Chapter 1

PERFORMING OBSERVATIONS
Performing observations of vital signs on patients is a fundamental healthcare task. Every time a set of observations are taken, valid consent must be obtained from the patient.

**CONSENT**

When a patient lacks the capacity to consent, as with all clinical skills, observations can be made if it is in the patient's best interests. This is part of the UK Mental Capacity Act 2005, which is an Act of Parliament. Its primary purpose is to provide a legal framework for acting and making decisions on behalf of adults who lack the capacity to make particular decisions for themselves.

The three key factors when testing for valid consent are:

- does the patient have enough information to make the decision?
- does the patient have enough capacity to make the decision?
- has the patient made a free choice?

All three tests must be met for you to have obtained valid consent.

**OBSERVATION CHARTS**

Observation charts have changed considerably over time, since the introduction of the Early Warning Score, whereby we are able to assess our patients and care for them before
their condition becomes critical. We will look at Early Patient Assessment and Response (EPAR) in Chapter 10, but for now we will start with the basic vital signs, looking at how to perform these tasks.

All patients admitted to hospital should have a ‘manual’ set of essential observations recorded; this is known as a baseline. Any changes to this norm will trigger action. Of course, the patient could be so ill as to present with a set of abnormal readings, but it is still useful to monitor the patient on admission so that we can see when progress is being made with the patient’s condition.

**BODY TEMPERATURE**

Body temperature is measured using a calibrated clinical electronic thermometer or tympanic thermometer. In children’s nursing, ‘smart-material’ tempo dot thermometer strips are often used (see overleaf). Mercury glass thermometers are used very rarely in hospitals today. It is considered best practice to document the temperature recording on the observation chart as a solid dot, connecting these dots with a straight line. This is the same procedure as for documented recordings of all vital signs.

The sites for recording body temperature are described below.

- **Oral**: the thermometer is placed in the posterior sublingual pocket, situated at the base of the tongue.
- **Axilla**: the thermometer is placed in the centre of the armpit, with the patient’s arm lying across their chest. The same site should be used for all recordings; that is, do not change armpits.
- **Rectum**: a special thermometer is inserted at least 4 cm into the anus of an adult, or 2–3 cm in infants. This provides the most accurate reading of all sites. Rectal temperature readings are usually about 1°C higher than readings taken in the ear.
- **Ear**: to take a temperature reading in the ear a device known as a tympanic membrane thermometer, which is covered with a disposable cuff, is inserted snugly into the ear canal (Figure 1.1). These devices use...
infrared light to measure body temperature. The same ear should be used each time for consistent results. Some clinical areas have reconfigured the display screen to show the oral temperature, but the device must still be placed in the ear.

Single-use plastic-coated 'smart-material' strips are also used, often in paediatric care, which have heat-sensitive dots that change colour to indicate the temperature. The strip can be placed across the forehead or in the mouth as shown in Figure 1.2.

Figure 1.1 A tympanic membrane thermometer

Figure 1.2 Tempo dot thermometer strips
PERFORMING OBSERVATIONS

Question 1.1  What are the reasons for recording an individual’s body temperature? List five, if you can.

Body Temperature Physiology

Body temperature is usually maintained between 36 and 37.5°C. A body temperature well above the normal range (41°C) is called hyperthermia and can result in convulsions. A temperature below normal temperature (35°C) is called hypothermia (Table 1.1).

Table 1.1  Hyperthermia and hypothermia

<table>
<thead>
<tr>
<th>Condition</th>
<th>Possible causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hyperthermia</td>
<td>Heat stroke, malignancy, stroke or central nervous system damage</td>
</tr>
<tr>
<td>Hypothermia</td>
<td>Environmental exposure, medication and exposure of body and internal organs during surgery</td>
</tr>
</tbody>
</table>

Pyrexia is defined as a rise in body temperature, above the normal, usually caused by a viral or bacterial infection. Lay person’s terminology for this is ‘having a temperature’ (see Table 1.2).

