



MEASURING AND RECORDING VITAL SIGNS

Learning Objectives:

After completing this lecture, the students will be able to:

1. Identify time to assess vital signs.
2. Describe factors that affect the vital signs and accurate measurement of them.
3. Recognize normal and abnormal values and characteristics of temperature, pulse, respirations, and blood pressure for infants, children, and adults.
4. Verbalize the steps used in assessing body temperature, peripheral and apical pulse, respirations and blood pressure.
5. Identify nine sites used to assess the pulse and state the reasons for their use.
6. List the characteristics that should be included when assessing pulses.
7. Describe appropriate nursing care for alterations in vital signs.
8. Recognize common terminology and abbreviations used in documenting and discussing vital signs.

INTRODUCTION:

Vital signs (VS) Also called (*signs of life, or cardinal signs*): are an indicators checked to monitor the body function or to sustain life. Traditionally, temperature (T), pulse (P), respirations (R), and blood pressure (BP) were considered VS; Now, many health-care professionals view arterial blood oxygen saturation (S_aO_2) and the presence of pain as additional VS. Variations from normal findings may indicate potential problems with the client's health status. Agencies have special graphic forms used to record vital signs findings, these forms facilitate data comparison at a glance because data are plotted on a graph.

When a nurse should assess vital signs:

1. When a patient is admitted or discharged to an health care agency or service.
2. When a client has change in health status such as chest pain or feeling hot.
3. Before, during & after surgery or an invasive procedure.
4. Before administration of a medication that could affect the respiratory or cardiovascular systems.
5. After administering a medication that may influence VS e.g., blood pressure after administering antihypertensive; temperature after administering an antipyretic; pulse rate and rhythm after administering an antidysrhythmic; respiratory rate after administering a bronchodilator.
6. Before and after any nursing intervention that could affect vital signs (such as ambulating the client on bed rest).
7. At the start of every shift, or as a routine nursing care.

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Assessing Body Temperature (T):

Reflect the balance between heat production by **metabolism** and heat lost through: **Radiation** (e.g., heat lost via the skin in a room that is cooler than the skin); **Conduction** (e.g., bathing, or a body is placed on a cool operating room table); **Convection** (e.g., use of fans); and **Evaporation** (e.g., perspiration that results from a hot environment). A nurse measures a patient's body temperature to assess the progression of an illness, and/or to monitor a response to therapy.

Kinds of body temperature:

- a. **Core temperature:** Temperature of deep body tissues, its remain constant. The "core" internal temperature of (37° centigrade [C°]) does not vary more ($0.77^{\circ}C$); and is higher than the skin and external temperature.
- b. **Surface temperature:** Temperature of the skin, the subcutaneous tissue, and fat. It by contrast, rises and falls in response to the environment.

Factors affecting body's heat production:

1. **Basal metabolic rate (BMR):** is the rate of energy utilization in the body required to maintain essential activities such as breathing. Its decrease with age. In general, the younger the person, the higher the BMR.
2. **Muscular activity:** (increase the metabolic rate).
3. **Thyroxine output:** increase thyroxine output increase the rate of BMR.
4. **Epinephrine, norepinephrine, and sympathetic stimulation:** Hormones immediately increase the rate of cellular metabolism in many body tissues.
5. **Fever:** increase the rate of cellular metabolism and thus increase the body's temperature further.

Factors affecting body temperature:

1. **Age:**
 - The infant is greatly influenced by the temperature of the environment and must be protected from extreme changes.
 - Children temperature vary more than those of adults until puberty.
 - Metabolic rate is higher in a younger person and decreases with age.
 - Older people are at risk of hypothermia for a variety of reasons such as **inadequate diet, loss of subcutaneous fat, lack of activity, and reduce thermoregulatory efficiency.**
2. **Diurnal variations:** Body temp. normally change throughout the day ($1.0^{\circ}C$ between early morning and the late afternoon). The highest body temperature is usually at (4.00-6.00 PM), and the lowest body temperature during sleep at (4.00-6.00 AM).
3. **Physical activity:** Hard work or exercise can increase body temperature.

