Year 2 MBChB
Clinical Skills Session
Vital signs

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Aims and Objectives

Aim: For the student to be able to measure a patient’s vital signs accurately and safely.

Objectives:
1. To be able to assess the pulse and blood pressure.
2. To be able to measure and understand the temperature.
3. To be able to measure and understand your partner’s respiratory rate and \( \text{SpO}_2 \).
4. To be able to assess a patient using the AVPU scale.
5. To understand the normal parameters of vital signs.

Theory and background

Measuring and accurately recording a patient’s vital signs are one of the fundamental activities in caring for a patient’s wellbeing.

Each component of vital signs, blood pressure, pulse, respiratory rate, oxygen saturation or temperature impacts upon the body’s ability to maintain its equilibrium otherwise known as homeostasis.

Homeostasis is the body maintaining a balance between interdependent physiological functions. Failure to do so can result in the body being unable to function.

This is why we routinely measure the following;
- Pulse rate
- \( \text{SpO}_2 \) – oxygen saturation
- Blood pressure
- Respiratory rate
- Temperature
- Level of consciousness

Additional physiological functions such as urine output and blood glucose may be measured to provide additional information.

Factors which influence vital signs

- Physical e.g. Fluid intake and output
- Psychological e.g. Anxiety, phobia
- Disease e.g. Carcinoma, atherosclerosis
- Infection e.g. Pneumonia, measles
- Trauma e.g. Bleeding, burns, fracture
- Environmental e.g. Temperature, pollutants

Normal adult ranges

Vital Signs have a ‘normal measurement range’ which can vary due to;
- The patient’s age, ethnicity or gender.
- In daily activities such as - eating or exercise.
Generally accepted *normal* healthy adult ranges are –

- Respiratory Rate 12 – 20 respirations per minute.
- Oxygen Saturation – > 94 %.
- Pulse rate 60 – 100 bpm.
- Core Temp 36.5 – 37.4°C.
- Blood Pressure 90/60 mmHg – 140/90 mmHg.
- Consciousness - Alert

Please note that if you come across an unresponsive patient, you will *not* be checking their vital signs at that point. You shout for help, assess their breathing and follow your Basic Life Support protocol.

**When should you take a patient’s vital signs?**

Taking vital signs can be done in multiple settings for multiple justified reasons;

- On admission to hospital.
- Pre operatively, intra operatively and post operatively.
- Occupational health check-ups or other health screening programs.
- Deteriorating patient. e.g. following a blood transfusion or certain drug treatments.

(This list is not exhaustive)

**Frequency of taking vital signs**

The frequency of measuring a patient’s vital signs depends on how ill the patient is. For example in Intensive care it is continuous, in surgery every 5 minutes and on the wards the frequency depends on how ill they are.

**Patient safety**

- Introduce yourself
- Check the patient’s identity
- (including allergies)
- Explain what you want to do
- Gain informed consent from the patient
- Consider an appropriate chaperone
- Adequate exposure maintaining dignity
- Position the patient appropriately
- Wear Personal Protective Equipment as required.
- Wash your hands before and after you touch the patient
**Respiratory rate (12 – 20 breaths per minute)**
The respiratory rate is measured by the number of respirations observed (by watching the chest rise and fall), over 1 minute. (1 respiration = 1 breath IN and 1 breath OUT)
As well as the rate of respiration the following descriptions are used;
- Depth (shallow, gasping)
- Rhythm (rapid, erratic)
- Symmetry of chest movement (both sides rising equally)
- Sound of breathing (wheezes, rattling)

**Surface percutaneous oxygen saturation (SpO₂) ≥94%**
SpO₂ is the percentage of haemoglobin binding sites occupied by oxygen in the blood. The body maintains a very precise balance for organ function.
You may also hear SpO₂ referred to as “SAT’S”, “O₂ sat’s” or oxygen sat’s.

The measuring device is called a “pulse oximeter”, “pulse ox” or “SAT’S probe”.

The measurement is expressed as a percentage with the normal parameter in adults being a reading greater than or equal to 94%.

The device is like a clothes peg in that you open it the same way and apply the open end on to the patient’s forefinger. Once on the patient’s finger it will take a few seconds before displaying a reading of the patient’s oxygen saturation levels (expressed as a percentage) and the heart rate. The reading may be displayed on the device or on a separate monitor.

