Vital Signs

Dr. Shatha aljabari

Objectives

1. Describe factors that affect the vital signs and accurate measurement of them.
2. Identify the variations in normal body temperature, pulse, respirations, and blood pressure that occur from infancy to old age.
3. Identify nine sites used to assess the pulse and state the reasons for their use.
4. Describe the mechanics of breathing and the mechanisms that control respirations.
5. Identify the components of a respiratory assessment.
6. Differentiate systolic from diastolic blood pressure

What are the Vital signs?

- In includes:
  - 1. Body temperature
  - 2.Pulse
  - 3. Respiration
  - 4. Blood pressure
  - 5. Pain

T – BP – P - RR

- **Objective data** that contributes to all other nursing and medical information
- Baseline values establish the norm against which subsequent measures are compared
- Information must be obtained and recorded **accurately**
- Should be a **thoughtful, scientific** assessment
- Monitor functions of the body, an outward clue to what is going on in the patient's body

When to Assess Vital Signs

- On **admission**
- **Change in client's health status**
- Client reports **symptoms** such as chest pain, feeling hot, or faint
- **Pre and post surgery/invasive** procedure
- Pre and post nursing intervention that could affect vital signs

Temperature

Regulation of Body Temperature

Temperature

Reflect the **balance** between the **heat produced** and **heat lost** from the body.

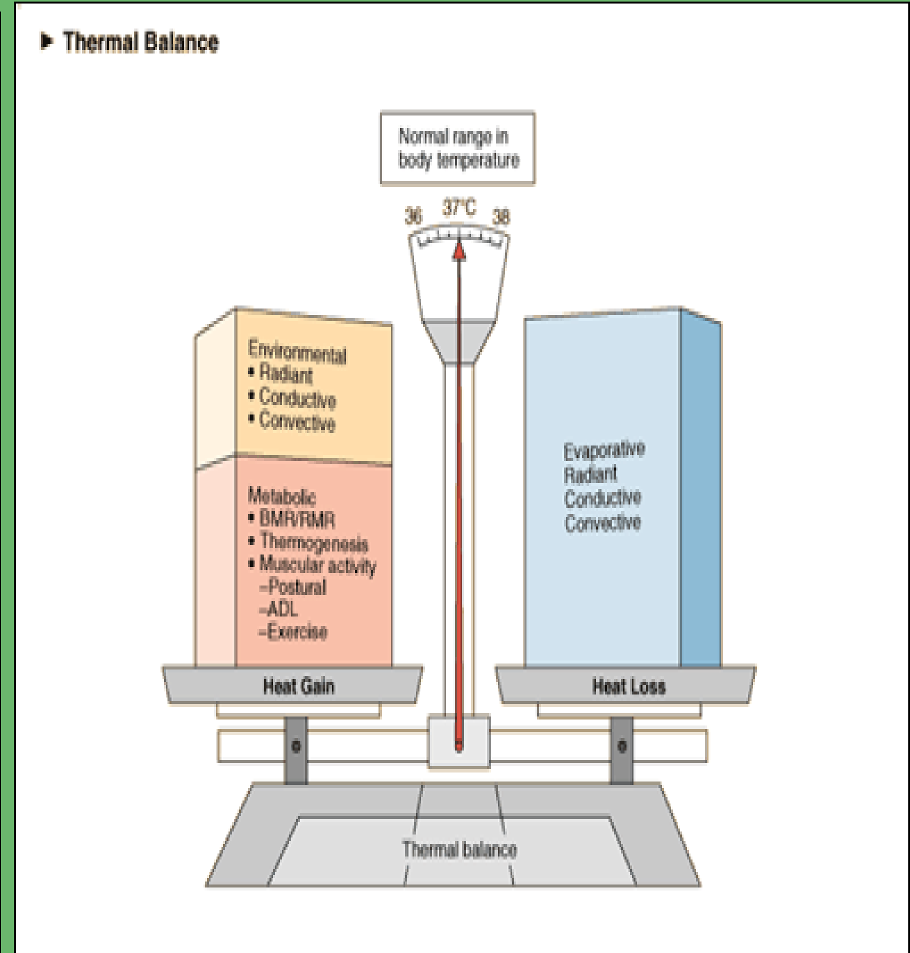
Temperature measured in heat unit called **degree**.

Temperature

- **Core temperature** : temperature of the deep tissue, such as abdominal cavity and pelvic cavity. (remain constant)
- **Surface temperature**: temperature of the skin, Subcutaneous tissue and fat.
  - Temperature varies according to the environment.
  - Lower than core temperature
  - Use oral and axillary method

Factors Affecting Heat Production

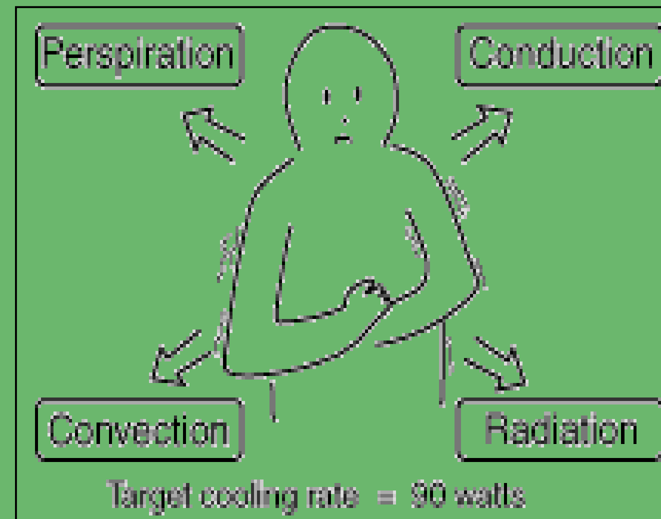
- Basal metabolic rate (BMR)
- Muscle activity
- Thyroxin output
- Epinephrine, Nor-epinephrine, and sympathetic stimulation
- Fever



