1.15 Vital Signs

a) Body Temperature

Objectives

By the end of this section you should know:

- How to prepare the patient for temperature recording;
- How to collect and prepare the equipment;
- How to measure and record body temperature at the axilla, aural and rectum;
- Range of body temperatures;
- Different types of clinical thermometer.

Indications for recording body temperature

Body temperature is measured using a calibrated clinical thermometer or electronic probe. Sites for recording body temperature include the axilla, rectum and ear. For each patient, the site for temperature measurement should be consistent. The normal range of body temperature is between 36°C and 37.5°C. The upper and lower limits for survival are not known exactly but are thought to be in the region of 45°C and 25°C respectively. Recording of body temperature may be required:

- To establish a baseline reading;
- To monitor fluctuations in temperature;
- To monitor signs of incompatibility during blood transfusion;
- To monitor the temperature of patients being treated for infection;
- To monitor the temperature of patients recovering from hypothermia.

Types of Thermometer

- Oral/axillary thermometer – calibrated between 35°C & 43.5°C;
- Rectal thermometer – calibrated between 35°C & 43.5°C;
- Low reading thermometer – calibrated between 25°C & 40°C;
- Disposable thermometer – these have rapid reacting heat sensitive chemicals so that a recording can be made in 60 seconds;
- Electronic thermometers – these have probes, which must be protected by disposable covers before being placed at the recording site. Some probes are designed for axillary, rectal or aural temperature recording. (Refer to manufacturer’s instructions)

Procedure

See manufacturer’s instruction for electronic thermometer.

Axilla

- Perform hand hygiene;
- Explain procedure to patient;
- Dry skin at the axilla by wiping with a tissue;
- Shake the thermometer to return the mercury column to 35°C;
1.15 **Vital Signs** cont.

**Procedure cont …**

- Clean thermometer by wiping it with an alcohol wipe and allow 30 seconds to dry;
- Place the bulb of the thermometer under the patient’s axilla;
- Ask patient to hold arm across their chest to hold thermometer in position;
- Leave thermometer in position for a minimum of 4 minutes;
- Remove thermometer;
- Clean thermometer with alcohol wipe in a twisting motion;
- Perform hand hygiene;
- Record and document temperature. Report abnormalities.

**Rectum**

- Perform hand hygiene;
- Maintain patient’s privacy;
- Lie patient on side with knees bent;
- Prepare thermometer as for axillary temperature;
- Apply a disposable sleeve;
- Lubricate the protected end of the thermometer;
- Insert the thermometer into the patient’s anus for 2 – 4 cm;
- Leave thermometer in position for at least 4 minutes;
- Remove thermometer;
- Dispose of protective sleeve;
- Clean thermometer using an alcohol wipe in a twisting motion;
- Perform hand hygiene;
- Record and document temperature. Report abnormalities.

**REFERENCES:**

1.15 **Vital Signs** cont.

b) **Pulse**

**Objectives**

By the end of this section you should be able to:

- Locate, measure and record the radial pulse;
- Locate the major pulse points in the body.

**Related information**

Normal range varies according to age, with an normal adult pulse rate of 60 – 100 beats per minute.

**Sites of major pulse points (see Diagram)**

Temporal  
Carotid  
Brachial  
Radial  
Femoral  
Popliteal  
Posterial tibial  
Dorsalis pedis

**Equipment**

Watch with a second hand

**Procedure**

- Perform hand hygiene;
- Explain the procedure to the patient;
- Locate radial artery, place second and third fingers along it and press gently;
- Count pulse for 60 seconds;
- Perform hand hygiene;
- Document pulse recording, comparing past recordings and report any irregularities or abnormalities.

**REFERENCES:**

c) **Respiration**

**Objectives**

By the end of this section you should be able to assess, measure and record the patient’s respiratory rate.

**Related information**

**Rate**

Normal respiratory rates vary according to age. The accepted normal range is:

- Healthy adults: 14 – 20 per minute
- Adolescents: 18 – 22 per minute
- Children: 22 – 28 per minute
- Infants: 30 or more per minute

**Depth**

The depth of respiration is approximately the same for each person and can be described as normal, shallow or deep.

**Pattern**

A normal breathing pattern is effortless, evenly paced, regular and automatic. Abnormal patterns may be described as:

- **Dyspnoea**
  Difficult, laboured breathing. The nostrils are dilated and the chest wall and shoulder girdle are raised and lowered in an exaggerated fashion.

- **Cheyne – Stokes**
  There is a gradual increase in the depth of respiration followed by a gradual decrease and then a period of no respiration (apnoea). This syndrome is associated with terminal illness.

- **Kussmaul’s respirations**
  There is an increased rate and depth of respiration with panting and long grunting expirations. This syndrome may be associated with lobar pneumonia.

- **Stertorous respirations**
  These are noisy respirations caused by excessive secretions in the trachea or bronchi. It may also be a sign of partial airway obstruction.

- **Stridor**
  A harsh, high-pitched noise on inspiration caused by laryngeal obstruction.