Before applying the device for a reading; ensure the finger is clean; there is no nail varnish or acrylic nails that may interfere with the reading.

**Factors affecting SpO₂**
Readings can be inaccurate for a variety of reasons.
To troubleshoot consider the following:
- How does your patient look? Does the machine work on you?
- Battery capacity
- Cardiac arrhythmias – irregular or erratic pulse
- Poor peripheral circulation
- Nail varnish/ acrylic nails
- Carbon monoxide poisoning
- Tremors to peripheries

**Taking a pulse (60 – 100 beats per minute)**
The pulse rate is measured by the number of beats (pulsations) felt at an arterial site in 1 minute. Pulse rate is referred to as bpm beats per minute (bpm).
Describing the pulse
The pulse is described by;
  o Rate: – beats per minute
  o Rhythm: – regular or irregular;
    o Regular – a continuous tapping beat at a constant rate
    o Irregular – the rate is as variable as to be described as having skipped beats or palpitations.
    o Irregularly, irregular – this is where there is a cyclical irregularity.
  o Volume: - this is measured in larger vessels no lower than the brachial or posterior tibialis pulses.
  o Character: - this is elicited in larger vessels and is a description of how the pulse feels e.g.in a patient with reduced blood flow the character of the pulse could be described as weak and thready.
  o State of vessel wall: - larger arterial vessels over time can become damaged and harden. An example of a cause of this would be high blood pressure. The arterial blood vessels harden as a consequence of the increased pressure. So, when a major arterial vessel is palpated it will have lost its elastic texture and adopt a harder or slightly crunchy texture.

Arterial Pulses
To measure a pulse place the pulp of your fingers over the artery and lightly compress. If you struggle to palpate the pulse try pressing more firmly/lightly.

Radial pulse
The radial pulse is located on the ventral surface of the lower forearm, on the lateral aspect just proximal (towards the centre of the body) to the wrist joint.

To palpate the radial pulse place your fingertips onto the base of the thumb and drop down and the tips of your fingers will drop into a groove. Apply light pressure and slowly increase the amount of pressure until you feel the pulse. The pulse can be felt (palpated) when the artery is lightly compressed against the underlying radial bone.

The rate of the pulse is recorded in beats per minute (bpm). The rate should be counted for a minimum of thirty seconds and multiply the rate by 2, if regular. If it is irregular, then count the rate for 1 minute.

The normal resting pulse rate is 60 -100 bpm/min (British Heart Foundation)
Slow (bradycardia)  <60/min
Fast (tachycardia)  >100/min
**The brachial pulse**
The brachial arterial pulse is located on the medial aspect of the ante cubital fossa. If you are having difficulty locating it place your fingertips onto the anterior surface of the elbow in the midline at the level of the joint. Have the patient slightly bend their elbow and move your fingers medially (towards the inside) and the tips of your fingers will feel a large tendon. Move your fingers medially from this tendon and ask the patient to straighten their arm. Apply light pressure and slowly increase the amount of pressure until you feel the pulse. The pulse can be palpated when the artery is lightly compressed against the underlying humerus and soft tissues. The brachial artery is deeper than the radial artery and requires a little more pressure to compress it.

**Carotid Pulse**

The carotid pulse is located on the anterior aspect of the neck just lateral (towards the outside of the body) to the larynx (voice box).

Position yourself slightly to the side of the patient. Place your fingertips onto the anterior surface of the neck in the midline with your index finger at the level of the Thyroid Cartilage (Adam’s apple). Move your fingers laterally (towards the outside) approximately 2.5 – 4 cm and the tips of your fingers will drop into a groove. Apply light pressure and slowly increase the amount of pressure until you feel the pulse. The pulse can be felt (palpable) when the artery is lightly compressed against the underlying tissues.

The Carotid Arteries contain pressure receptors called baroreceptors and you should take care not to press too hard. You MUST NOT palpate both arteries at the same time and you MUST NOT rub the Carotid Artery.

**Femoral artery**

This artery is classed as a central artery and is palpated in cardiac arrests due to its ease of location and detection. It is palpated to check on lower limb vascularisation. The femoral artery is palpated at the mid inguinal point, in concordance with the mid clavicular line. It is felt just below the inguinal ligament in the groin.
**Volume (brachial, carotid & femoral)**
The volume of the pulse is a crude indicator of the stroke volume of the heart (the amount of blood ejected by the heart).
It is increased in exercise and certain disease processes (full or bounding) and reduced in states of low blood volume (weak or thready).