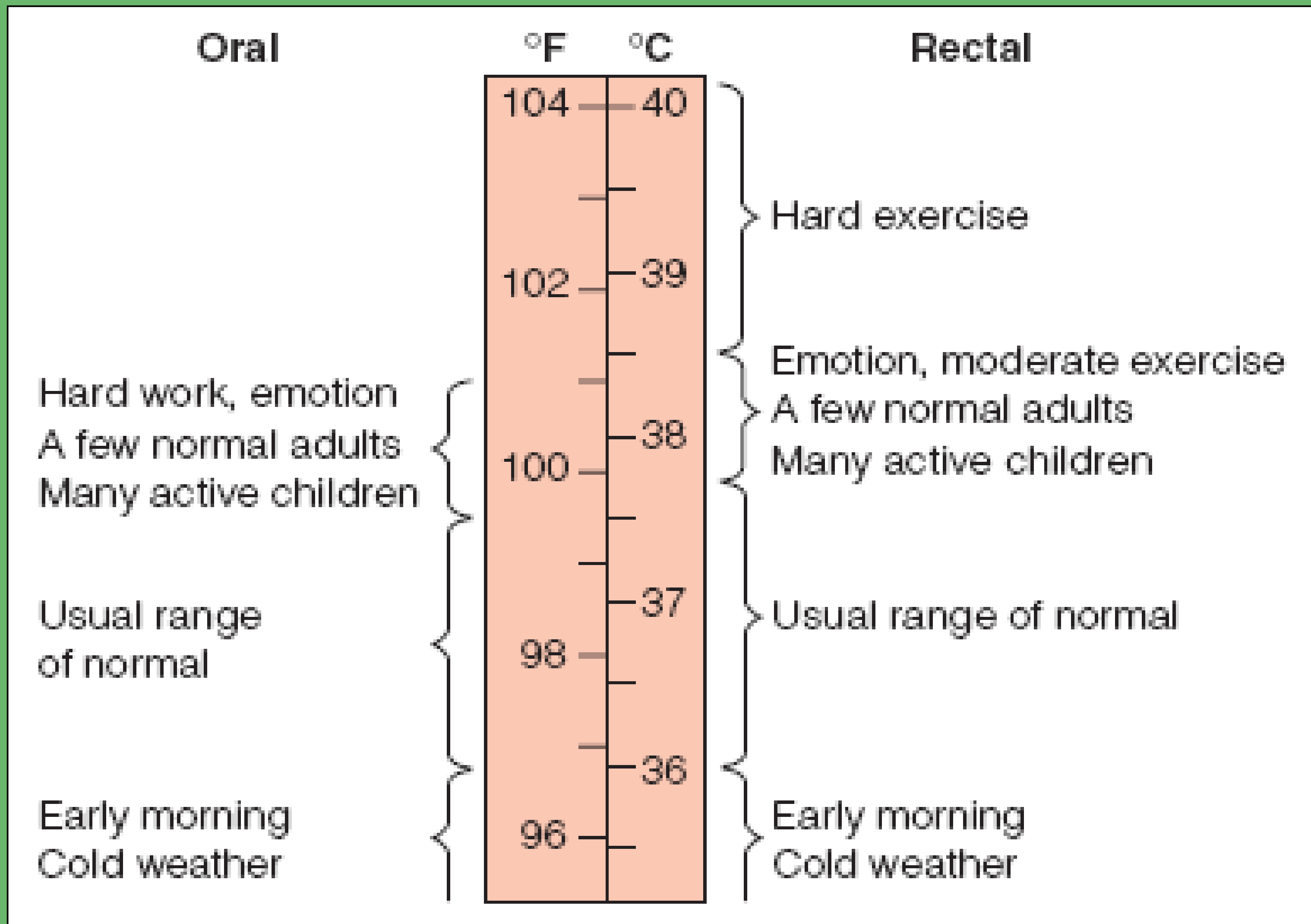
Heat Loss

- Heat is lost from the body through
- 1. Conduction (with contact)
- 2. Convection
- 3. Radiation (without contact)
- 4. Evaporation

- ?



Body Temperature in Normal Person



Regulation of Body Temperature

- Body temperature regulated by
  - Sensor/ skin
  - Integrator (hypothalamus)
  - Effector system

- During cold
  - Shivering
  - Inhibiting of sweating
  - vasoconstriction

Factors Affecting BodyTemperature

- Age (thermoregulatory control)
  - Infants
  - Elders
- Diurnal variations

  (circadian rhythms)
  - changes of temperature during the day
    - (highest 8-12 pm)
    - (lowest 4-6 am)
- Exercise increases temp.

- Hormones
  - In women during ovulation
- Stress
  - Epinephrine and

    nor epinephrine increase temp.
- Environment

Variances in Temperature

- Fever or Pyrexia or hyperthermia: body temperature above usual range
- Hyperpyrexia: very high body temperature may reach 41C̊
- Febrile: person have fever
- Afebrile

- Types of fever
  - Intermittent fever
  - Remittent fever
  - Relapsing fever
  - Constant fever

Signs of Fever

1. Onset Stage

Increased heart rate.
Increased rate and depth of breathing.
Pallid, cold skin and shivering.
Complaints of feeling cold.
Cyanotic (blue) nail beds.
Gooseflesh appearance of the skin.
Cessation of sweating.

2. Course Stage

Absence of chills.
Skin that feels warm.
Glassy eyed appearance.
Increased pulse and respiration rates.
Increased thirst
Mild to sever dehydration
Drowsiness, restlessness, delirium, or convulsions.
Herpetic lesions of the mouth.
Loss of appetite.
Malaise, weakness, and aching muscles

3. Abatement Stage

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

Nursing Intervention for Client in Fever

- Monitor vital signs.
- Assess skin color and temperature.
- Monitor white blood cell count
- Remove excess blankets when the client feels warm, but provide extra warmth when the client feels chilled.
- Provide adequate nutrition and fluids

- Measure intake and output.
- Reduce physical activity
- Provide oral hygiene to keep the mucous membranes moist.
- Provide a tepid sponge bath to increase that loss through conduction.
- Provide dry clothing and bed linens
- Administer antipyretics as ordered

Signs of Hypothermia

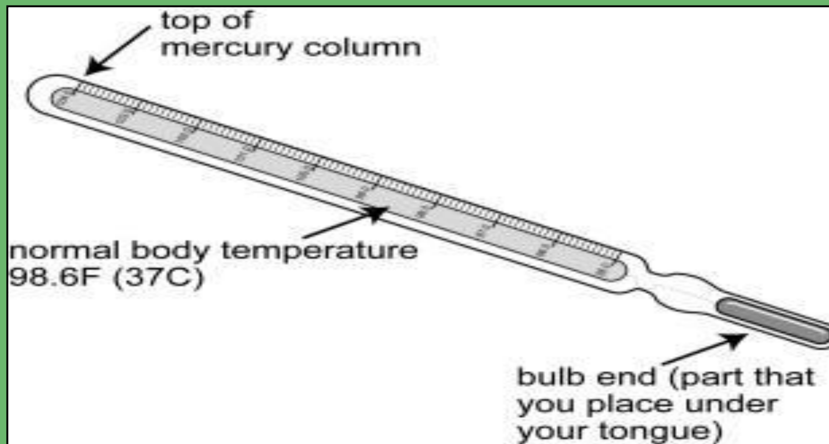
- Decreased body temperature, pulse, and respirations.
- Severe shivering (initially)
- Feelings of cold and chills.
- Pale, cool, waxy skin.
- Decreased urinary output.
- Lack of muscle coordination.
- Drowsiness progressing to coma

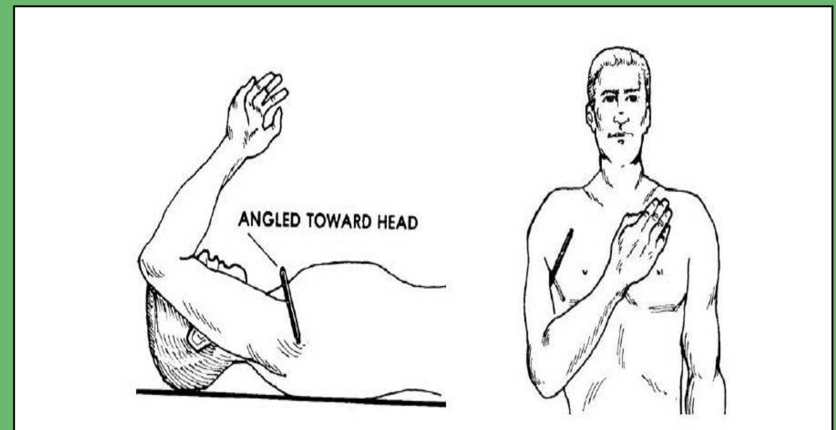
Nursing Intervention for Client in Hypothermia