Table 1.2  Pyrexia

<table>
<thead>
<tr>
<th>Low-grade pyrexia</th>
<th>Normal to 38°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate- to high-grade pyrexia</td>
<td>38–40°C</td>
</tr>
<tr>
<td>Hyperpyrexia</td>
<td>40°C and above</td>
</tr>
</tbody>
</table>

Procedure to Obtain the Temperature Using a Tymppanic Membrane Thermometer

In many clinical areas, staff must have undertaken training in the use of this equipment.

1. Explain and discuss the procedure with the patient. Gain consent.
2. Wash your hands.
3 Check which ear is being used for the reading.
4 Remove thermometer from the base unit and ensure the device is clean (Figure 1.1).
5 Place a disposable probe cover on the probe tip.
6 Gently place the probe tip in the ear canal to seal the opening, ensuring a snug fit.
7 As soon as device indicates (usually by bleeping) remove it from the ear.
8 Press the release/eject button on the device to remove the probe cover.
9 Replace the thermometer in its base unit.
10 Record the reading on the patient’s observation chart.

Documenting a Temperature Reading on an Observation Chart

Let’s look at the observation chart (Appendix 1). Just for the moment we will keep it simple (in Chapter 10 we go into the EWS or Early Warning Score system in more depth). You will notice that each of the sections for vital signs (temperature, respiratory rate, etc) are colour-coded. At the bottom of this document you will see what score each of the colours represents. Let’s say our patient has a temperature of 36.5°C, this is in the white section of the chart and scores zero. If this same patient had a score of 39.0°C it would be in the peach-coloured section and would generate a score of 2. Without going into any more detail yet, here are the actions we would perform with each score:

0–1  Continue with routine observations.
2–3  Report this information to the nurse in charge immediately.
4 and above  Re-check score. Inform the nurse in charge. Request a medical review within 15 minutes. Record the action taken.

Of course, we would usually do a full set of observations and tot up the scores for all the vital signs to get our final EWS score for that time.
PERFORMING OBSERVATIONS

**BLOOD PRESSURE**

Blood pressure is the force extended by the blood as it flows through the blood vessels, and increases with age, weight gain, stress and anxiety. Normal range for an adult is usually considered to be from 100/60 to 140/90 mmHg. The first figure is known as the **systolic** reading and the second figure is the **diastolic** reading. Although we record both figures on our observation chart, it is only the systolic reading that generates a score. Table 1.3 lists some of the terms you may hear in relation to the blood pressure reading.

<table>
<thead>
<tr>
<th>Normotension</th>
<th>Blood pressure within normal range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypotension</td>
<td>Blood pressure lower than normal range</td>
</tr>
<tr>
<td>Hypertension</td>
<td>Blood pressure higher than normal range</td>
</tr>
</tbody>
</table>

Of course, we should never lose sight of the fact that we are all individuals and have our own ‘normal’ range for the vital signs.

**Blood pressure equipment**

Increasingly electronic sphygmomanometers (also known as automatic or oscillometric machinery; see Figure 1.3) are being used to monitor blood pressure, but these may not achieve the same level of accuracy as manual sphygmomanometers (also known as aneroid sphygmomanometers; see Figure 1.4). This is especially so in certain disease states, such as arrhythmias, pre-eclampsia and certain vascular diseases. Staff using these machines should be trained and assessed on how to use them correctly.

Automated blood pressure machines should also not be used on patients with irregular heart rates or on patients with movement disorders, such as Parkinsonian tremors. These patients’ blood pressure recordings should be taken using a manual aneroid sphygmomanometer and stethoscope, which you will be shown how to use during your nurse training.

Medics may occasionally request that patients have a ‘lying and standing’ blood pressure recording, and this is exactly how it sounds: taking the blood pressure first while the patient is...
lying down, then when standing. Beware that the patient may experience postural hypotension and feel dizzy when standing.