**Character (brachial, carotid & femoral)**
Character can be difficult to define until you have had some practice in palpating some cardiovascular abnormalities. Minor variations in blood flow are not always detectable.
However some of the questions you can ask to determine the character are:
- Is the pulse consistent?
- Does the volume decrease largely on inspiration?
- Does it alternate between a strong and weak pulse?
The above 3 are some indications of specific abnormalities, in clinical practice please report any unusual findings.

**State of vessel wall**
The normal arterial wall is compressible and has an elastic feel whereas diseased arteries may feel inelastic and even hard in cases of calcification. This is normally assessed in larger more proximal arteries such as the carotid or femoral. Care needs to be taken not to break off any atheromatous plaques with excessive palpating.

**Blood pressure measurement**
Blood Pressure (BP) reflects the amount of pressure exerted by the blood when the heart is relaxed (diastolic pressure) and when the heart contracts (systolic pressure).
This is measured in millimetres of mercury (mmHg) using an instrument called a sphygmomanometer.

Accurate measurement of BP is important in:
- Assessment and management of hypotension (low blood pressure)
- The diagnosis and management of hypertension (high blood pressure)
- Management of drug therapy
- Management of patient hydration
- Helping to identify a deteriorating patient

Blood pressure readings are traditionally recorded with the systolic value preceding the diastolic, usually separated by a slash e.g.

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126/84 mmHg
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**Systolic blood pressure** is the maximum pressure reached in the vasculature and is due to ventricular systole when the heart pumps blood into the vascular system.

**Diastolic blood pressure** relates to the resting pressure within the blood vessels when the heart relaxes (diastole) to fill with blood prior to the next systole when the pressure in the vasculature is at its lowest.
**Hypotension**
This is defined as a blood pressure of less than 90 / 60 mmHg. Hypotension does not usually require treatment in the majority of patients. However, if associated with acute illness, trauma or in conjunction with drug therapy, then treatment appropriate to the condition will need to be commenced.

**Hypertension**
This is defined as a blood pressure of more than 140/ 90 mmHg in patients, see diagnosing hypertension in NICE guidelines 2011; [https://www.nice.org.uk/guidance/CG127/chapter/1-Guidance#diagnosing-hypertension-2](https://www.nice.org.uk/guidance/CG127/chapter/1-Guidance#diagnosing-hypertension-2)

Ensure that you measure blood pressure in both arms and if one arm is higher measure subsequent blood pressures in the arm with the higher reading.

If the blood pressure is 140/90 mmHg or higher:
Take a second measurement and if any discrepancy, take a further reading.
Record the lower of the last two measurements
If the clinic blood pressure is 140/90 mmHg or higher, offer ambulatory blood pressure monitoring (ABPM) to confirm the diagnosis of hypertension.
If a person is unable to tolerate ABPM, home blood pressure monitoring (HBPM) may be a suitable alternative

**British Hypertension Society classification of blood pressure levels**

<table>
<thead>
<tr>
<th>Category</th>
<th>Systolic blood pressure (mmHg)</th>
<th>Diastolic blood pressure (mmHg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optimal blood pressure</td>
<td>&lt;120</td>
<td>&lt;80</td>
</tr>
<tr>
<td>Normal blood pressure</td>
<td>&lt;130</td>
<td>&lt;85</td>
</tr>
<tr>
<td>High-normal blood pressure</td>
<td>130-139</td>
<td>85-89</td>
</tr>
<tr>
<td>Grade 1 hypertension (mild)</td>
<td>140-159</td>
<td>90-99</td>
</tr>
<tr>
<td>Grade 2 hypertension (moderate)</td>
<td>160-179</td>
<td>100-109</td>
</tr>
<tr>
<td>Grade 3 hypertension (severe)</td>
<td>≥ 180</td>
<td>≥ 110</td>
</tr>
<tr>
<td>Isolated systolic hypertension (Grade 1)</td>
<td>140-159</td>
<td>&lt;90</td>
</tr>
<tr>
<td>Isolated systolic hypertension (Grade 2)</td>
<td>≥ 160</td>
<td>&lt;90</td>
</tr>
</tbody>
</table>