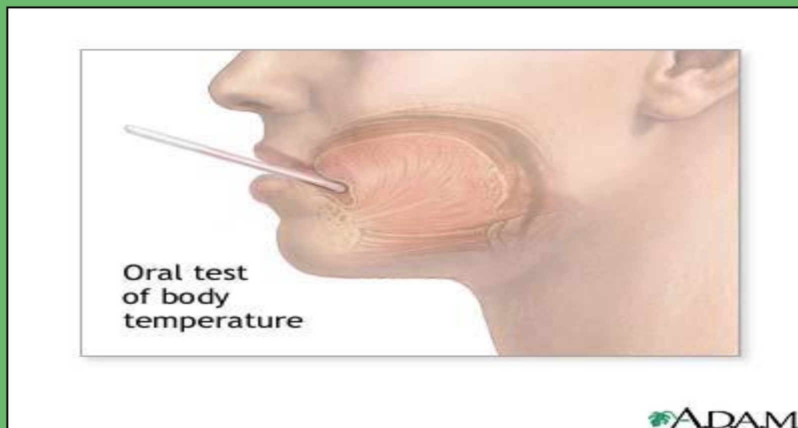
- Provide a warm environment.
- Provide dry clothing.
- Apply warm blankets.
- Keep limbs close to body.
- Cover the client's scalp with a cap or turban.
- Supply warm oral or intravenous fluids.
- Apply warming pads.

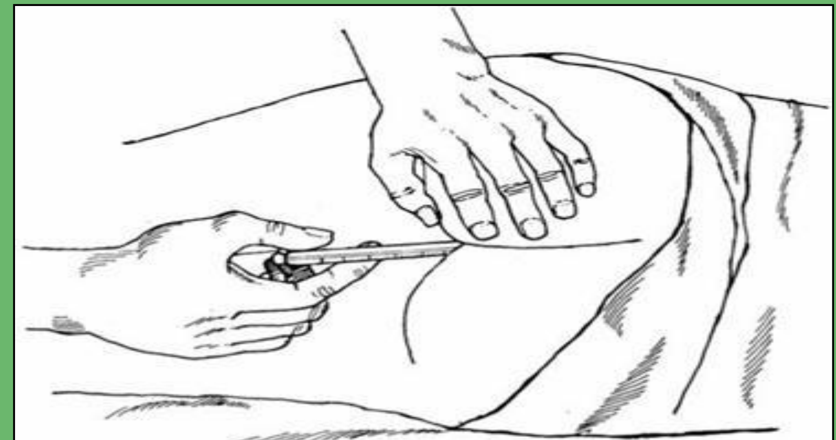
Assessing Body Temperature

Routes for Taking Temperature







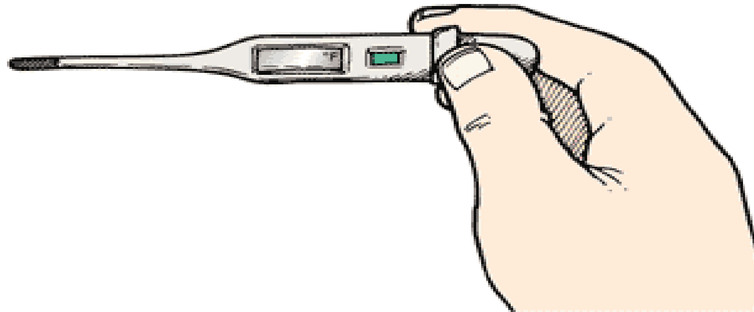


Advantages and Disadvantages of Temperature Sites

Site	***Advantages***	***Disadvantages***
Oral 2-3 Min	•Accessible and convenient	•Can be broken – if bitten •Inaccurate if client just ingested hot or cold food or fluid, Smoked, on O2 mask
Rectal 2-3 Min	•Reliable measurement	•Unpleasant and inconvenient •Could injure the rectum •Could not be used for patient who cannot turn from side to side •Presence of stool could interfere with thermometer placement
Axiliary 6-9 Min	•Safe and non-invasive	•Must leave thermometer in place for longer period of time
Tympanic Membrane	•Readily accessible, reflects the core temperature. Very fast.	•Can be uncomfortable and involves risk of injuring the tympanic membrane

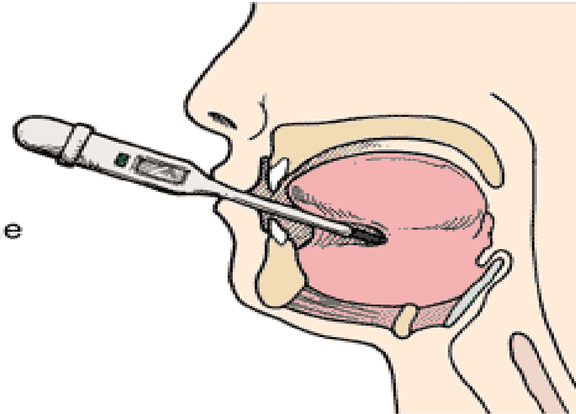
How to Measure Body Temperature: Oral

1. Turn on thermometer according to package directions.



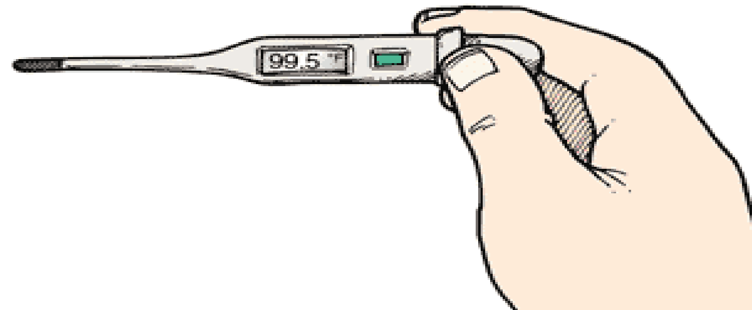
2-3 MIN

2. Place the tip of the thermometer under one side of tongue toward the back. Close mouth and breathe through nose.



3. Remove the thermometer after you hear the signal (usually a series of beeps) and read the temperature on the screen.

A fever is a temperature over 99.5 °F.

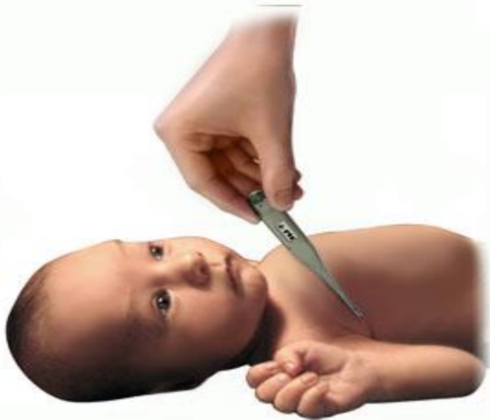


Copyright © 2002 McKesson Health Solutions LLC. All rights reserved

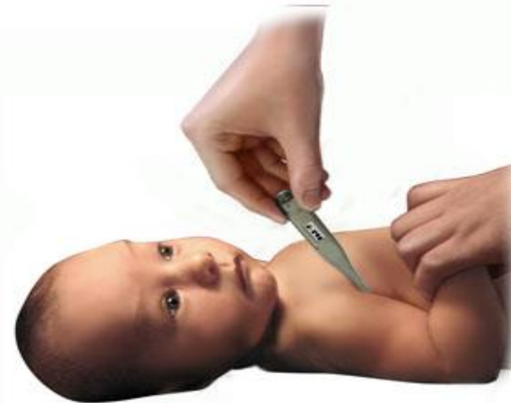
How to Measure Body Temperature: Axillary

