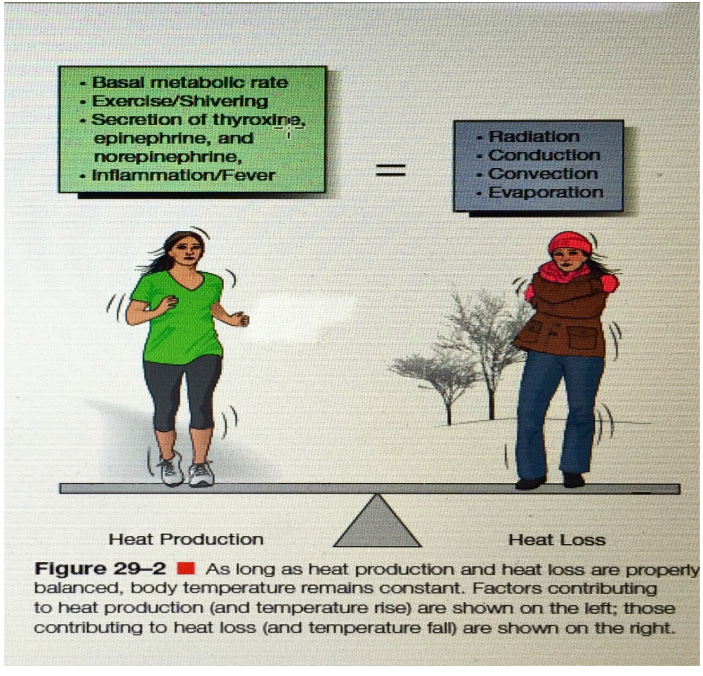


Figure 29–2 ■ As long as heat production and heat loss are properly balanced, body temperature remains constant. Factors contributing to heat production (and temperature rise) are shown on the left; those contributing to heat loss (and temperature fall) are shown on the right.

Factors affect the body's heat production

1. Basal metabolic rate
2. Muscle activity
3. Thyroxine output
4. Epinephrine, norepinephrine, and sympathetic stimulation/ stress response
5. Fever.

Basal metabolic rate.

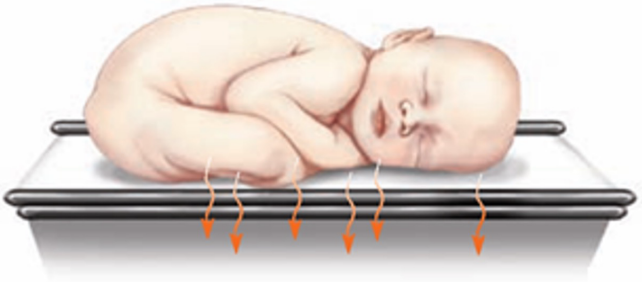
- The basal metabolic rate (BMR) is the rate of energy utilization in the body required to maintain essential activities such as breathing.
- Metabolic rates decrease with age. In general, the younger the person, the higher the BMR.

- **Muscle activity:** including shivering, increases the metabolic rate.
- **Thyroxine output:** Increased thyroxine output increases the rate of cellular metabolism throughout the body.
- **Epinephrine, norepinephrine, and sympathetic stimulation/ stress response:** These hormones immediately increase the rate of cellular metabolism in many body tissues.

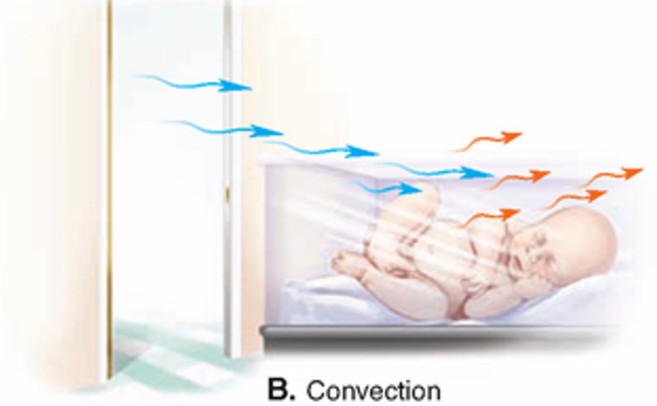
- **Fever** increases the cellular metabolic rate and thus increases the body's temperature further.
- Heat is lost from the body through radiation, conduction, convection, and evaporation.

