Introduction :-

- Vital Sign also Known as **Cardinal Sign**.
- Vital Sign are Sign of life which used in measurement the level of health.

The Vital Signs are :-

1. Body Temperature
2. Pulse
3. Respiration
4. Blood Pressure
5. Pain

1. **Body Temperature :-**
   - Degree of the Heat maintain by the Body.
   - A Balance between heat production and Heat loss.
   - **Thermogenesis :-** Heat Production ( By Chemical Regulation or Metabolism ).
   - **Thermolysis :-** Heat loss ( by Physical Regulation ).
   - The regulatory centre of Body Temperature is :- **Hypothalamus**.

   ✦ **Way of Heat Production :-**

   1. **Oxidation of Food :-**
      - 1 gm Carbohydrate - 4 k Calorie / 17 k Joule
      - 1 gm Protein - 4 k Calorie / 17 k Joule
      - 1 gm Fat - 9 k Calorie / 37 k Joule
      - 1 gm Alcohol - 7 k Calorie

   2. **Specific Dynamic Action of the Food :-**
      - Specific Dynamic Action of Carbohydrate - 5-6%
      - Specific Dynamic Action of Protein - 30 %
      - Specific Dynamic Action of Fat - 4 %
      - Specific Dynamic Action of the mixed Diet - 12 %
Method of Heat Loss :-

1. Through Skin :-

A. Conduction :-
- Transfer of Heat by directly through a substances from Hot part to the Cold Part. (ठंडी वस्तुओं के सीधे संपर्क में आने से )
- 3 % loss of Heat.
- eg. ठंडे कपड़े पहनना , सीधे बर्फ के संपर्क में आने से होने वाला Heat loss.

B. Convection :-
- Heat loss due to in contact with Circulating Air Movement.
- 15 % loss of Heat.
- eg. Heat loss due to Fan, A.C , Coolers

C. Radiation :-
- Heat loss By indirect Contact
  - Heat loss 60 % ( Radiation सबसे ज्यादा Skin द्वारा होने वाला Heat Loss का Method है )

4. Evaporation :-
- Heat loss by Vapour ( भाप के द्वारा )
- 22 % heat loss

2. Through Lungs
3. Through Kidney
4. Through GIT

Normal Variations in Body Temperature :-
- Time of the Day :: Evening > Morning
- Time of the menstruations :: Sudden fall in Temperature
- After Ovulation - rises Slowly ( Maximum just before the next Menstrual Period due to Highest level of Progesterone. )
Site (Route) of Body Temperature:

<table>
<thead>
<tr>
<th>Site of Temperature</th>
<th>Body Temperature</th>
<th>Time Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral Temperature</td>
<td>98.6° F (37°C)</td>
<td>For 2-3 min nut</td>
</tr>
<tr>
<td>Axillary Temperature</td>
<td>97.6° F (36.4°C)</td>
<td>For 5 Min nut</td>
</tr>
<tr>
<td>Rectal Temperature</td>
<td>99.6° F (37°C)</td>
<td>For 2 Min nut</td>
</tr>
<tr>
<td>Tympanic membrane</td>
<td>98.6° F</td>
<td>Placement time 2-3 sec</td>
</tr>
</tbody>
</table>

**Some Special Points:**

- Best route of Temperature in children - Axilla
- Most reliable method of Temperature - Rectal Route
- Position for Rectum temperature - Left lateral Position
- Rectal Thermometer Insertion -
  - Adult - 1.5 inch
  - Infant / Child - 1 inch

**Thermometer:**

- खोज - Galileo Galilee

- **Glass Thermometer / Clinical Thermometer:**
  - Range - 95-110° F & 35-43.3°C
  - Constriction Present between Bulb and Stem

- **Lotion Thermometer:**
  - Range - 32-212° F & 0-100°C
  - No Constriction Present

- **Electronic Thermometer:** (Digital Thermometer)
Disinfectant Use For Thermometer:

<table>
<thead>
<tr>
<th>Disinfectant</th>
<th>Ratio</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dettol</td>
<td>1:40</td>
<td>5 Minnut</td>
</tr>
<tr>
<td>Savlon</td>
<td>1:20</td>
<td>5 Minnut</td>
</tr>
<tr>
<td>Lysol</td>
<td>1:40</td>
<td>3 Minnut</td>
</tr>
</tbody>
</table>