6-9 MIN

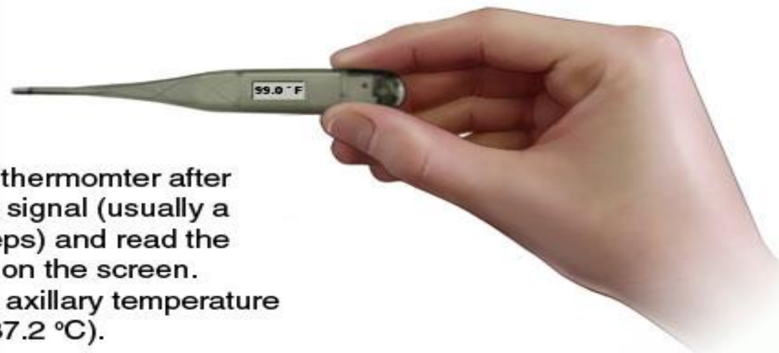
1. Turn on thermometer according to package directions.



2. Place the thermometer in a dry armpit.



3. Close the armpit by holding the elbow against the chest.

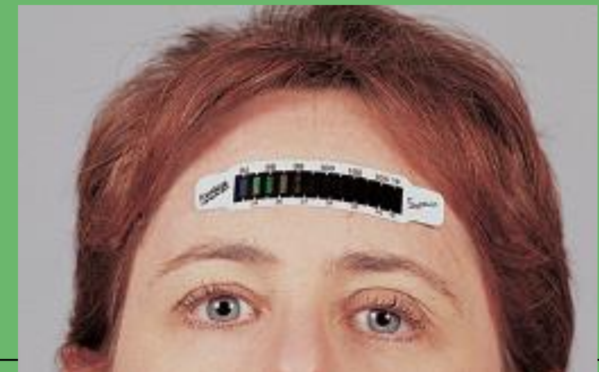


4. Remove the thermomter after you hear the signal (usually a series of beeps) and read the temperature on the screen. A fever is an axillary temperature over 99 °F (37.2 °C).

© 2007 RelayHealth and/or its affiliates. All rights reserved.

Types of Thermometers

- Electronic
- Chemical disposable
- tympanic
- Scanning infrared (temporal artery)
- Temperature-sensitive tape
- Glass mercury



Conversion Formula

- **Fahrenheit to Celsius:**

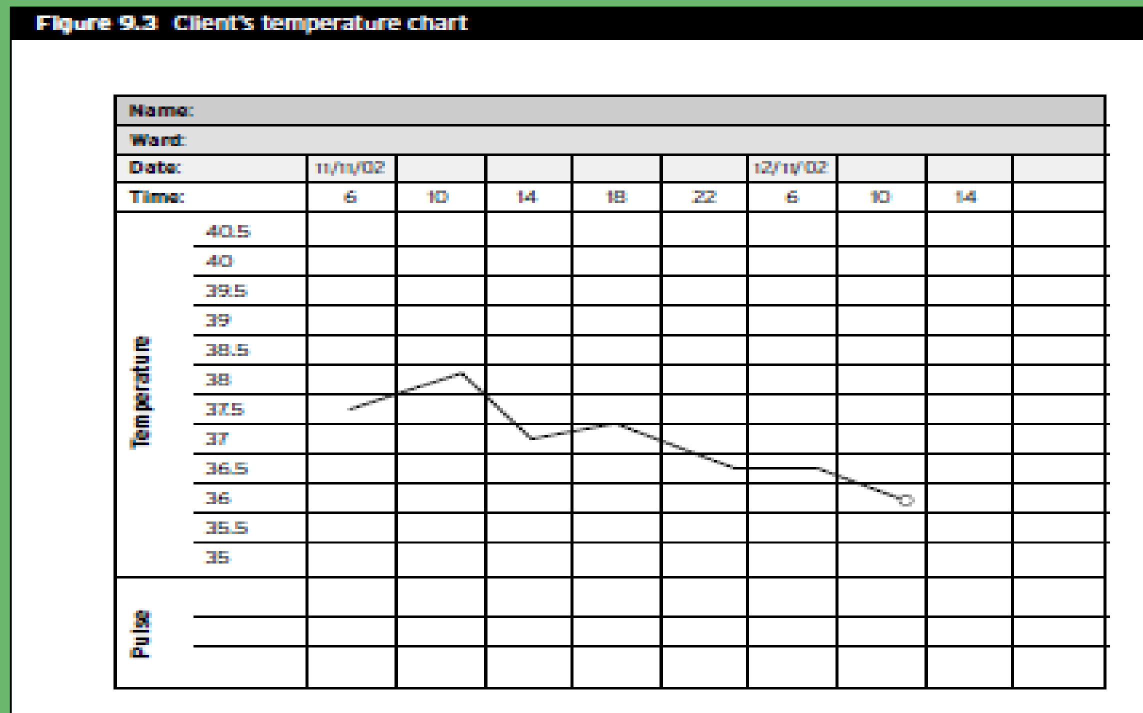
$$C = (F - 32) \cdot \frac{5}{9}$$

- **Celsius to Fahrenheit:**

$$F = C \cdot \frac{9}{5} + 32$$

How to Document Temperature

- Rectal temperature ®
- Axillary Temperature as (X, or AX).



Nursing Diagnosis

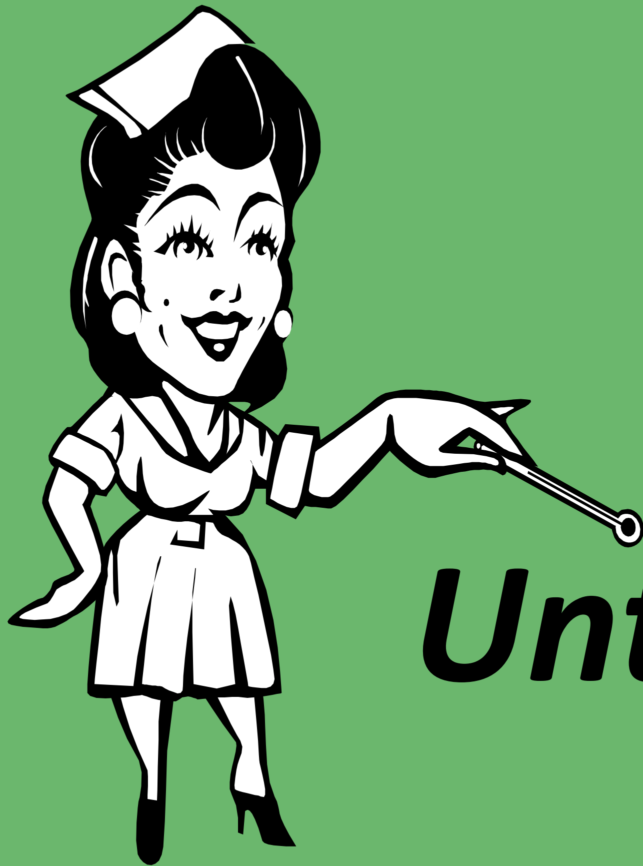
- Hyperthermia RT inflammatory process AMB temperature orally 38C̊̊
- Hypothermia
- Ineffective thermoregulation
- Risk for imbalanced body temperature