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- 4. Gender:** Women usually experience more hormone fluctuations than men (progesterone secretion at the time of ovulation raised body temperature by about 0.3-0.6°C).
- 5. Stress:** Stimulation of sympathetic nervous system can increase the production of epinephrine and norepinephrine thereby increasing metabolic activity and heat production.
- 6. Environment:** High environmental temperature, high humidity, and a hot bath or immersion in a hot tub can cause an increase in body temperature. Decreased environmental temperature, lack of adequate clothing, lack of shelter, submersion in cold water can cause decrease in body temperature.

Alteration in body temperature: The normal range of adults body temperature is (36.0 °C - 37.5 °C) or (96.8 °F- 99.5 °F). There are two primary alteration in body temperature:

- 1. Pyrexia, hyperthermia, fever:** a core body temperature above the usual range { > 38 °C or 100.4 °F}.
 - 1. Hyperpyrexia:** a very high fever above 41°C or 105.8 °F.
 - 2. Febrile:** a client who has a fever.
 - 3. Afebrile:** a client who does not have a fever.
- 2. Hypothermia:** a core body temperature below the lower limit of normal {< 36°C or 96.8 °F}. **There are three physiological mechanisms of hypothermia include:**
 - a. Excessive heat loss.
 - b. Inadequate heat production to counteract heat loss.
 - c. Impaired hypothalamic thermoregulation.

Types of hypothermia:

- 1. Induced hypothermia:** is the intentional lowering of body temperature to decrease the need for oxygen by body tissues such as during surgery.
- 2. Accidental hypothermia:** can occur as a result of:
 - a. Exposure to cold environment.
 - b. Immersion in cold water.
 - c. Lack of adequate clothing or heat.
 - d. In adults the problems can be compounded by a decrease in metabolic rate and use of sedative medication.

Clinical manifestation of hypothermia:

- ✓ Decrease body temperature, pulse, and respirations.
- ✓ Severe shivering (initially).
- ✓ Feelings of cold and chills.
- ✓ Pale, cool, waxy skin.
- ✓ Frostbite (discolored, blistered nose, fingers, toes).
- ✓ Hypotension.

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- ✓ Decrease urinary output.
- ✓ Lack of muscle coordination.
- ✓ Disorientation, Drowsiness progressing to coma.

Nursing intervention for clients with hypothermia:

-  Provide a warm environment.
-  Provide a warm bath.
-  Provide dry clothing & warm blanket and pads.
-  Keep limbs closed to the body.
-  Cover the clients scalp with a cover or turban.
-  Provide warm oral fluids.
-  Administer warm intravenous (IV) fluids as ordered.

Types of fever:

- 1. Intermittent fever:** Body temperature alternates at regular intervals between periods of fever and periods of normal or subnormal temperature such as malaria.
- 2. Remittent fever:** A body with a wide range of fluctuation (more than 2°C) above normal occur over a 24 hours period a day such as with cold or influenza .
- 3. Relapsing (recurrent) fever:** Temperature in the normal range lasting for 1 to 2 days. Followed by 1 or 2 days where the temperature is higher than the normal range.
- 4. Constant (sustained) fever:** Body temperature, fluctuate minimally but always remains above normal, as in typhoid fever.

Clinical Manifestation of fever:

- 1. Onset (cold or chill phase):**
 - a. Increased heart rate.
 - b. Increased respiratory rate.
 - c. Shivering.
 - d. Pallid, cold skin.
 - e. Complaints of feeling cold.
 - f. Cyanotic nail beds.
 - g. Cessation of sweating.
- 2. Course (plateau phase):**
 - a. Absence of chills.
 - b. Skin that feels warm.
 - c. Photosensitivity.
 - d. Glassy- eyed appearance.
 - e. Increased pulse and respiratory rate.
 - f. Increase thirst.
 - g. Mild to severe dehydration.

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- h. Drowsiness, restlessness, delirium, or convulsions.
- i. Herpetic lesions of the mouth.
- j. Loss of appetite.
- k. Malaise, weakness, and aching muscle.

3. Flush phase:

- a. Skin appears flushed and feels warm.
- b. Sweating.
- c. Decrease shivering.
- d. Possible dehydration.