Radiation

Is the transfer of heat from the surface of one object to the surface of another without contact between the two objects, mostly in the form of infrared rays.

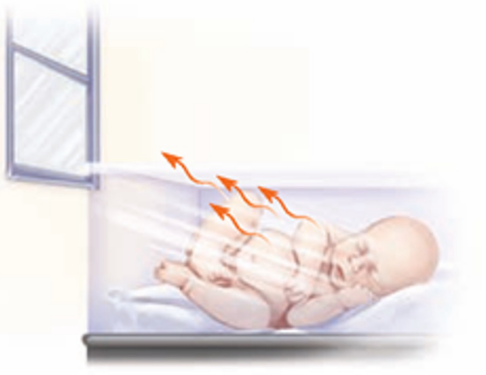


A. Conduction



B. Convection

C. Evaporation



D. Radiation

Conduction

- Is the transfer of heat from one molecule to a molecule of lower temperature. Conductive transfer cannot take place without contact between the molecules and normally accounts for minimal heat loss except, for example, when a body is immersed in cold water.
- The amount of heat transferred depends on the temperature difference and the amount and duration of the contact.

Convection

- Is the dispersion of heat by air currents. The body usually has a small amount of warm air adjacent to it.
- This warm air rises and is replaced by cooler air, so people always lose a small amount of heat through convection.

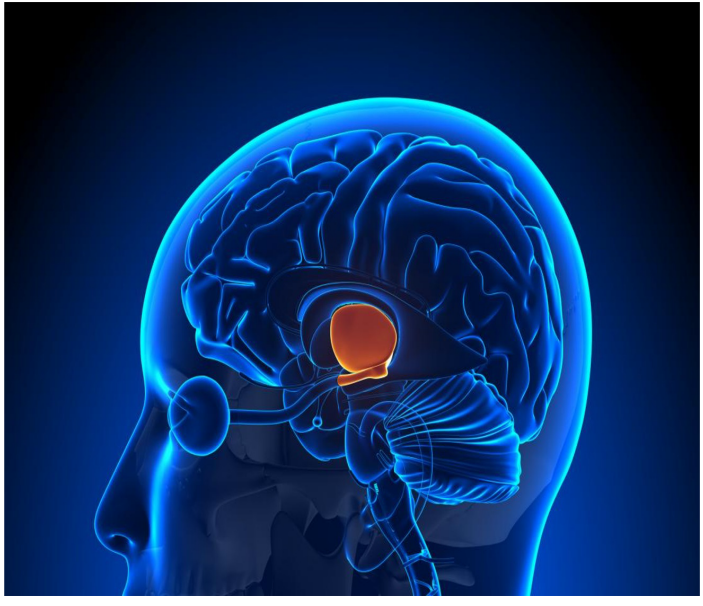
Evaporation

- Is continuous vaporization of moisture from the respiratory tract and from the mucosa of the mouth and from the skin.
- This continuous and unnoticed water loss is called insensible water loss.

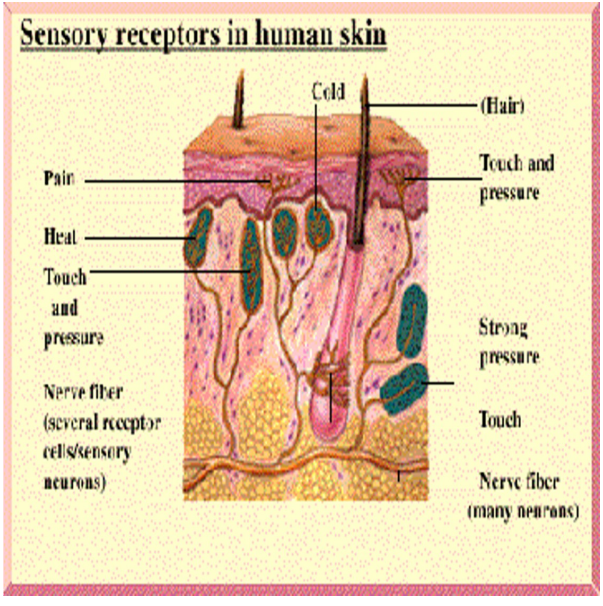
- The accompanying heat loss is called insensible heat loss . Insensible heat loss accounts for about 10% of basal heat loss.
- When the body temperature increases, vaporization accounts for greater heat loss.