Nursing Care for Fever

- Monitor **vital signs**
- Assess skin color and temperature
- Monitor laboratory results for signs of **dehydration** or infection
- Remove **excess blankets** when the client feels warm
- Provide **adequate nutrition** and fluid
- Measure **intake and output**
- Reduce physical activity
- Administer **antipyretic** as ordered
- Provide **oral hygiene**
- Provide a **tepid sponge bath**
- Provide **dry clothing** and bed linens

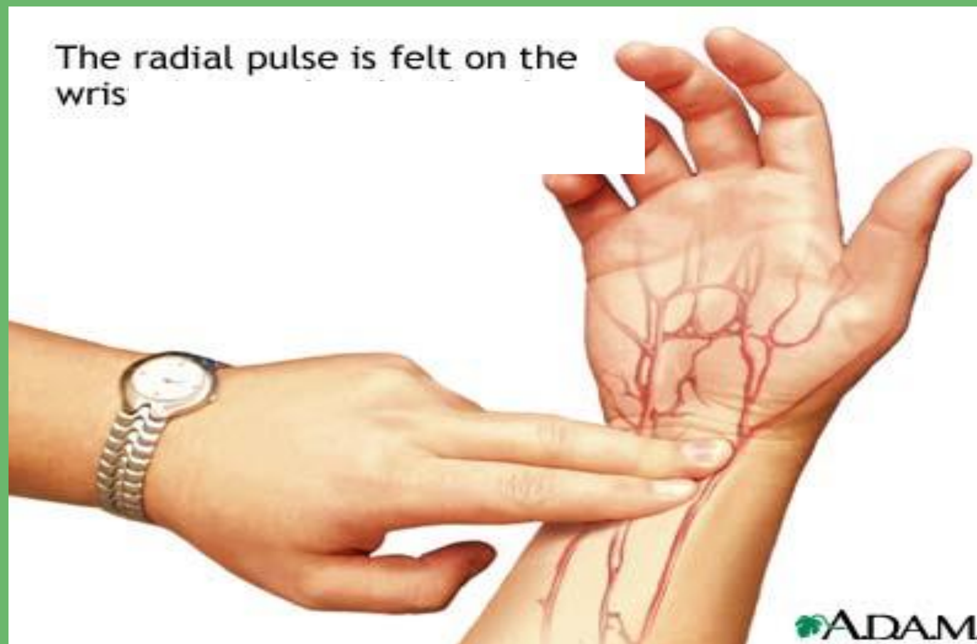
Nursing Care for Hypothermia

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



Until next lecture

Pulse



Pulse

- Is a wave of blood created by contraction of the left ventricle of the heart.
- Pulse represents the stroke volume output and the amount of blood that enters arteries with each ventricular contraction

Common Pulse Points

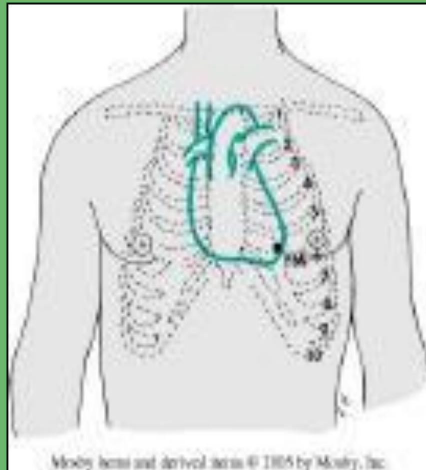
- **Apical:** at the apex of the heart
- **Temporal:** superior and lateral to eyes
- **Carotid:** between midline and side of neck
- **Brachial:** medially in the antecubital space
- **Radial:** laterally on the anterior wrist
- **Femoral:** in the groin fold
- **Popliteal:** behind the knee
- **Posterior tibial**
- **Dorsalis pedis**

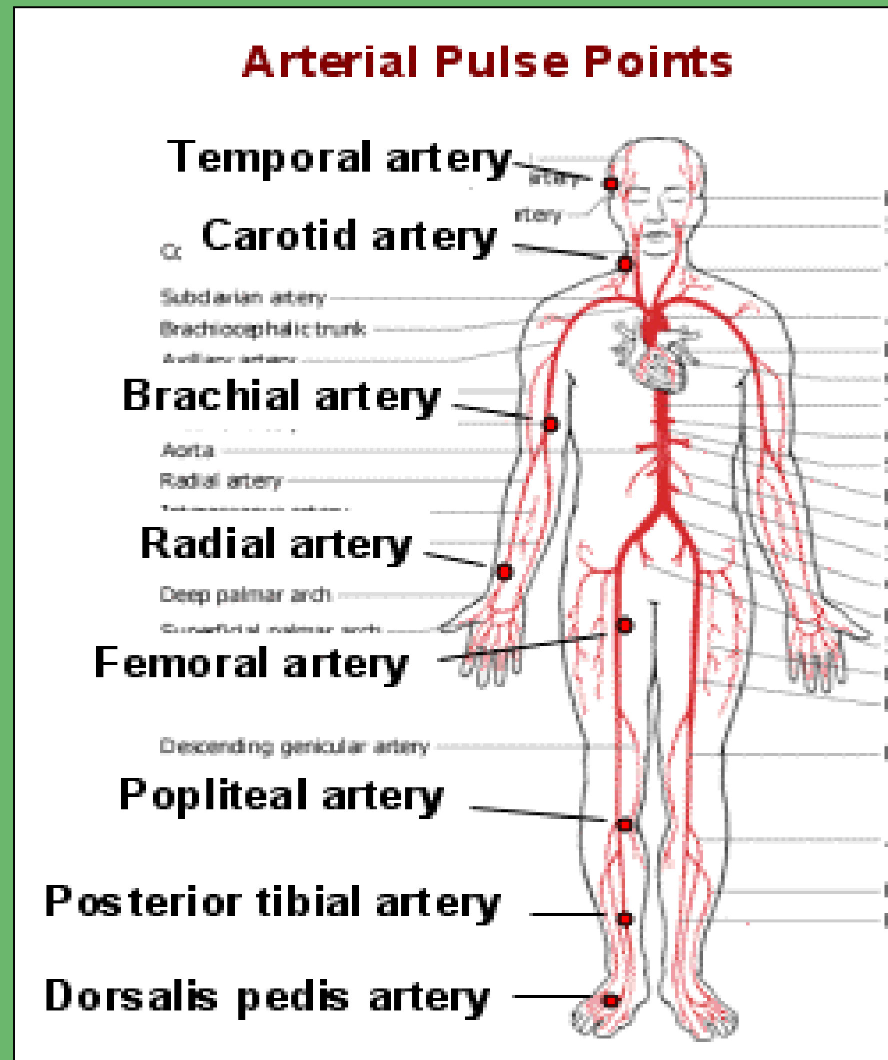
central pulse

peripheral pulse

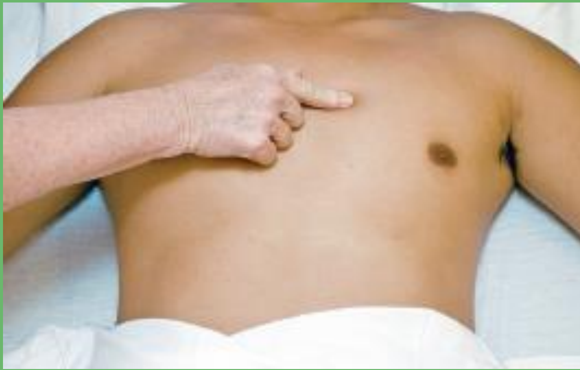
Pulse location (Central and Peripheral)