**Indications for assessing respiration**

Respiration is the exchange of oxygen and carbon dioxide between the cells of the body and the environment through rhythmic expansion and deflation of the lungs. Each respiration consists of an inhalation, exhalation and the pause which follows. The respiratory rate may be assessed to:
1.15 **Vital Signs** cont.

**Indications for assessing respiration cont ...**

- Establish a baseline respiratory rate;
- Monitor the patient’s condition during and following investigative procedures and treatments (eg. aspiration of pleural cavity, pleural biopsy, peritoneal dialysis);
- Estimate the degree of dysfunction and the effect of treatment.

**Equipment**

Watch with a second hand

**Procedure**

- Ensure patient is relaxed and if possible unaware of the counting process;
- Count the respiratory rate and observe the depth and pattern of respiration;
- Count the number of respirations for at least 30 seconds;
- Document the results and report abnormal findings.

**REFERENCES:**

1.15 Vital Signs cont.

d) Apical – radial pulses

Objectives

By the end of this section you should be able to locate, measure and record the apical – radial pulses.

Indications for measuring the apical – radial pulses

The rate at the apex of the heart and the radial pulse rate are counted simultaneously to determine if there is a deficit in the rate. It may be assessed to estimate the degree of dysfunction and effect of treatment for patients with:

- Cardiac impairment;
- Patients receiving medication to improve cardiac function;
- Patients who have vascular disease.

Equipment

- Watch with a seconds hand
- Stethoscope

Procedure

N.B. 2 nurses are required to carry out this procedure

- Perform hand hygiene;
- Explain the procedure to the patient;
- Assist the patient into a comfortable position with access to chest wall;
- Clean stethoscope with alcohol wipe, allowing 30 seconds to dry;
- Nurse 1 places the stethoscope over the apex of the patient’s heart (at the 5th intercostal space and 12cm to the left of the midline);
- Nurse 2 locates the radial pulse;
- Ensure the watch is visible to both nurses;
- Both nurses count the heart rate simultaneously for 1 minute;
- Clean stethoscope with alcohol wipe;
- Perform hand hygiene;
- Document the results on the patient’s chart and report any abnormal findings.

REFERENCES:

1.15 Vital Signs cont.

e) Blood Pressure

Objectives

By the end of this section you should know how to:

- Prepare the patient for the procedure;
- Collect and prepare the necessary equipment;
- Assess, measure and record blood pressure.

Related information

Blood pressure is the force extended by the blood as it flows through the blood vessels. It is arterial blood pressure which is normally recorded. Blood pressure increases with age, weight gain, stress & anxiety. Normal range is considered to be from 100/60 to 140/90 mm Hg. The term hypotension is used when the blood pressure is lower than the normal range. The term hypertension is used when the systolic or diastolic blood pressure is elevated above the normal range. The correct size of cuff must be used to ensure accurate recordings.

Indications for recording blood pressure

Blood pressure may be recorded to:

- Aid in the diagnosis of disease;
- Aid in the assessment of the cardiovascular system;
- Assess the cardiovascular system pre and post operatively.

Equipment

- Sphygmomanometer
- Stethoscope
- Alcohol wipes

N.B. Increasingly electronic sphygmomanometers are being used to monitor blood pressure. The nurse should refer to manufacturer’s instructions regarding the use of these machines.

Procedure

- Perform hand hygiene;
- Explain the procedure to the patient and gain consent;
- Prepare equipment including clean stethoscope with alcohol wipe;
- Assist the patient into a comfortable position – usually sitting (unless otherwise specified) with the patient’s arm resting on a firm surface;
- Roll up patient’s sleeve, avoiding restrictive tightly rolled up clothing as this may lead to inaccurate recordings;
- Position the sphygmomanometer at approximately heart height, ensuring the mercury level is at zero;
- Apply the blood pressure cuff approximately 3-5cm above where the brachial artery can be palpated;
- Connect the cuff tubing to the manometer tubing and close the valve to the inflation ball;
1.15 Vital Signs cont.

Procedure cont …

- Palpate the radial pulse and inflate the cuff until the pulse disappears. Inflate a further 20mmHg. Release the valve slowly and note when the radial pulse returns. The mercury is read at the top of the meniscus. Allow all the air to escape from the cuff;
- Palpate the brachial pulse;
- Place the stethoscope over the brachial pulse site and inflate the cuff 20mmHg above the previous reading;
- Release the valve slowly;
- When the first pulse is heard, the level of mercury should be noted – this is the systolic blood pressure;
- Continue to deflate the cuff and the pulse will change to a muffled sound until it finally disappears;
- The mercury level should be noted at this point – this is the diastolic pulse;
- Completely deflate the cuff and remove it from the patient’s arm;
- Clean stethoscope with alcohol wipe;
- Perform hand hygiene;
- Document blood pressure recordings on the patient’s chart and report any abnormalities.

REFERENCES:

1.15 Vital Signs cont.

f) Neurological Examination

Objectives

By the end of this section you should be able to:

- Prepare and support the patient for a neurological examination;
- Collect and prepare the equipment;
- Assess, measure and record level of consciousness and decide if GCS monitoring is required.

