PATIENT ASSESSMENT

PART 5 – MEASURING PULSE

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As the heart ventricles contract and blood is ejected into the aorta, a wave of pressure is initiated through the arterial system. This can be felt as pulsations wherever an artery passes near the skin and over a firm or bony surface of the body (Hinchliffe et al, 1996).

Each heart contraction initiates a pulsatile wave, so the rate of these pulsations can be measured to provide a pulse rate. In healthy individuals this will equate to heart rate but this may not always be the case, for example, in patients with cardiac dysrythmias such as atrial fibrillation.

Measuring the pulse provides information on the regularity of heart beat (heart rhythm) and an indication of the strength of heart contraction (pulse volume or amplitude). These factors are an essential part of basic cardiovascular assessment.

The radial artery at the wrist is often easily accessible and is commonly used to assess pulse (Dougherty and Lister, 2004). In certain clinical situations such as shock, it may be difficult to assess pulse at this site and the carotid or femoral sites may be used. The brachial site is used frequently in children, and counting the heart rate through auscultation is recommended in neonates (Resuscitation Council UK, 2005).

CONTROL OF HEART AND PULSE RATE

The heart generates its own electrical impulses, which can create muscular contraction to eject blood from its ventricles. The rate of contractions is influenced by the autonomic nervous system, circulating hormones, temperature and the amount of strain placed upon the heart.

In healthy individuals the normal heart rate, and therefore the pulse rate, is about 65–85 beats per minute (bpm), although higher values are normal for babies, infants and children. A pulse rate of over 100bpm is known as tachycardia, while one under 50bpm is called bradycardia. Tachycardia is considered normal for babies and infants.

The pulse rate may increase slightly during inspiration and decrease during expiration, a normal condition known as respiratory sinus arrhythmia. This is rarely noticeable in adults. Other factors can increase the pulse rate: emotion, such as anger or excitability; exercise; drugs; temperature; infection/inflammation; decreased heart contractility; cardiac dysrythmias; hypovolaemia or haemorrhage; and hypoxia.

Factors that decrease the pulse rate include: cardiac dysrythmias; metabolic derangement; hypothermia; hypoxia; nervous system dysfunction/neurological insult; and some drugs such as beta-blockers.

This procedure should be undertaken only after approved training, supervised practice and competency assessment, and carried out in accordance with local policies and protocols.
Pulse rhythm
Assessing the pattern of pulsations and the pauses between them provides information about the heart rhythm. This should be smooth and regular. Abnormality can allow early detection of cardiac dysrhythmias. Since these can also have a regular pattern, the rhythm should be noted as ‘regular’, ‘regularly irregular’, or ‘irregularly irregular’.

Pulse amplitude or volume
Amplitude is a reflection of pulse strength and the elasticity of the arterial wall (Dougherty and Lister, 2004). Manual palpation gives a subjective assessment of amplitude, as a numerical value cannot be calculated, and gives a description of how the pulse feels. Pulses may be described as ‘weak’, ‘faint’, ‘strong’ or ‘bounding’. The amplitude may change from strong to weak as a result of dysrhythmias or respiration.

Because of this subjectivity, amplitude should only be used to complement other cardiovascular assessment. It may be measured objectively in critical care areas.

MONITORING PULSE RATE
Pulse/heart rate should be monitored in any patient who is at risk of becoming acutely ill.

This group includes: emergency admissions; older people; patients with pre-existing disease; those who are severely ill or failing to recover from serious illness; those in shock; those recently anaesthetised; those who have recently received a blood transfusion; and those transferred from critical care. Pulse rate measurement should also be part of physiological track-and-trigger or early warning scoring systems (NICE, 2007).

Mechanical aids to pulse assessment
Some automated non-invasive blood pressure recording devices also measure pulse rate. These rarely take dysrhythmias into account and do not assess pulse amplitude. Their efficacy is questionable in shocked, peripherally shutdown patients.

THE PROCEDURE
Ensure you have the correct equipment – plastic apron and disposable gloves if there is a risk of contact with any body fluid fluids other than sweat, and a stopwatch.

- Obtain informed consent;
- Wash hands, don apron and gloves;
- Note factors that may influence readings;
- Ensure the patient is comfortable;
- Identify artery to be used (Fig 1). Consider patient dignity if using the femoral site;
- Using the second or third finger (or both) apply gentle pressure against the artery site (the thumb should not be used, as the practitioner’s own pulse may be felt) (Fig 2);
- Count the pulse rate for exactly one minute (this allows sufficient time to detect rhythm irregularities) (Fig 3);
- Dispose of apron and gloves (Fig 4);
- Wash hands (Fig 5);
- Document the results, reporting as necessary (Fig 6).