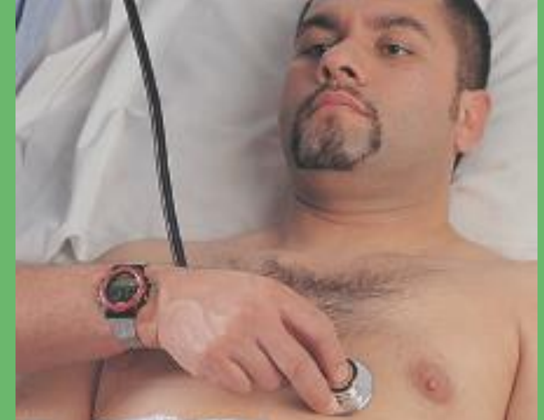
- Central pulse





Assessing Apical Pulse - **PMI**
(**P**oint of **M**aximum **I**mpulse)





Pulse Sites

Radial	Readily accessible
Temporal	When radial pulse is not accessible
Carotid	During cardiac arrest/shock in adults Determine circulation to the brain
Apical	Infants and children up to 3 years of age Discrepancies with radial pulse Monitor some medications

Pulse Sites

Brachial	Blood pressure Cardiac arrest in infants
Femoral	Cardiac arrest/shock Circulation to a leg;
Popliteal	Circulation to lower leg
Posterior tibial	Circulation to the foot
Dorsalis pedis	Circulation to the foot

Factors Affecting Pulse

- Age
  - Age increase, pulse decrease
- Gender
  - After puperty male pulse slower than female
- Body temperature, fever
  - Increase pulse
- Hypovolemia
  - Increase poulse
- Position changes
  - Decrease pulse
- Pathology
  - Varies
- Exercise
  - Increase pulse
- Anxiety, Stress
  - Increase pulse
- Emotions
  - Increase pulse
- Medications
  - Varies effect
- Hemorrhage (bleeding)
  - Increase pulse
- Pulmonary condition

Assessment of Pulse

- Collect data (assessment) about medication
- After physical activities wait 10-15min before assessing pulse.

- **Rate**
  - Measured in beats per full minute (b/m)

TABLE 29–2 **Variations in Pulse by Age**

AGE	PULSE AVERAGE (AND RANGES)
Newborn	130 (80–180)
1 year	120 (80–140)
5–8 years	100 (75–120)
10 years	70 (50–90)
Teen	75 (50–90)
Adult	80 (60–100)
Older adult	70 (60–100)

Assessment of Pulse

- **Rhythm**
  - Regular
  - Irregular (arrhythmia or dysrhythmia)
- **Pulse volume** (strength or amplitude)
  - Absent
  - Bounding
- **Quality**
  - Full
  - Weak (Thready)
  - Bounding

- **Arterial wall elasticity**
  - Expansibility or deformity
- **Equality**
  - Symmetry bilaterally
  - Compare corresponding artery

Variances in Pulse Rate

- Bradycardia: rate < 60 bpm
- Tachycardia: rate > 100 bpm
- Dysrhythmia (arrhythmia): irregular rhythm
-
- Pulse deficit: Difference between radial and apical

Inadequate Circulation

- **Pallor**
  - Paleness of skin when compared with another part of the body
- **Cyanosis**
  - Bluish-grayish discoloration of the skin due to excessive carbon dioxide and deficient oxygen in the blood

Apical-Radial Pulse

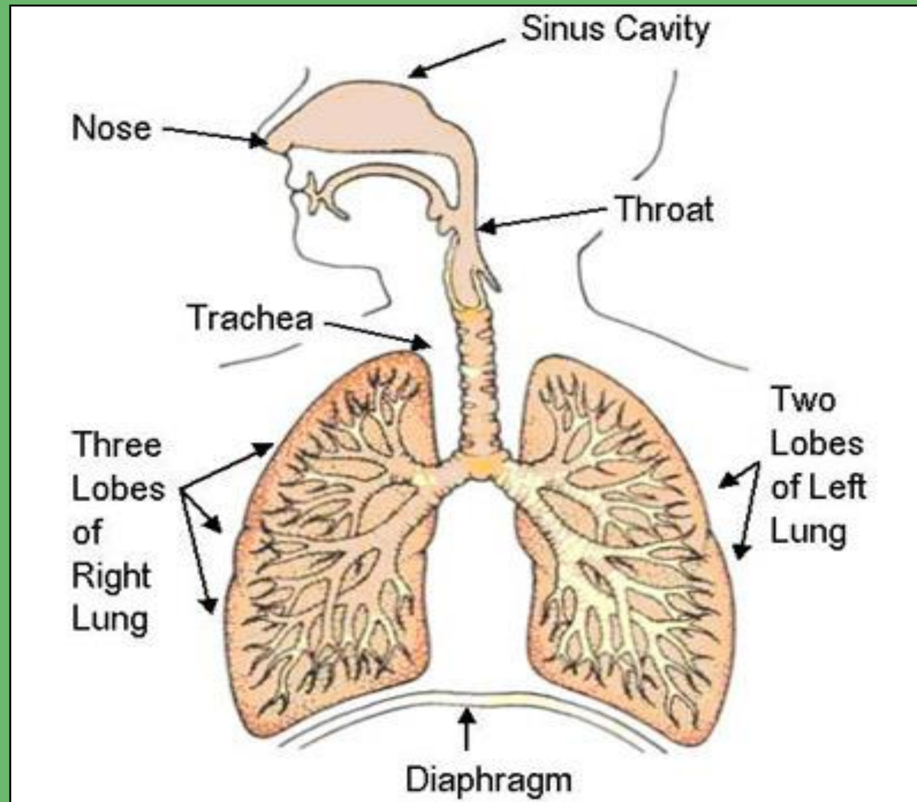
- Locate apical and radial sites
- **Two** nurse method:
  - Decide on starting time
  - Nurse counting radial says "start"
  - Both count for 60 seconds
  - Nurse counting radial says "stop"
  - Radial can **never** be greater than apical

Pulse deficit

Nursing Diagnosis

- Ineffective tissue perfusion
- Decreased cardiac output

Respiration



Respiration

- Respiration is the act of breathing
- The exchange of oxygen and carbon dioxide in the body
- Respiration
  - External (gas exchange between alveoli of the lung and pulmonary blood)
  - Internal: gas exchange between blood and body tissues)
- Two separate process
  - Mechanical
  - Chemical

Respiration

- **Mechanical**
  - **Pulmonary ventilation; breathing**
  - **Ventilation:**
    - **Active movement of air in and out of the respiratory system**
  - **Conduction**
    - **Movement through the airways of the lung**

- **Chemical**
  - **Exchange of oxygen and carbon dioxide**
  - **Diffusion**
    - **Movement of oxygen and CO2 between alveoli and RBC**
  - **Perfusion**
    - **Distribution of blood through the pulmonary capillaries**

Mechanics of Ventilation

- **Inspiration (inhalation)**
  - Drawing air into the lung
  - Involves the ribs, diaphragm
  - Creates negative pressure-allows air into lung
- **Expiration (exhalation)**
  - Relaxation of the thoracic muscles and diaphragm causing air to be expelled