**Indications for taking a Blood Pressure (BP)**
- **Routine-** Regular checks should be made on hypertensive patients to assess treatment and lifestyle interventions.
- **Any patient on admission to hospital** should have a BP taken.
- **Patients who are unwell, or having specific treatment for example a blood transfusion** should have their blood pressure monitored regularly.
- **A blood pressure should always be taken on both arms when first meeting a patient.** The reasoning behind this practice is that there are sometimes important differences between the two arm readings, and that the lower blood pressure in one arm should be investigated as it may be a sign of an abnormality (co - arctation, stenosis, dissection). A difference of equal to or less than 10mmHg is acceptable and needs no further investigation.
Lying and standing BP’s should be taken on first meeting the patient, if symptoms indicate postural hypotension such as history of collapse

**Consideration: White Coat Syndrome**

“15-30% of patients have white coat syndrome” **(O’Brien 1999)**

This is a phenomenon where their blood pressure is normal outside the GP’s surgery, but increases when measured in the surgery. Some patients with white coat hypertension develop target organ damage and all require close follow up. (target organ damage is where there is a pathophysiological response to high blood pressure that results damage. i.e. kidney damage.)

**Taking a manual blood pressure**

Explain the procedure to patient and gain informed consent. Refer to patient safety section for a reminder. Ensure patient allergies are checked and noted and action taken as necessary.

Seat the patient for at least 3-5 minutes prior to the measurement, this is to give the patient time to regulate their pulse rate and BP as they may have just rushed in from the carpark for example, and then gather equipment needed – stethoscope, sphygmomanometer and alcohol wipe.

Clean the stethoscope with the alcohol wipe and ensure hands are washed using the full Ayliffe technique.

Place the sphygmomanometer no more than 1 meter from you when you are recording the BP. The longer the tubing from the sphygmomanometer the greater the reduction in the reliability of the reading.

**The cuff and bladder**

The cuff is an inelastic cloth with an inflatable bladder within it. The cuff is secured with Velcro fastenings or by wrapping a tapering end around the arm and tucking it into the encircling material.

The importance of bladder size (in either manual or automatic) should be noted;

- If it is too short or too narrow, the BP is falsely high
- If it is too long or too wide, the BP is falsely low

**Applying the cuff and positioning it**

Expose the arm and make sure it is comfortably supported at the same level as the heart. The cuffed arm should be at the level of the right atria. If the arm were to be lower or higher it would give an inaccurate reading.

The upper arm should not be constricted by tight clothing. This can prevent correct placement of the cuff and disrupt proper blood flow through constriction.

Apply cuff (ensure that this has been cleaned appropriately, see local Trust policy) – the centre of bladder must be over brachial artery (the bladder should cover at least 80% of the circumference of the upper arm, but not so that it overlaps) and the lower edge of the cuff should sit 2.5 cm above ante-cubital fossa.
**Cuff sizes**
As patients come in different shapes and sizes so do BP cuffs. As described earlier it is essential to use the correct size cuff to obtain an accurate reading. Below is the size guidance from the British Hypertension Society.

**Large bladders for arm circ. over 42cm may be required**

<table>
<thead>
<tr>
<th>INDICATION</th>
<th>BHS GUIDELINES</th>
<th>ARM CIRC.</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Bladder width &amp; length (cm)*</td>
<td>(CM)*</td>
</tr>
<tr>
<td>SMALL ADULT/CHILD</td>
<td>12 X 18</td>
<td>&lt;23</td>
</tr>
<tr>
<td>STANDARD ADULT</td>
<td>12 X 26</td>
<td>&lt;33</td>
</tr>
<tr>
<td>LARGE ADULT</td>
<td>12 X 40</td>
<td>&lt;50</td>
</tr>
<tr>
<td>ADULT THIGH CUFF**</td>
<td>20 X 42</td>
<td>&lt;53</td>
</tr>
</tbody>
</table>

**Taking a BP**

**Estimate the systolic pressure**
Palpate the pulse at either the brachial or radial artery and inflate the bladder slowly feeling for the disappearance of that pulse. Continue to inflate the cuff to 20mmHg above the point of pulse disappearance, then deflate the bladder slowly continuing to palpate for the pulse.