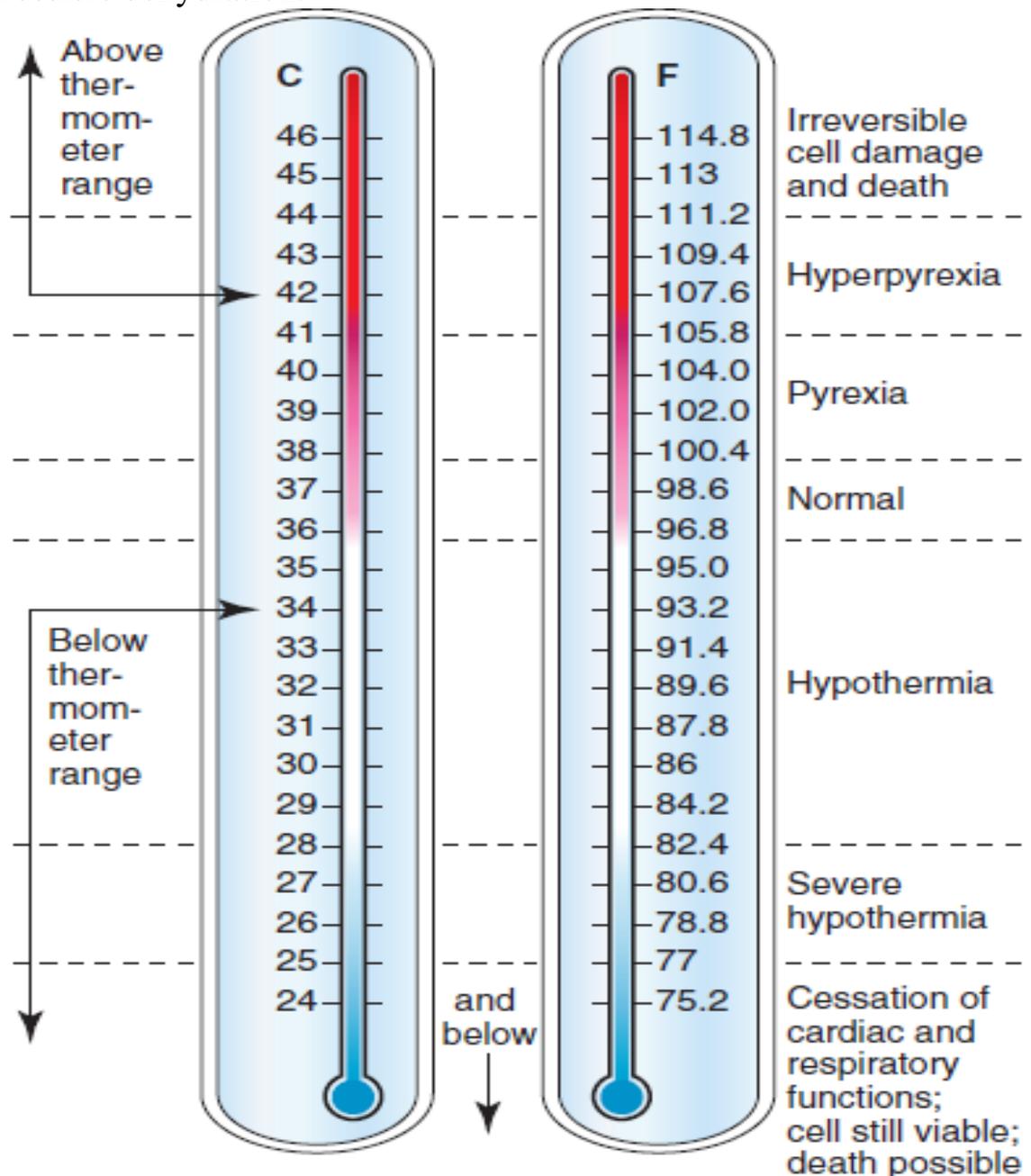


Fig 11.2 Ranges of body temperature. (From Wilkinson and Treas [2011]. *Fundamentals of nursing*, Vol. 1, 2nd ed. Philadelphia: F. A. Davis Company, with permission.)

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Nursing interventions for clients with fever:

Goal: to support the body's normal physiological processes, provide comfort, and prevent complications.