Wipe The Thermometer:

- **Before Taking Temperature** - Wipe bulb to Stem
  - Temp. लेने से पहले Thermometer को Bulb से Stem की तरफ Moist Swab से Wipe करते हैं

- **After Taking Temperature** - Wipe Stem to Bulb
  - Temp. लेने के बाद Thermometer को Dry Swab से Stem से Bulb की तरफ Wipe करेंगे।

**Temperature Converting Formula**:

- Fahrenheit to Celsius: \( ^\circ C = \frac{5}{9}(^\circ F - 32) \)
- Celsius to Fahrenheit: \( ^\circ F = \frac{9}{5}^\circ C + 32 \)

**Site / Route of Body Temperature**:

1. **Oral Route** - (By Mouth)
   - Normal Oral Temperature - 37°C or 98.6°F
   - Time - 2-3 Minnut

   **Contraindications** - (निषेध)
     - 6 वर्ष से छोटे बच्चों में Temperature Oral Route से ना लें।
     - Psychiatric Patient में।
     - Mouth trauma & Oral Surgery के case में।
2. Axilla Route :-
   - Normal Axillary Temperature - 36.4°C or 97.6° F
   - It is Best Route for Infant & Children.
   - Time Duration - 5 Minnut

3. Rectal Route :-( Core / Bottom / Pulp ) :-
   - Most Reliable method of Temperature taking.
   - Normal Rectal Temp. - 37.5°C or 99.6° F
   - Position - Left Lateral
   - Placement Time - 2 Minnut

<table>
<thead>
<tr>
<th>Age</th>
<th>Thermometer Insertion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult</td>
<td>1.5 Inch</td>
</tr>
<tr>
<td>Child / Infant</td>
<td>1 Inch</td>
</tr>
</tbody>
</table>

**Contraindications** :- Diarrhoea, Rectal Surgery & Cardiac Surgery

◆ Note ◆ Core Body Temperature are Rectum & Tympanic membrane ( Aural Route ).
◆ Death Due to Abnormal Body Temperature - Body Temperature Below 25°C or Above 43°C.

◆ Fever :-
   - Fever is Also Known as Pyrexia or Febrile.
   - Fever is Define as in a adult, an Oral Body temperature above 100.4°F (38°C) is indicate to the Fever.

**Terminology :-**
   - Hypothermia - Body Temperature less than 95° f.
   - Sub Normal Body Temperature - 95-98° F
   - Low Pyrexia - 99-100° F
   - Moderate Pyrexia - Temp. 100-103° F
   - High Pyrexia - Temp. 103-105° F
• Hyperpyrexia - Temp. 105° F
• Hyperthermia - Temp. Up to 105° F

Types of Fever :-
1. Onset / Invasion :- Rising condition of Temperature.

2. Fastigium / Stadium :-
• Temperature has reached it's Maximum & remains fairly constant at a High level.

3. Decline / Defervescence :-
• Elevated Temperature return to Normal.

A. Crisis :- Crisis में बढ़ा हुआ Temperature अचानक कम हो जाता हैः
   1) True Crisis :- Patient Condition Improve.
   2) False Crisis :- Patient Condition not Improve.

B. Lysis :- Lysis में बढ़ा हुआ Temperature Zig-Zag manner में decrease होता हैः

4. Constant / Continuous Fever :-
• Temp. Varies not more than 2° f between morning and Evening, Not Return to normal.

5. Remitent Fever :-
• Temperature varies more than 2° Between morning and Evening, Return to Normal.

6. Intermittent or Quotidien fever :-
• Temperature rise from normal or subnormal to High Temperature and comeback normal at regular intervals.

7. Inverse Fever :-
• Temperature High in morning and Low in Evening.

8. Hectic / Swinging Fever :-
• Greater difference between lowest and Highest Temperature.

9. Rigor :-
• Shivering Condition + Hyperpyrexia ( Seen in Malaria )

Stages of Rigor
1. Cold Stage
2. Hot Stage
3. Sweating Stage
**Pulse :-**

- The rhythmic dilation of an artery that results from beating of the heart.
  
  Or
  
- Alternative fall and Rise of Artery due to Left Ventricle Contraction known as Pulse.

  ➢ **Sphymograph :-** Pulse can be recorded in a graph with Computerized instrument.
  