Assessment of Respiration

- **Rhythm**
  - **Assessment of the pattern**
    - **Regular**
    - **Irregular**
- **Depth/volume**
  - **Normal: diaphragm moves ½ inch**
  - **Deep (hyperventilation)**
  - **Shallow (hypoventilation)**

- **Rate:**
  - **Eupnea: normal breathing**
  - **Normal: 12-20 breaths per minute**
  - **Apnea: no breathing**
  - **Bradypnea: abnormally slow**
  - **Tachypnea: abnormally fast**
  - **Observe for one full minute**

Assessment of Respiration

- **Quality**
  - Full
  - Deep
  - Shallow
  - Labored
  - Noisy

- **Effort**
  - Work of breathing
  - **Dypsnea**: labored (difficult) breathing
  - **Orthopnea**: inability to breath when horizontal (supine position)
  - Observe for retractions, **nasal flaring** and restlessness

Secretion and Coughing

- Haemoptysis: blood in sputum
- Productive cough: expectorated secretion
- Non productive cough: dry cough

Factors Affecting Respirations

- Exercise
- Stress
- Environmental temperature
- Medications

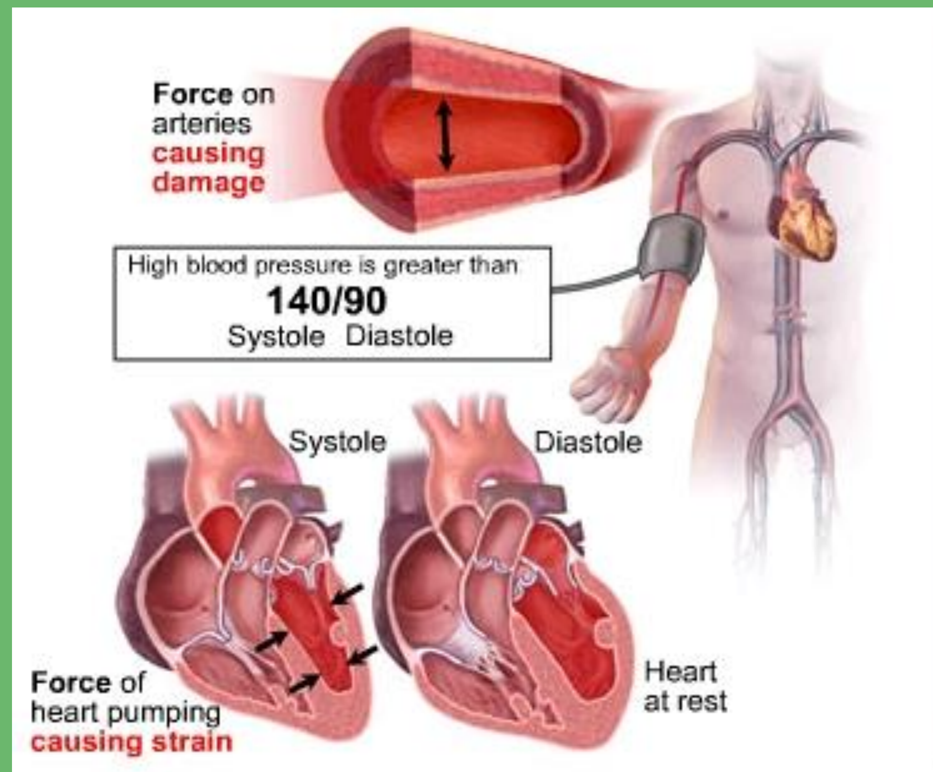
TABLE 29–2 **Variations in Respirations by Age**

AGE	RESPIRATIONS AVERAGE (AND RANGES)
Newborn	35 (30–80)
1 year	30 (20–40)
5–8 years	20 (15–25)
10 years	19 (15–25)
Teen	18 (15–20)
Adult	16 (12–20)
Older adult	16 (15–20)

Variations in Assessment of Breath Sounds

- Wheeze
  - High pitched continuous musical sound; heard on expiration
- Rhonchi
  - Low pitched continuous sounds caused by secretions in large airways
- Crackles
  - Discontinuous sounds heard on inspiration; high pitched popping or low pitched bubbling
- Stridor
  - Piercing, high pitched sound heard during inspiration
- Stertor
  - Labored breathing that produces a snoring sound

Blood Pressure



Blood Pressure

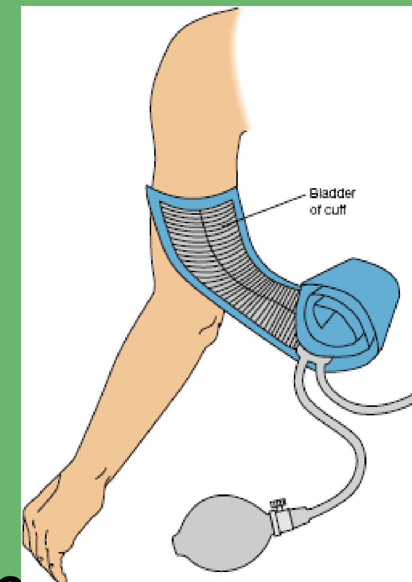
- Force exerted by blood against arterial walls
- Work of the heart reflected in periphery via BP
- **Systolic**
  - Peak pressure exerted against arterial walls as the ventricles contract and eject blood
- **Diastolic**
  - Minimum pressure exerted against arterial walls between contraction when the heart is at rest
- **Pulse pressure**
  - Difference between systolic and diastolic

Blood Pressure

- Measured in millimeters of mercury **(mm Hg)**
- Recorded as systolic over diastolic
  - Recorded as a fraction, كسر e.g. 120/80mmHg
    - Systolic = 120 mmHg
    - Diastolic = 80 mmHg

Regulation of Blood Pressure

- **The body constantly adjusts arterial pressure to supply blood to body tissues**
- **Elasticity**
  - **Less elasticity creates greater resistance to blood flow= > systolic BP**
  - **Decreased in smokers and increased cholesterol**
- **Influenced by three factors**
  - **1. Cardiac function**
  - **2. Peripheral vascular resistance**
  - **3. Blood volume**
    - **Normal = 5000 ml**
    - **Volume increases=BP increases**
    - **Volume decreases= BP decreases**
    - **Viscosity= reaction same as volume**



Factors Affecting Blood Pressure

- Age
  - Elasticity of arteries decrease, BP increase
- Exercise
- Stress
- Race
- Nutrition

- Gender
  - **After puberty, female have lower BP than male**
  - **After menopause, women have higher BP than pre-menopause**
- Medications
- Disease process
- Obesity