Which arm was used to record the blood pressure should be documented in the care plan, due to variations in reading and consistency. Blood pressures should not be taken from a patient’s arms that are affected by arteriovenous fistulae, paralysis or breast surgery, or in which intravenous (IV) lines are situated.

Blood pressure cuffs should be the appropriate size to fit the patient, to ensure accurate measurement. The cuff
PERFORMING OBSERVATIONS

should cover 80% of the circumference of the upper arm or appropriate limb and should be checked for latex if using on a latex-sensitive individual. Many latex-free cuffs are now available. These cuffs should also be wiped clean between patient use to avoid cross-contamination from patient to patient.

Some clinical areas may still have mercury sphygmomanometers, but these are being used much less frequently today due to the dangers of mercury spillage.

Activity 1.1

Our patient has had his blood pressure taken hourly. Plot these recordings for the last 5 hours on a copy of the observation chart shown in Appendix 1. Do any of these readings generate a score?

130/70 mmHg
140/70 mmHg
170/74 mmHg
190/90 mmHg
202/90 mmHg
CHAPTER 1

Procedure to Obtain Blood Pressure Using an Aneroid Sphygmomanometer and Stethoscope

You will be shown how to perform this skill during your training, so don’t worry if you don’t understand the procedure yet. You will need plenty of practice.

1. Wash your hands.
2. Explain procedure to the patient and gain their consent.
3. Gather equipment and clean the stethoscope with an alcohol wipe.
4. Assist the patient into a comfortable position with the arm to be used resting on a firm surface.
5. Roll up the patient’s sleeve, making sure this is not too tight; otherwise this will lead to an inaccurate recording. It may be best to take the arm out of the sleeve if this may be the case.
6. Position the sphygmomanometer at approximately heart level, ensuring the dial is set at zero.
7. Apply the blood pressure cuff approximately 3–5 cm above where the brachial artery can be palpated (located at the inner side of the biceps). Connect the cuff tubing to the manometer tubing and close the valve to the inflation bulb.
8. Palpate the radial pulse and inflate the cuff until the pulse disappears. Inflate a further 20 mmHg. Release the valve slowly and note when the radial pulse returns. Allow the air to escape from the cuff.
9. Palpate the brachial pulse: Place the stethoscope over the brachial pulse site and inflate the cuff 20 mmHg above the previous reading.
10. Release the valve slowly.
11. When the first pulse is heard, the reading should be noted: this is the systolic blood pressure.
12. Continue to deflate the cuff and the pulse will change to a muffled sound until it finally disappears. The reading should be noted: this is the diastolic blood pressure.
13 Completely deflate the cuff and remove it from the patient’s arm.
14 Clean the stethoscope and cuff.
15 Document the blood pressure recordings and report any abnormalities.
16 Wash your hands.

HEART RATE

Heart rate varies according to age. We can see what the heart rate is by using the pulse rate, which is measured by palpating an artery that lies close to the surface of the body. The radial artery in the wrist is often the area of choice due to its accessibility. Normal pulse rates per minute are displayed in Table 1.4.

Heart rate can be felt by feeling the pulse points, so sometimes it is referred to as the pulse rate.

Table 1.4 Pulse rates at various ages

<table>
<thead>
<tr>
<th>Age</th>
<th>Approximate range (beats per minute)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newborn</td>
<td>120–160</td>
</tr>
<tr>
<td>1–12 months</td>
<td>80–140</td>
</tr>
<tr>
<td>12 months–2 years</td>
<td>80–130</td>
</tr>
<tr>
<td>2–6 years</td>
<td>75–120</td>
</tr>
<tr>
<td>6–12 years</td>
<td>75–110</td>
</tr>
<tr>
<td>Adolescent</td>
<td>60–100</td>
</tr>
<tr>
<td>Adult</td>
<td>60–100</td>
</tr>
</tbody>
</table>

Question 1.2 What are the sites of the major pulse points and where are they located on the body?
The sites of the major pulse points can be viewed in the Figure 1.5.

The pulse should be taken for one full minute, assessing for rate, regularity and volume. Patients with a known or suspected irregular heart rate should have a manual reading taken each time this observation is performed.