Regulation of body temperature

- The hypothalamic integrator is the center that controls the core temperature.



- Most sensors or sensory receptors are in the skin.
- The skin has more receptors for cold than warmth. Therefore, skin sensors detect cold more efficiently than warmth.



- When the skin becomes chilled over the entire body, three physiological processes to increase the body temperature take place:
    1. Shivering increases heat production.
    2. Sweating is inhibited to decrease heat loss.
    3. Vasoconstriction decreases heat loss.

- When the integrator detects heat, it sends out signals intended to reduce the temperature, that is, to decrease heat production and increase heat loss.
- In contrast, when the cold sensors are stimulated, the integrator sends out signals to increase heat production and decrease heat loss.

- The signals from the cold-sensitive receptors of the hypothalamus initiate effectors, such as vasoconstriction, shivering, and the release of epinephrine, which increases cellular metabolism and hence heat production.
- When the warmth-sensitive receptors in the hypothalamus are stimulated, the effector system sends out signals that initiate sweating and peripheral vasodilation.

Factors affecting body temperature

1- Age.

- Infants are greatly influenced by the temperature of the environment and must be protected from extreme changes.
- Many older people, particularly those over 75 years, are at risk of hypothermia (temperatures below 36°C,) for a variety of reasons.

- Such as inadequate diet, loss of subcutaneous fat, lack of activity, and reduced thermoregulatory efficiency.
- Older adults are also particularly sensitive to extremes in the environmental temperature due to decreased thermoregulatory controls.

2- Diurnal variations (circadian rhythms).

- Body temperatures normally change throughout the day, varying as much as 1.0°C between the early morning and the late afternoon.
- The point of highest body temperature is usually reached between (4:00 pm and 6:00 pm).
- and the lowest point is reached during sleep between (4:00 am and 6:00 am)

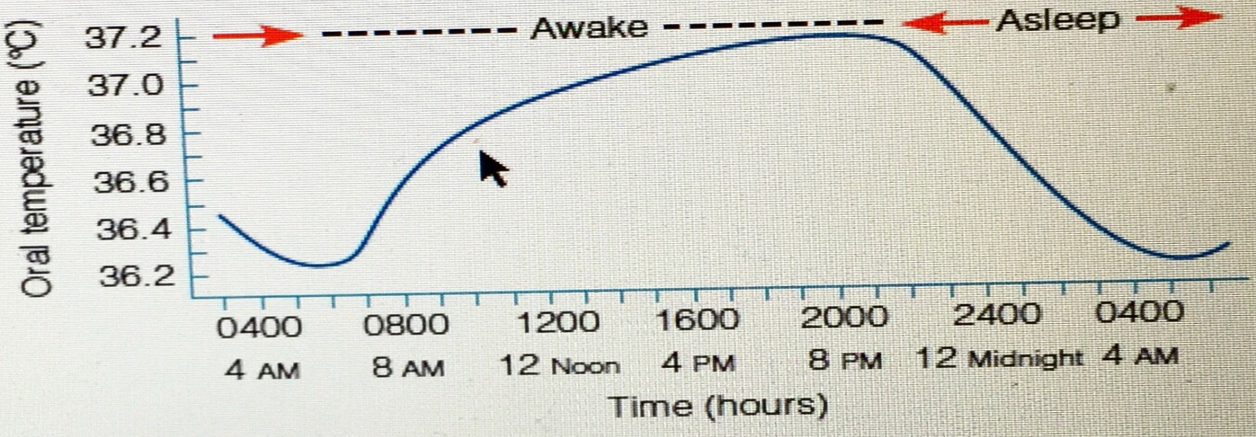


Figure 29–3 ■ Range of oral temperatures during 24 hours for a healthy young adult.