Indications for neurological examination

Determining a normal level of consciousness indicates adequate perfusion of blood to the brain. In patients whose level of consciousness is abnormal this may indicate a primary neurological disease process or a disease process primarily outwith the neurological system.

Assessing level of consciousness can be carried out in two ways, either by simple assessment or Glasgow Coma Scale Monitoring. Changes in patient level of consciousness give early indication of patient deterioration.

Indication for assessing level of consciousness:

- To establish a baseline
- To aid in diagnosis/monitor of neurological disease
- To aid in the assessment and treatment during the course of a neurological disease
- To aid in the detection of life threatening situations and those which need medical intervention.

Equipment

- Pencil torch

Procedure

- Perform hand hygiene;
- Collect and prepare the equipment;
- Explain procedure to the patient and gain consent and co-operation;
- Ensure the patient has privacy;
- Observe the patient throughout this activity (see below);
- Ensure the patient is left feeling as comfortable as possible;
- Dispose of the equipment as per Division policy;
- Perform hand hygiene;
- Document procedure, monitor after-effects and report abnormal findings immediately.
1.15 Vital Signs cont.

Simple Assessment
Is the patient alert and orientated to time and place?
Is the patient confused?
Does the patient respond to verbal stimuli?
Does the patient respond to painful stimuli?
Does the patient make no response and remain unconscious despite repeated attempts at painful stimuli?

Glasgow Coma Scale
Glasgow Coma Scale should be used for all patients:

- Admitted with suspected or proven head injury;
- who on assessing are found to only respond to painful stimuli;
- where there is no response.

If patient is unresponsive, or only responding to pain, formal GCS scoring should be started. Coma is defined as GCS of 8 or below; if GCS is recorded as below 15, medical staff should be informed.

The GCS describes level of consciousness by assessing a patient’s ability to perform three activities:

- eye opening
- motor response
- verbal response

<table>
<thead>
<tr>
<th>Eye opening</th>
<th>Verbal</th>
<th>Motor</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>spontaneous</td>
<td>5 orientated</td>
</tr>
<tr>
<td>3</td>
<td>voice</td>
<td>4 confused</td>
</tr>
<tr>
<td>2</td>
<td>pain</td>
<td>3 inappropriate word</td>
</tr>
<tr>
<td>1</td>
<td>none</td>
<td>2 incomprehensible sound</td>
</tr>
<tr>
<td></td>
<td>1 nil</td>
<td>2 extension</td>
</tr>
</tbody>
</table>

If a GCS falls by 2 or more points, inform medical staff.

REFERENCES:

1.15 Vital Signs cont.

REFERENCES:

1.15 Vital Signs cont.

g) Central Venous Pressure Recordings

Objectives

By the end of this section you should be able to:

- Prepare the patient for a recording of central venous pressure;
- Collect and prepare the equipment;
- Monitor and record the central venous pressure.

Indications for central venous pressure recording

The CVP recording is the measurement of the pressure of the right atrium of the heart and is measured in cmH₂O. Sixty percent of the circulating blood volume is held within the venous system, the CVP being the product of blood volume and venous tone. The range of normal is between 3-10 cmH₂O. The frequency of measuring the central venous pressure will be dependent on the patient’s condition.

Equipment

- A central venous catheter, intravenous fluid and associated lines in situ
- A venous pressure manometer
- A spirit level

Procedure

- Prepare hand hygiene;
- Collect and prepare the equipment;
- Explain the procedure to the patient and gain consent;
- Ensure the patient has privacy;
- Assist the patient into the correct position, preferably lying flat;
- Position the manometer, which should be on a pole to allow easy reading. Ensure there are no strains on line or catheter.
- Observe the patient throughout this activity;
- Assess the baseline. This is level with the patient’s right atrium, where the tip of the catheter is lying.
- Assist the medical practitioner as requested. The medical practitioner will note the level at an imaginary 90° angle between the sternal notch and the midline form the axilla. In some areas, it is the practice to use the sternal notch as a proxy for this point. With the patient’s consent, this can be marked on the skin to ensure consistency;
- Read the baseline. A spirit level is used to record the level on the manometer gauge that corresponds to the baseline level, which may be marked on the side of the patient’s chest, to ensure accuracy;
- Turn off all other infusions;
- Flush the line;
- Turn the tap on the three-way stopcock away from the patient and towards the infusion fluid, to allow the manometer tub to refill with fluid;
1.15 **Vital Signs** cont.

**Procedure cont...**

- Turn the tap towards the patient; to establish a free flow of fluid between the manometer and the catheter. The fluid in the manometer tube will tall to a level that corresponds to the pressure in the right atrium or superior vena cava. The fluid fluctuates in relation to the patient’s respiration once it falls to the level for recording;
- Read the level of the lower fluctuation on the manometer gauge once the fluid in the tube is maintaining a steady level with a fluctuation of 0.2 – 1.0 cm.
- Subtract the baseline reading figure from this figure to give the measurement of CVP.
- Turn the tap on the stopcock back to the correct position.
- Ensure the patient is left feeling as comfortable as possible;
- Dispose of the equipment as per Division policy;
- Perform hand hygiene;
- Document the procedure, monitor after-effects and report abnormal findings immediately.

**REFERENCES:**