**Activity 1.2**

A patient is on hourly observations. Plot the following heart-rate recordings (shown in beats per minute, bpm) on a copy of the observation chart. Do any of the readings generate an EWS score?

- 80 bpm
- 88 bpm
- 102 bpm
- 90 bpm
- 82 bpm

An abnormally fast heart rate (over 100 beats per minute in adults) is known as **tachycardia**. This may be caused by raised body temperature, physical/emotional stress or heart disease, as well as certain drugs.

An abnormally slow heart rate (less than 60 beats per minute) is known as **bradycardia**. This may be caused by low body temperature and certain drugs. Very fit athletes also tend to have low pulse rates.

**Procedure to Obtain a Pulse Reading**

1. Wash your hands.
2. Explain the procedure to the patient and gain their consent.
3. Locate the radial artery by placing the second and third fingers along it and press gently. Some nurses prefer to use three fingers for this.
PERFORMING OBSERVATIONS

4 Count the pulse for 60 seconds, assessing for rate, regularity and volume.
5 Document the recordings and report any irregularities or abnormalities.
6 Wash your hands.

RESPIRATIONS

On the Bristol Observation Chart, the respiratory rate section is at the top, showing how crucial this recording is. A change in a patient’s respiratory rate is a sensitive predictor of deterioration, and can be a precursor to an adverse event, such as a cardiac arrest, up to 4 hours prior to its occurrence. Trends in respiratory rate on a chart are therefore very important.

Figure 1.5 Pulse points (Smith and Roberts, 2011)
The respiratory system supplies the body with oxygen and removes the carbon dioxide through the rhythmic expansion and deflation of the lungs. Each respiration consists of an inhalation, exhalation and pause.

Ventilation is the act of breathing, with air moving in and out of the respiratory tract. Ventilation is under involuntary control, being dependent on the respiratory centre in the medulla oblongata and pons varolii, which are situated at the top of the brain stem.

Ventilation is also under voluntary control and is regulated through the central nervous system (CNS). The CNS enables individuals to maintain conscious control over their breathing rate.

It is for this reason we should not let patients know when we are counting the rise and fall of their chest (monitoring the respiratory rate) as they can alter their natural readings.

The respiratory rate is the number of breaths per minute. Normal respiratory rates vary according to age, with the accepted normal ranges displayed in Table 1.5.

<table>
<thead>
<tr>
<th>Age group</th>
<th>Approximate range (breaths per minute)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy adults</td>
<td>14–20</td>
</tr>
<tr>
<td>Adolescents</td>
<td>18–22</td>
</tr>
<tr>
<td>Children</td>
<td>22–28</td>
</tr>
<tr>
<td>Infants</td>
<td>30 or more</td>
</tr>
</tbody>
</table>

A good respiratory assessment should be assessed over one full minute, and includes looking, and reporting on:

- the rate of breathing: regular or irregular,
- the depth of breathing: normal, shallow or deep,
- the patient’s colour: pink, flushed, cyanosed,
- the sounds and ease of breathing: effortless, laboured, noisy, abnormal.

Abnormal patterns of breathing are described in Table 1.6.
Table 1.6  Abnormal patterns of breathing

<table>
<thead>
<tr>
<th>Pattern</th>
<th>What to look for</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dyspnoea</td>
<td>Difficult, laboured breathing. Shoulders are often raised, nostrils dilated and veins visible in the neck.</td>
</tr>
<tr>
<td>Cheyne–Stokes</td>
<td>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 end-of-life care.</td>
</tr>
<tr>
<td>Kussmaul’s respirations</td>
<td>There is an increased rate and depth of respiration with panting and long grunting expirations. Associated with lobar pneumonia.</td>
</tr>
<tr>
<td>Stertorous respirations</td>
<td>Noisy respirations caused by secretions in the trachea or bronchi. May be due to partial airway obstruction.</td>
</tr>
<tr>
<td>Stridor</td>
<td>A high-pitched noise heard on inspiration which is caused by laryngeal obstruction: this is a medical emergency.</td>
</tr>
</tbody>
</table>

The next activity looks at the terminology you will come across in relation to respirations.