3. Stress.

- Stimulation of the **sympathetic nervous system** can increase the production of epinephrine and norepinephrine, thereby increasing metabolic activity and heat production.
- Nurses should anticipate that a highly stressed or anxious client could have an elevated body temperature for that reason.

4. Exercise. Hard work or strenuous exercise can increase body temperature to as high as 38.3°C to 40°C measured rectally.

5. Hormones. Women usually experience more hormone fluctuations than men. In women, progesterone secretion at the time of ovulation raises body temperature by about 0.3°C to 0.6°C above basal temperature.

6. Environment

- Extremes in environmental temperatures can affect a person's temperature regulatory systems.
- If the temperature is assessed in a very warm room and the body temperature cannot be modified by convection, conduction, or radiation, the temperature will be elevated.

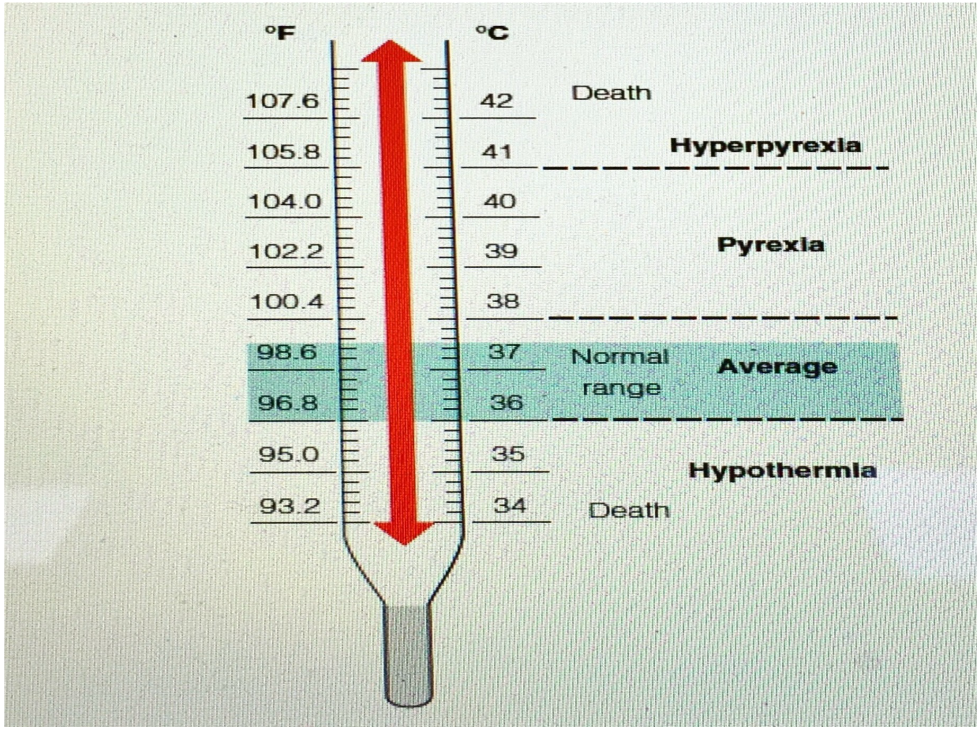
Similarly, if the client has been outside in cold weather without suitable clothing, or if a medical condition prevents the client from controlling the temperature in the environment (e.g., the client has altered mental status or cannot dress self), the body temperature may be low.

Alterations in body temperature

- The normal range for adults is considered to be between 36°C and 37.5°C.
- There are two primary alterations in body temperature: **pyrexia and hypothermia**.

Pyrexia

- A body temperature above the usual range is called pyrexia , hyperthermia , or (in lay terms) fever .
- A very high fever, such as 41°C is called hyperpyrexia.
- The client who has a fever is referred to as febrile ; the one who does not is afebrile.