1. Monitor vital signs.
2. Assess skin color and temperature.
3. Monitor WBCs count, and other laboratory tests for indication of infection or dehydration.
4. Remove excess blankets when the client feels warm, but provide extra when feels chilled.
5. Provide adequate nutrition and fluids (2500 -3000 ml/ day) to meet the metabolic demands and prevent dehydration.
6. Measure intake and output.
7. Reduce physical activity to limit heat production, especially during flash stage.
8. Administers antipyretic as order.
9. Provide oral hygiene to keep the mucous membrane moist.
10. Provide a tepid sponge bath to increase heat loss through conduction.
11. Provide dry clothing and bed linens.

Sites (methods) for assessing body temperature:

A. Oral site (Orally):

❖ **Advantage:** accessible and convenient.

❖ **Disadvantage:**

1. Inaccurate if client has ingested hot or cold food or fluid or smoked, (the nurse should wait 30 minutes before taking orally temperature to ensure that the mouth is not affected by temperature of food, fluid, or smoke).
2. Patients need to be able to breathe through the nose.
3. Not applicable for patients who have oral, and nose pathology or recent oral, nose surgery.
4. Not applicable for patients who are receiving oxygen.
5. Patients need to be alert and cooperative and cognitively capable.
6. Not applicable for children, comatose or confused patients.
7. Thermometers can break if bitten.

B. Rectal site:

❖ **Advantage:** reliable (accurate) measurement.

❖ **Disadvantage:**

1. Inconvenient and more unpleasant for clients.
2. Difficult for client who cannot turn to the side.
3. Could injure the rectum.
4. Presence of stool may interfere with thermometer placement.
5. Contraindicated following rectal surgery.

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6. Contraindicated for clients who have diarrhea, or disease of the rectum, immunosuppressed, have a clotting disorders or hemorrhoids.
7. Risk of rectal Valsalva's perforation in children less than 2 years of age.
8. Contraindicated for cardiac patients because it can stimulate the vagus nerve(Valsalva's maneuver) and slowing heart rate.

C. Axillary site: is the preferred site for measuring temperature in newborns and infant because it is accessible and safe.

❖ **Advantage:** safe, noninvasive, and easily accessible.

❖ **Disadvantage:**

1. Least accurate measurement.
2. Thermometer may need to be left in place a long time to obtain accurate measurement.

D. Tympanic membrane site:

❖ **Advantage:** readily accessible, reflects core temperature, and very fast.

❖ **Disadvantage:**

1. Uncomfortable.
2. Risk of injuring the membrane if the probe inserted too far.
3. Presence of cerumen can affect the reading.

E. Temporal artery site: used in newborns and infant.

❖ **Advantage:** safe and noninvasive, very fast.

❖ **Disadvantage:** Variation in technique needed if the client has perspiration on the forehead.

F. Skin site: (Forehead , abdomen skin temperature):

❖ **Advantage:** Easily accessible, available in disposable strips.

❖ **Disadvantage:**

1. Less accurate and reliable than other routes; should not be used if accurate monitoring of temperature is essential.
2. Perspiration interferes with measurement.

Types of thermometers:

1. Glass-Mercury thermometer (oral, and rectal): Mercury in glass, calibrated with centigrade or fahrenheit measurements.
2. Electronic thermometer (provide reading in only 2- 60 second), Battery-powered display unit with a sensitive probe covered with a disposable plastic sheath for individual use.
3. Chemical disposable thermometer: Thin strips of plastic with chemically impregnated dots that, change color to reflect temperature. used orally, rectally or axillary.
4. Temperature sensitive tape (change color indicate temperature) (usually used on forehead or abdomen for a period of 15 second).



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5. Tympanic thermometer: Battery-powered display unit with disposable speculums and infrared-sensing electronics
6. Temporal artery thermometer (infrared sensor).

Temperature scales:

Centigrade or Fahrenheit scale are used to measured and record body temperature. A centigrade calibrated scale ranges from (34°C-42°C), and a Fahrenheit calibrated scale ranges from (94°F- 108°F). Conversions from one scale to another:

- a) Celsius (Centigrade) to Fahrenheit conversion: multiply the centigrade reading by the fraction 9/5 and add 32: $^{\circ}\text{F} = (^{\circ}\text{C} \times 9/5) + 32$.
 - b) Fahrenheit to Celsius (centigrade) conversion: deduct 32 from the Fahrenheit reading and multiply by the fraction 5/9: $^{\circ}\text{C} = (^{\circ}\text{F} - 32) \times 5/9$.
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