Note the point at which the pulse can be felt again - this point approximates to systolic blood pressure (our estimation of systolic pressure)
Deflate the cuff fully and quickly

**Why do we estimate the systolic?**
An estimate is made to gain an informed idea of what the patients’ systolic pressure may be. In doing this it prevents discomfort from overzealous cuff inflation for every patient.
If you have a patient who suffers with hypertension and you do not inflate the cuff high enough you may miss the true systolic pressure therefore resulting in an incorrect reading.
A period of silence below the initial systolic phase (Korotkoff 1) is found in some patients. This is known as the “Auscultatory gap” (period of silence) and may result in the systolic pressure being underestimated, reinforcing the need for an estimate to be performed.
**Auscultate for Korotkoff sounds**

- Place the stethoscope over the brachial artery
- Re-inflate the cuff to 20-30mmHg over the estimated systolic
- Slowly deflate the cuff (approximately at 2-3mmHg/second) whilst listening with the stethoscope for two consecutive taps (indicating systolic BP)
- These tapping sounds are known as Korotkoff phase 1 and they equate to the **Systolic** pressure
- You will then hear Korotkoff sounds 2,3 and 4 (described further down)
- At the point you have complete disappearance of sounds this is Korotkoff phase 5 and equates to **Diastolic** pressure. (Please note in some patients it does not return to silence but there is a sustained muffle sound as the gauge returns to zero. In effect Korotkoff 4 becomes the denominator for the diastolic reading. Diastole is determined at the point when it becomes muffled)
- After all sounds have disappeared the cuff should be fully deflated, even if another measurement is to be attempted
- >15 seconds should lapse before attempting to repeat the reading

**The Korotkoff sounds**

Korotkoff sounds are only heard once the pressure in the BP cuff equals and decreases relative to the pressure in the brachial artery. The sounds are created as a consequence of blood starting to flow through the gap as the artery returns to its normal shape. In returning to its normal shape, turbulence is created by blood forcing its way through the narrowed gap. As the gap widens the sounds are created due to particular patterns of turbulence that can be clearly defined into 5 discernible sounds that are known as Korotkoff sounds 1 through to 5. They are also referred to as phases 1 - 5.

- **Phase 1**  First appearance of faint clear tapping sounds which gradually increase in intensity
- **Phase 2**  The softening of sounds which may become swishing
- **Phase 3**  The return of louder sounds
- **Phase 4**  Muffling of sounds
- **Phase 5**  The complete disappearance of sounds

\[
\begin{align*}
\text{Phase 1} &= \text{Systolic pressure} \\
\text{Phase 5} &= \text{Diastolic pressure}
\end{align*}
\]

Please note that by placing a stethoscope over the brachial artery when the cuff has not been inflated YOU WILL NOT HEAR ANYTHING! As blood flow is laminar in nature and therefore silent.
**Recording the reading/telling the patient**

Tell the patient about their BP reading – one reading is insufficient to diagnose health, hypertension or hypotension, (please see NICE guidance).

In clinical practice BP findings will be recorded in the patient notes or on an observation chart. Please ensure that results are reported to the person supervising you and they should document the results.

**Documenting Results**

Please report abnormal results immediately to a senior member of staff. Any abnormal readings will necessitate re-testing and may require further investigations if the readings continue to be abnormal.

**Automatic Blood pressure**

Automated devices are used more commonly in hospitals and primary care. Patients should be prepared in the same way as with a manual aneroid sphygmomanometer.

The machine should be plugged in, ensure the right cuff size is used and apply the cuff in the same way as you would with a manual device, then press the start button. The BP will be displayed on the screen along with a heart rate.

Considerations; the heart rate reading should not be used as it does not take into account an irregular heart rate. The pulse should be palpated manually. The automatic machines can be uncomfortable for the patient as they inflate to a very high level by default and they can also give inaccurate readings in patients with hypo or hypertension, brady or tachycardia and if there is excessive patient movement.

**Factors affecting blood pressure values**

**Age:** About 70% of people aged over 75 have hypertension.

**Gender:** Prevalence of hypertension is higher among men than women up to age 64, over 64 it is higher in women.

**Race:** Hypertension is more common in Afro-Caribbean’s.

**Temperature:** BP can increase with cold temperature - Heart rate increases, plus shivering and peripheral vascular close down.

**Pain:** Linked with hypertension as well as an elevated heart rate. An increase in sympathetic nervous system activity in acute pain causes an increase in BP. The correlation between an elevated BP and pain is not well understood. Treatment is to provide adequate pain relief.

**Emotion:** BP can be increased with stress. The body releases hormones that act on the vasculature to results in an increase in BP.