  ➢ **Sphymography :-** Study of Pulse .

**Resting Pulse Time :-**

<table>
<thead>
<tr>
<th>Age</th>
<th>Beats / Minnut</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Babies Under 1 Year</td>
<td>100-160</td>
</tr>
<tr>
<td>2. 1 to 10 Years</td>
<td>70-120</td>
</tr>
<tr>
<td>3. Greater than 10 Years and Adults</td>
<td>60-100</td>
</tr>
<tr>
<td>4. Atheletes</td>
<td>40-60</td>
</tr>
</tbody>
</table>

**Site of Pulse :-**

1. Temporal Pulse
2. Carotid Pulse
3. Apical Pulse
4. Brachial Pulse
5. Radial Pulse
6. Femoral Pulse
7. Popliteal Pulse
8. Posterior Tibial Pulse
9. Dorsal Pedis
Abnormalities of Pulse :-

1. Rate :-
   - Normal Pulse Rate is - 72 Beats / Minut
   - Tachycardia - Heart Rate >100 beat / Minut
   - Bradycardia - Heart Rate <60 Beat / Minut

2. Volume :-
   - Normal Stroke Volume is - 70 ml / Beat

Decrease Stroke Volume :-
- Filliform / Thready / Wiry / Weak Pulse :-
  - Hypovolemia
  - Dehydration
  - Diarrhoea

Increase Stroke Volume :-
- Bounding Pulse :- Increase Stroke Volume
  - Hypervolemia
  - Exercise
  - Anxiety

Pulse Alteration :-
Alteration in Stroke Volume (Increase or Decrease).
  - Congestive Heart Failure
  - Drug Toxicity
  - Electrolyte Imbalance

1. Water Hammer Pulse / Corriagen Pulse / Collapsing Pulse :-
   - Pulse feel Normal or Strong but suddenly collapse.
   - eg. Aortic Regurgitation.

2. Paradoxical Pulse :-
   - Weak Pulse during Inhalation

3. Bigeminal Pulse :-
   - Every Second beat feel early and Weak.
3. Rhythm :-
   1. Intermittent Pulse :-
      • Beat missed at Regular Interval.
   2. Pulse Deficit :-
      • Difference between apical and Radial Pulse.
   3. Dicrotic Pulse :-
      • One Heartbeat but feel of two sensation of Pulse.

Special Points :-
   • Always Pulse Count for 1 Minnut.
   • Don’t use Thumb for counting Pulse because there is a Pulse in the thumb and the Nurse could mistake for client Pulse.
   • Apical Pulse Site - Left Mid clavicular line is used at 4th or 5th Intercostal Space.
   • Suitable Site to Check Pulse in Newborn is - Apical Pulse

◆ Respiration ◆

Respiration :- Act of Breathing

1. Internal Respiration / Tissue Respiration :-
   • Gases Exchange between Blood and Tissue.
2. External Respiration / Pulmonary Respiration :-
   • Gases Exchange between Blood and Lungs ( Alveoli ).
   • Respiratory Center - Medulla Oblongata

Eupnea :-
   • Normal Breathing को Eupnea कहते हैं,
   • Normal Breathing is 12-18 breaths/min.

Characteristics of Respiration :-
1. Rate
2. Depth
3. Rhythm
1. Rate :
   - Number of Respiration in a Minut.

A. Bradypnea :-
   - Breathing **Below 10 breaths/Minut** (Slower than Normal)
   - Associated Condition : Bradypnea यह Increase ICP, Brain Injury & Drug Overdose के case में देखने को मिलती हैं

B. Tachypnea :-
   - Breathing **Above 24 breaths/Minut** (Rapid Shallow Breathing)
   - Associated Condition : Pneumonia, Pulmonary Edema, Metabolic Acidosis & Septicemia.