تباينVariation of BP

- Values

TABLE 29–4 **Classification of Blood Pressure**

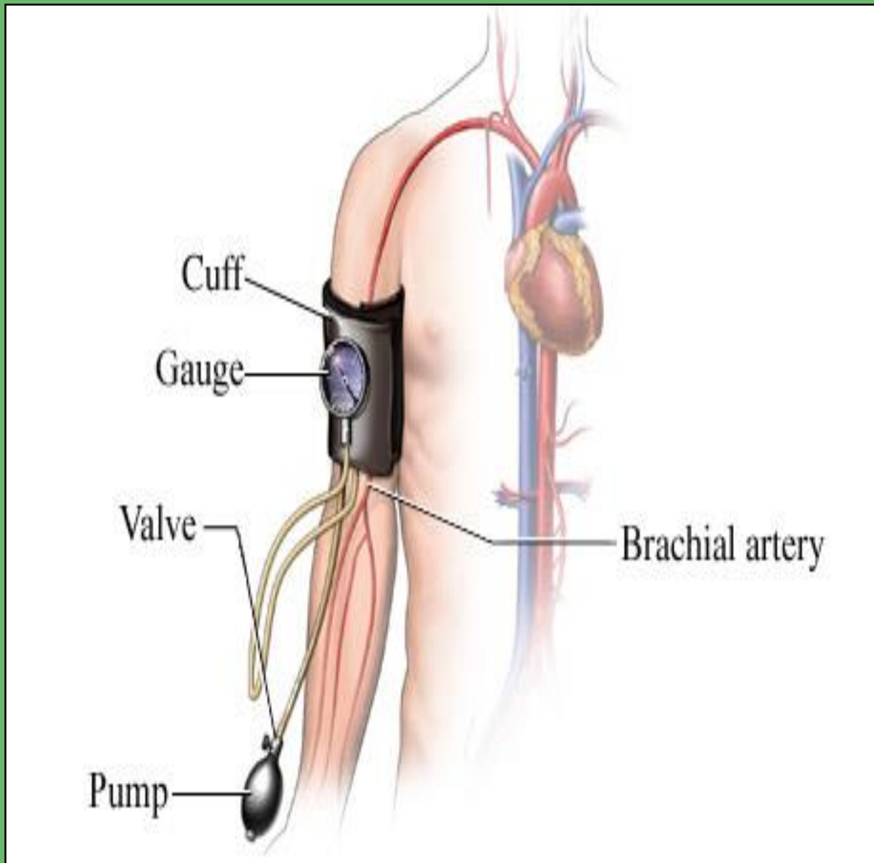
CATEGORY	SYSTOLIC BP MM HG		DIASTOLIC BP MM HG
Normal	<120	and	<80
Prehypertension	120–139	or	80–89
Hypertension, stage 1	140–159	or	90–99
Hypertension, stage 2	>160	or	>100

- Persistant increase in BP
  – Damage to vessels; loss of elasticity; decrease in blood flow to vital organs

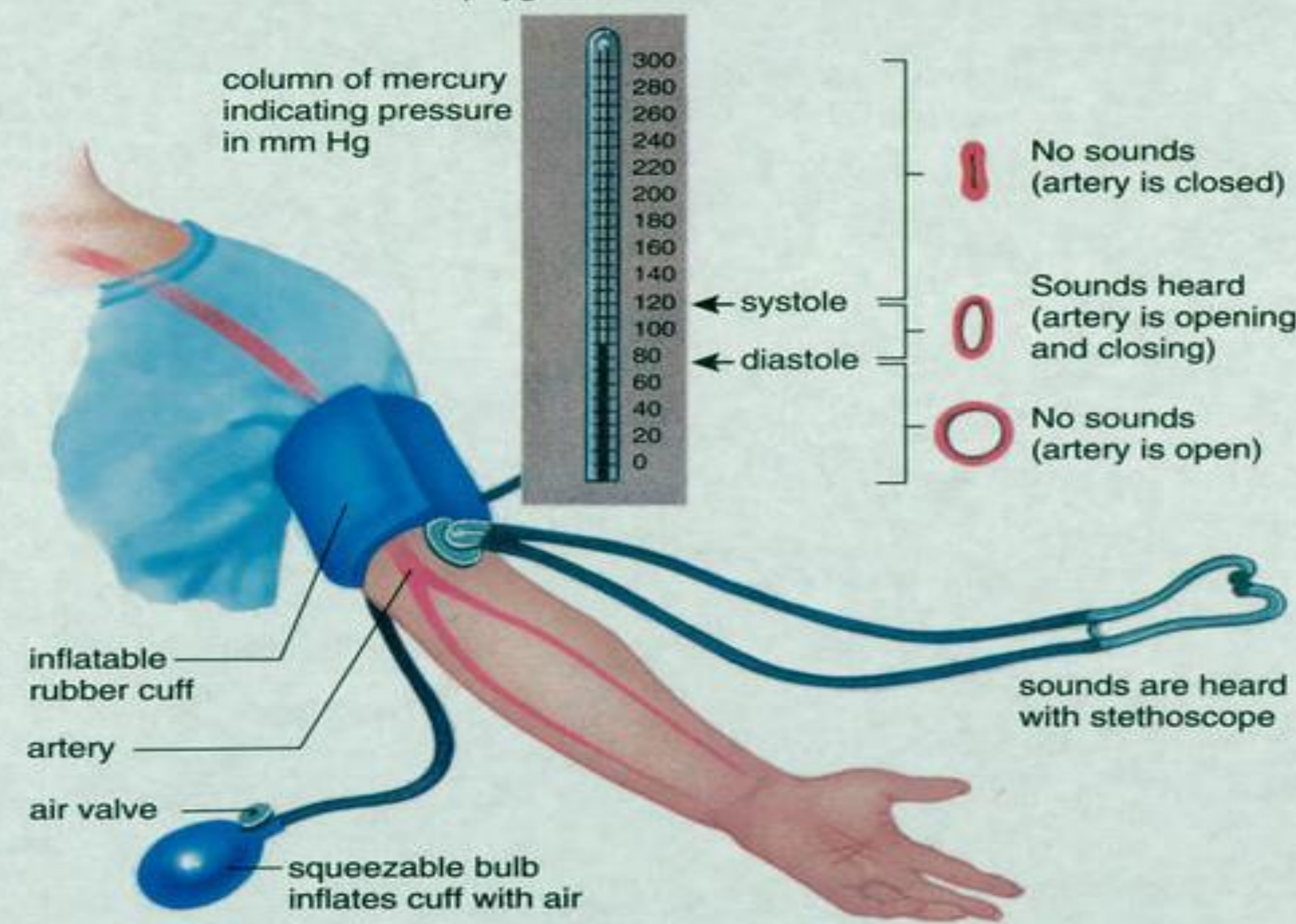
Measurement of BP

1. Direct way (Invasive):
   - In patient setting only
   - Catheter is threaded into an artery under sterile conditions
   - Attached to tubing that is connected to monitoring system
   - Displayed as waveform on monitoring screen

Measurement of BP



2. Indirect way
   - Most common, accurate estimate
     - Equipment: Sphygomanometer and stethescope
- Sites
   - Upper arm (brachial artery)
   - Thigh (popliteal artery)


Sphygmomanometer
column of mercury
indicating pressure
in mm Hg
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
systole
diastole
No sounds
(artery is closed)
Sounds heard
(artery is opening
and closing)
No sounds
(artery is open)
inflatable
rubber cuff
artery
air valve
squeezable bulb
inflates cuff with air
sounds are heard
with stethoscope

Other BP Issues

- **Primary or essential hypertension**
  - Diagnosed when no known cause for increase
  - Accounts for at least 90% of all cases of hypertension
- **Secondary hypertension**: hypertension: elevated blood pressure of known causes.
- **Orthostatic or postural hypotension**
  - Sudden drop in BP on moving from lying to sitting or standing position

Common Errors in Taking BP

- **Nurse may be influenced by patient's previous blood pressure reading or diagnosis**
- **Cuff too narrow or too wide**
- **Arm unsupported**
- **Insufficient rest before taking BP**
- **Repeating assessment too quickly**
- **Assessing after a meal or while patient is smoking or has pain**
- **Wrapping cuff too loosely**
- **Deflating cuff too quickly or too slowly**
- **Not using same arm**
- **Arms above level the heart**

THANK YOU