**Alcohol:** Regular heavy alcohol intake increases blood pressure.

**Smoking:** Nicotine present in tobacco products causes increased blood pressure and heart rate

**Exercise:** regular activity helps to maintain the elasticity of the blood vessels which reduces BP

**Obesity:** Blood pressure may be affected with overall body mass. This is independent of errors in measurement due to obesity – cuff artefact etc.
Sources of error

Sphygmomanometer
- poor maintenance
- incorrect cuff size
- incorrect cuff application
- tube/pump leakage

Patient
- Arrhythmias
- Arm position – above heart level

The observer
- poor technique
- observer bias – They are old. Therefore, the BP must be high!
- terminal digit preference (e.g. 120/70mmHg or 125/75mmHg instead of real pressure: 122/72mmHg. Some clinicians document results this way. THIS SHOULD NOT BE DONE. Document what it actually is.
- note: the scale is graduated in 2s - there is no 5mmHg
- distance from scale – The patient should be no more than 1 metre away.

Taking a temperature 36°C – 37.5°C

A normal core body temperature is between 36 – 37.5 °C and relates to arterial blood flowing around the central organs. A normal reading is referred to as Apyrexial.

If the temperature falls outside of this narrow band it is defined as:
- Hypothermia (low temp) <35.5°C
- Pyrexia (raised temp) > 37.5°C
- Hyperpyrexia (very high temp) > 40°C

Common sites for monitoring temperature
- Oral (sublingual)
- Axilla (under the arm)
- Aural (in the ear)
- Skin (forehead)
- Rectal
- Groin

Equipment & timing

Electronic thermometers are the most common as they are quick, accurate and safe to use. Glass-mercury thermometers are rarely used as they need to be left in position for longer periods of time, around 3 mins: they are more accurate if left longer. They also pose a risk to patients & staff if the mercury is spilt, or the glass breaks!
Factors that may affect the temperature measurement
Oral temperatures are affected by the temperature of ingested food or drink, the muscular action of chewing, heavy exercise, smoking and mouth breathing.
To get an accurate reading allow 15-30 minutes to elapse before taking a temperature after any of these activities.

Procedure for taking a temperature

Oral temperature

The thermometer should be cleaned before and after use with a 70% isopropyl alcohol wipe as per guidelines. Electronic thermometers will have single use disposable covers for hygiene purposes.
Set the thermometer to take the reading via the oral route. On the thermometer’s display screen there is an icon that indicates what setting has been selected. E.g. flashing head = oral, flashing arm = axilla & flashing leg = rectal.
Apply the cover and place the thermometer probe into the patients’ mouth and keep it there until the device indicates that it is done, usually a bleep, as per manufacturer’s guidance - this normally takes approx. 15 seconds. The measurement will be displayed on the thermometer’s LCD screen.
Dispose of cover when you have taken the measurement.

Axillary temperature
This is less accurate since the axilla (armpit) is not close to major arterial blood vessels. Also, its reliability and accuracy may be affected by environmental factors.
Ensure the thermometer is set to take an axillary reading and place the disposable sheath on the thermometer’s probe.
To take a reading, the probe is placed in the centre of the axilla (armpit) in contact with the skin with the arm held firmly against the patient’s chest. Read the measurement on the LCD screen when ready or in accordance with manufacturer’s instructions.
When the reading has been obtained, dispose of the sheath and clean as per manufacture’s guidelines. Electronic thermometers can usually be adjusted to compensate for the inherent inaccuracy of axillary temperature taking.
Aural temperature
The Tympanic membrane (in the ear) can be used to determine core temperature using a specially designed electronic thermometer.

To take the temperature reading; place a disposable sheath onto the thermometer’s probe, pull the patients’ ear gently upwards and backwards to straighten the auditory canal. The aural thermometer is then gently inserted into the ear. (Pressing too deep may be painful)
The temperature reading appears in the thermometer’s LED window. It is preceded by an audible “beep” indicating that the temperature has been measured.
The reading may be inaccurate if a poor technique is employed (not inserted far enough) or if there is excessive amounts of ear wax. This method can also be painful if the patient has an ear infection. So, think before using this method. An ear infection may result in an elevated temperature reading. Take another reading using a different method in order to determine if the raised temperature is localised or not.