°F
°C
107.6
42
Death
105.8
41
Hyperpyrexia
104.0
40
102.2
39
Pyrexia
100.4
38
98.6
37
Normal range
Average
96.8
36
95.0
35
Hypothermia
93.2
34
Death

- Four common types of fevers are **intermittent, remittent, relapsing, and constant**.
- During an **intermittent fever** , the body temperature alternates at regular intervals between periods of fever and periods of normal or subnormal temperatures. An example is with the disease **malaria.**

- During a **remittent fever** , such as with a cold or influenza, a wide range of temperature fluctuations (more than 2°C occurs over a 24-hour period, all of which are above normal.
- In a **relapsing fever** , short febrile periods of a few days are interspersed with periods of 1 or 2 days of normal temperature.

- During a **constant fever** , the body temperature fluctuates minimally but always remains above normal. This can occur with typhoid fever.
- A temperature that rises to fever level rapidly following a normal temperature and then returns to normal within a few hours is called **a fever spike .**

Clinical manifestations of fever

ONSET (COLD OR CHILL PHASE)

- Increased heart rate
- Increased respiratory rate and depth
- Shivering
- Pallid, cold skin
- Complaints of feeling cold
- Cyanotic nail beds
- Cessation of sweating

Course (plateau phase)

- Absence of chills
- Skin that feels warm
- Increased pulse and respiratory rates
- Increased thirst
- Mild to severe dehydration
- Drowsiness, restlessness, convulsions
- Herpetic lesions of the mouth
- Loss of appetite (if the fever is prolonged)
- weakness, and aching muscles

(Fever abatement/flush phase)

- Skin that appears flushed and feels warm
- Sweating
- Decreased shivering
- Possible dehydration.

Nursing interventions for clients with fever

- Monitor vital signs.
- Assess skin color and temperature.
- Monitor white blood cell count, hematocrit value, and other pertinent laboratory reports for indications of infection or dehydration.

- Remove excess blankets when the client feels warm, but provide extra warmth when the client feels chilled.
- Provide adequate nutrition and fluids (e.g., 2,500–3,000 mL/ day) to meet the increased metabolic demands and prevent dehydration.
- Measure intake and output.

- Reduce physical activity to limit heat production, especially during the flush stage.
- Administer antipyretics (drugs that reduce the level of fever) as ordered.
- Provide oral hygiene to keep the mucous membranes moist.
- Provide a tepid sponge bath to increase heat loss through conduction. And Provide dry clothing and bed linens.

Hypothermia

Hypothermia is a core body temperature below the lower limit of normal. The three physiological mechanisms of hypothermia are (a) excessive heat loss, (b) inadequate heat production to counteract heat loss, and (c) impaired hypothalamic thermoregulation.

Clinical manifestations of hypothermia

- Decreased body temperature, pulse, and respirations
- Severe shivering (initially)
- Feelings of cold and chills
- Pale, cool skin
- Hypotension
- Decreased urinary output
- Lack of muscle coordination
- Disorientation
- Drowsiness progressing to coma

Nursing interventions for clients with hypothermia

- Provide a warm environment.
- Provide dry clothing.
- Apply warm blankets.
- Keep limbs close to body.
- Cover the client's scalp with a cap or turban.
- Supply warm oral or intravenous fluids.
- Apply warming pads.

Assessing body temperature

- The most common sites for measuring body temperature are oral, rectal, axillary, tympanic membrane, and skin/temporal artery.
- The body temperature may be measured orally . If a client has been taking cold or hot food or fluids or smoking, the nurse should wait 30 minutes before taking the temperature orally.

- Rectal temperature readings are considered to be very accurate.
- Rectal temperatures are contraindicated for clients who are undergoing rectal surgery, have diarrhea or diseases of the rectum, are immunosuppressed, have a clotting disorder, or have significant hemorrhoids.

- The axilla is often the preferred site for measuring temperature in newborns because it is accessible and safe.
- Axillary temperatures are lower than rectal temperatures.