Activity 1.3

See how many of these terms related to respiration that you recognise.

cyanosis
blood gases
hypoxia
hypercapnia
hypoxaemia
tidal volume
total lung capacity
residual volume
Procedure to Obtain a Reading for Respiratory Rate

1. Ensure the patient is relaxed and not aware that you are assessing their respirations.
2. Count the respiratory rate and assess the rate, depth and ease of breathing and patient’s colour (for cyanosis) for one full minute.
3. Document the recordings and report any abnormal findings.

NEUROLOGICAL OBSERVATIONS

A full neurological assessment is conducted using the Glasgow Coma Scale (GCS), which is outlined in Chapter 10 (see Figure 10.1). The GCS looks at the patient’s level of consciousness, pupillary activity, motor function, sensory function and their vital signs, with each test equating to a score. We will look at this in more depth in Chapter 10, where you will be shown how to use the tool.

Many clinical areas use the AVPU assessment tool. If you look at the Bristol Observation Chart and the Neuro Response section you will see the following:

A = Alert
V = Responds to voice or a change in the verbal response
P = Responds to painful stimuli
U = Unresponsive

Only the alert recording does not generate a trigger or score. If the patient is V, P or U we would need to measure their GCS and inform the nurse in charge.

Procedure for Obtaining an AVPU Recording

Simply approaching our patient and talking to them will tell us if they are alert (A) or responding to voice (V). If we are required to give them a painful stimulus, this is usually conducted by performing a ‘trapezium squeeze’.
PERFORMING OBSERVATIONS

The trapezium squeeze: using the thumb and two fingers, hold 5 cm of the trapezium muscle, where the neck and shoulder meet, and twist.

OXYGEN SATURATION

Oxygen saturation (SpO₂) is routinely measured with a pulse-oximetry machine, after training and assessment to use this machinery.

Red blood cells contain haemoglobin molecules that bind with oxygen to form oxyhaemoglobin. Pulse oximetry works on the principle that blood saturated with oxygen is a different colour to deoxygenated blood. The clean probe, which is placed on a finger, contains a light source and detector which shines through the tissues of the body to obtain the oxygen saturation reading.

The pulse oximeter will not display a correct estimate of the oxygen saturation unless the machine is able to accurately capture the patient’s pulse reading. The user should always check the patient’s manual pulse against the waveform displayed by the machine.

Pulse oximeters will not give accurate measurements if the patient is peripherally compromised or wearing nail varnish, as this interferes with the light source on the probe. Bright or fluorescent room lighting may also interfere with the light transmission on the probe. Pulse detection on the probe may be interfered with by patient movement (such as Parkinsonian movement disorders), rigors or shivering.

Due to the limitations with this machinery, the pulse oximeter should not replace either the manual respiratory rate or pulse measurement.

Oxygen saturation is recorded on the Bristol Observation Chart (in the section marked SpO₂). The target oxygen saturation should have been identified by a medic, and should include whether it is to be attained with or without oxygen therapy. In other words, we are looking to see if the
patient’s oxygen saturation is within the acceptable range, as stated by a medic. The normal arterial oxygen saturation is approximately 95–98%.

**TEST YOUR KNOWLEDGE**

Go back to the Bristol Observation Chart and input these observations from a patient. What is this patient’s Early Warning Score? What would be your actions?

- Respiratory rate: 30 breaths per minute
- Oxygen saturation, SpO₂: 95%
- Blood pressure: 192/74 mmHg
- Heart rate: 110 beats per minute
- Neurological response: alert
- Temperature: 38.4°C

**KEY POINTS**

- Obtaining valid consent.
- Using the Bristol Observation Chart.
- Performing vital-sign observations of temperature, blood pressure, heart rate, respiration, neurological indicators and oxygen saturation.