Skin temperature
An example of a skin temperature measuring device is the Feverscan™ used particularly with children.
To use this device, hold the FeverScan™ firmly in place for 15 seconds across the patient’s forehead, with the black surface flat against the middle of a DRY forehead.
Read the FeverScan™ whilst it is on the forehead using the lower (Celsius) scale, temperature is indicated by the CENTRAL YELLOW LINE.
It may be inaccurate in flushed patients. So, in this circumstance it is advisable to use an alternate method.
After use the FeverScan™ is cleaned with a soft clean cloth and stored in its case.
Temporal Thermometers scan the skin overlying the temporal artery and are increasingly being used. However, there are conflicting studies regarding their accuracy when compared to more traditional methods such as oral and rectal measurement.

Rectal temperature
Rectal thermometry has been demonstrated to be more accurate than oral measurements. However, it is much more invasive and time consuming in practice.
An electronic thermometer will have disposable sheaths, and often have a red coloured probe to distinguish it from oral, which is blue. Additionally there is usually an indicator on the LED screen that displays how it is set up to be used. i.e. rectal, oral or axillary.
The thermometer needs to be inserted at least 4cm into the rectum in adults and held in position securely to prevent movement. It is not often recommended for alert children given the nature of the procedure.
Assessing consciousness
Being aware of one’s surroundings as well as one’s self is fundamental to our wellbeing physically and mentally. Therefore, a change in consciousness level is a significant indicator of deteriorating health.

There are 2 accepted neurological assessment tools:

- Glasgow Coma Score or G.C.S. This method is accepted as the “gold standard” means of assessment. However, due to the complexity it can take a number of minutes to carry out the full assessment.
- ACVPU is a quick assessment tool that is used for basic assessment in clinical practice with a follow up of the more accurate Glasgow Coma Score.

ACVPU (Alert to Voice, pain or is unresponsive) assessment
Alert – patient is alert & awake
Confusion- new confusion or new altered mental state ie; sudden increased confusion or agitation
Voice – patient responds to verbal stimuli – only responds to deliberate questioning
Pain – patient only responds to painful stimuli
Unresponsive – patient is unresponsive to all of the above.

This system looks for the best response from the four following domains, starting with the letter A for Alert for someone who is responsive and aware of their surroundings and progressing to U for someone who is unresponsive.

Some recording methods (NEWS2) have now added in an additional element that is: Confusion – confused or disorientated

Please note if a patient is newly confused, they are still classed as alert, but staff need to be aware of this confusion and have this documented and continue to monitor regularly and re-categorise to either V.P or U at the next scheduled vital signs assessment.

Sources and useful resources –
British Hypertension Society,
http://www.bhsoc.org/
N.I.C.E. National Clinical Guideline Centre,
https://www.nice.org.uk/guidance/CG127/chapter/1-Guidance#diagnosing-hypertension-2

National Service Framework for Coronary Heart Disease 2000
WHO 5 moments of hand hygiene,
http://apps.who.int/iris/bitstream/handle/10665/44102/9789241597906_eng.pdf;jsessionid=860889B95656D64A355205D163AFBD7B?sequence=1 see p67 & 68
RCN (2017) Standards for Assessing, Measuring and Monitoring Vital Signs in Infants, Children and Young People [PDF]
Royal College of Physicians (2012); accessed 10/ 2017,
https://www.rcplondon.ac.uk/projects/outputs/national-early-warning-score-news
Royal College of Physicians (2017)
https://www.rcplondon.ac.uk/projects/outputs/national-early-warning-score-news-2
**Glossary**

Arrhythmias – abnormal heart rhythms.
Auscultatory gap – a period of silence following Korotkoff phase 1.
Bradycardia – low heart rate.
Diastolic blood pressure – resting pressure within the blood vessels when the heart relaxes (diastole) to fill with blood prior to the next systole.
Hypertension – High blood pressure levels.
Hypotension – Low blood pressure levels.
Korotkoff phase 1-5 – Sounds heard during blood pressure recordings, Korotkoff 1= systolic, Korotkoff 4/5 = diastolic.
mmHg – millimetres of Mercury.
Postural hypotension – Blood pressure falls on standing.
Sphyg’ – sphygmomanometer.
Systolic blood pressure – maximum pressure reached in the blood vessels and is due to ventricular systole when the heart pumps blood into the arterial.
W.H.O. guidelines on hand washing.
Tachycardic – fast heart rate.
Pyrexial – patient has an elevated temperature above normal.
Apyrexial – Normal temperature.
Hypothermia – Temperature is below normal.
Hyperpyrexia – A bodily temperature in excess of 40 degrees celsius.