2. Depth :
   
   A. Hyperpnea :-
      - Increase Depth of Respiration.
   
   B. Hypopnea :-
      - Decrease Depth of Respiration.

**Abnormal Breathing Pattern :-**

1. Apnea :-
   
   Period of Cessation of Breathing. (स्वास्ति का रुकना)

2. Kussmaul Respiration :-
   
   - Rapid, Gasping & Very deep type of labored Breathing.
   - Commonly called as "**Air Hunger**".
     Associated Condition :-
   
   - Severe Metabolic Acidosis
   - Diabetic Ketoacidosis

3. Cheyne - Stokes Respiration :-
   
   - Also Called **Periodic Breathing**.
   - Characterized by Altered Period of Tachypnea & Apnea (Usually Apnea time Period is about 20 Seconds)
     Associated Condition :-
• Damage to the Pons Where respiratory Center is located.
• Stroke, Brain Injury, Brain Tumour, Toxicity, Heart Failure

4. Biot's Respiration :- ( Cluster Breathing )
• It is Group of Quick, Shallow inspiration followed by Regular or Irregular Periods of Apnea. (Apnea usually 10 - 60 Seconds )
• Associated with Nervous system Disorders.

5. Paradoxical Respiration :-
• Seen in Flail chest (Blunt chest trauma associated with Accidents )
• Paradoxical Respiration means Inward movement of a segment of the thorax during Inspiration with Outward movement during expiration ).

7. Wheezing Sound :-
• Musical Whistle sound
• Asthma & Emphysema

8. Sigh (उडासी) :-
• Deep Respiration followed by a Prolonged expiration.

9. Rale (Rahl) :-
• Abnormal Bubbling Sound
• Ex. Pneumonia

10. Stridor :-
• Harsh, Vibrating Sound Producing during Respiration. (Sound like Crow )
• eg. Inflammation of upper Respiratory tract, Laryngitis & Pharyngitis

11. Stertonous :-
• Noisy snoring Sound
• Acute Alcoholic Patient.
Blood Pressure

Introduction:
- Pressure Exerted by the Blood against the walls of the Blood Vessels as it flows through them.
- Normal Blood Pressure is 120/80 mmHg.

A. Systolic Blood Pressure:
- Highest degree of Pressure during the Ventricular Systole when the left Ventricle forcing the Blood into the Aorta.
- Normal Systolic Blood Pressure is 120 mmHg.

B. Diastolic Blood Pressure:
- Lowest pressure when the heart is in resting period just before the Contraction of Left Ventricle.
- Normal Diastolic Blood Pressure is 80 mmHg.

C. Pulse Pressure:
- Pulse Pressure = Systolic Blood Pressure - Diastolic Blood Pressure
- Normal Pulse Pressure is 40 = 120 S.BP - 80 D.BP = 40

<table>
<thead>
<tr>
<th>Systolic Blood Pressure</th>
<th>Diastolic Blood Pressure</th>
<th>Pulse Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>120</td>
<td>80</td>
<td>40</td>
</tr>
<tr>
<td>Ratio</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

Mean Arterial Blood Pressure (MABP): Normal MABP is 93.3 mmHg

Formula -
1. \[
\frac{\text{Systolic Pressure} + (\text{Diastolic Pressure} \times 2)}{3} = \frac{120 + (80 \times 2)}{3} = \frac{280}{3} = 93.3
\]

Or
2. \[
\frac{\text{Diastolic Pressure} + \frac{1}{3}\text{Pulse Pressure}}{3} = 80 + \frac{1 \times 40}{3} = 93.3
\]
Orthostatic Hypotension / Postural Hypotension :-
- When B.P is suddenly decrease on Standing Position.
- Systolic Blood Pressure decrease at least 20 mmHg or Diastolic Blood Pressure decrease at least 10 mmHg within 3 minutes of Standing.

Sphygmomanometer / B.P Instrument :-

Site of taking Blood Pressure :-

Upper Extremities :-
- Apply deflated cuff over the Brachial Artery, 2 inch Above ante cubital fossa.

Lower Extremities :-
- Apply cuff just Above the Knee or Over the Popliteal fossa.
Sphygmomanometer B.P Cuff :

<table>
<thead>
<tr>
<th>Cuff Size (According to Age)</th>
<th>Cuff Width (CM)</th>
<th>Cuff Length (CM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Born</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Infant</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>Adult</td>
<td>13</td>
<td>30</td>
</tr>
<tr>
<td>Adult High</td>
<td>20</td>
<td>42</td>
</tr>
</tbody>
</table>

**Do Not take B.P on a Client's arm if :-**

- The arm has an I.V Infusion
- Injured arm or Diseased
- Side of Radical Mastectomy

**Note :-** Temperature measurement or B.P measurement में Scale को Eye Level पर रखना चाहिए।