The clinical signs of critical illness – tachypnoea, tachycardia, hypotension and altered consciousness – indicate a compromise of the body’s respiratory, cardiovascular and neurological functions (Resuscitation Council UK, 2006; Nolan et al, 2005).

Accurate measurement of blood pressure is a fundamental part of patient assessment and is a main component of the Resuscitation Council UK’s (2006) systematic airway, breathing, circulation, disability, exposure (ABCDE) approach to the assessment of critically ill patients (Jevon, 2007a; 2007b).

**DEFINITION OF BLOOD PRESSURE**

Blood pressure can be defined as the pressure of blood in the circulatory system. Systolic blood pressure is the peak pressure in the artery following ventricular systole (contraction), while diastolic pressure is the level to which the arterial blood pressure falls during ventricular diastole (relaxation) (Talley and O’Connor, 2001).

Blood pressure is determined by cardiac output and vascular resistance (Waugh and Grant, 2006):

- **Cardiac output:** is the amount of blood ejected by the heart per minute;
- **Vascular resistance:** resistance to the flow of blood, determined by the tone of the vascular musculature and the diameter of the blood vessels. The smooth muscle in the arterioles is controlled by the vasomotor centre in the medulla oblongata in the brain. The muscle is in a state of partial contraction caused by continuous sympathetic nerve activity, often referred to as “sympathetic tone”.

A fall in cardiac output, vascular resistance or both can lead to a fall in blood pressure (Smith, 2003) (Fig 1).

**DEFINITION OF HYPOTENSION**

It is difficult to define hypotension because it depends on the patient’s clinical condition and pre-morbid state, for example, if there is a history of chronic hypertension (Adam and Osborne, 2005). In addition, it is important to place blood pressure readings in the context of what is normal for each individual patient; for example, a blood pressure of 90/60mmHg may be well tolerated, and indeed normal, in a fit young adult (Gwinnutt, 2006).

However, in practical terms, if the systolic blood pressure is <90mmHg, the patient is considered to be hypotensive (Wyatt et al, 2006). This is reflected in many EWS systems (for example, Goldhill et al, 1999). The causes of hypotension are listed in Box 1.

**Effects of hypotension**

Hypotension has the following effects on organs of the body:

- **Renal system:** decreased renal perfusion leads to a fall in the glomerular filtration rate and oliguria (poor urine output). Acute renal failure may develop;
- **Brain:** reduced cerebral perfusion can...
lead to altered level of consciousness including symptoms of lightheadedness, drowsiness, confusion, agitation, syncope and coma;
- Heart: decreased coronary perfusion can lead to myocardial ischaemia and acute coronary syndrome;
- Gastrointestinal tract: decreased perfusion can lead to bowel ischaemia;
- Skin: poor skin perfusion leads to pallor and cool peripheries. Peripheral ischaemia can develop (Adam and Osborne, 2005; Smith, 2003).

Hypotension is a symptom of shock and is common in critically ill patients. Shock is a complex physiological phenomenon and a life threatening condition. If left untreated, it leads to cell starvation, cell death, organ dysfunction, organ failure and eventually death (Jevon, 2008).

It is usually caused by hypovolaemia, which can respond well to timely and appropriate resuscitation with intravenous fluids (Jevon, 2008).

The presence of shock is best detected by looking for signs of compromised end organ perfusion (ABCDE approach) (Graham and Parke, 2005). For example, poor cerebral perfusion can lead to an altered level of consciousness such as drowsiness, confusion, and agitation.

Hypotension is often a late sign of shock (Smith, 2003), occurring when the compensatory mechanisms such as peripheral vasoconstriction and an increase in heart rate activated in response to hypoperfusion, are overwhelmed (Graham and Parke, 2005).

If there is a delay in starting effective treatment, organ failure can occur. In A&E, non-traumatic related hypotension is associated with a higher risk of in-hospital mortality (Jones et al, 2006).
TREATING HYPOTENSION

Hypotension should be considered a medical emergency (Smith, 2003). The main aim of initial treatment is to buy time to stabilise the patient’s condition, make a diagnosis and request expert help (Gwinnutt, 2006). The main objectives of management are to:

- Identify and treat the underlying cause;
- Maintain tissue oxygenation by ensuring adequate cardiac output and adequate arterial oxygen saturation;
- Maintain tissue perfusion pressures by increasing systemic blood pressure (Adam and Osborne, 2005).

A suggested plan for treating hypotension is outlined in Box 2.

CONCLUSION

Hypotension is associated with critical illness and nurses must ensure that patients’ vital signs are monitored and the EWS chart completed following local protocols.

They should ensure that senior help is requested if necessary and that patients are managed appropriately.

REFERENCES


BOX 2. TREATING HYPOTENSION

- Assess patients following the ABCDE approach (Resuscitation Council UK, 2006). Monitor vital signs, complete EWS charts following local protocols and ensure senior help is requested if necessary. It is important to adjust the frequency of EWS observations as appropriate for each patient following local protocols.

- Ensure patients have a clear airway and are able to breathe adequately; administer high concentration oxygen – use a mask with a non-rebreather bag and high flow oxygen (15L per minute). Patients with COPD should be carefully assessed (for details, see Jevon, 2010).

- Monitor the pulse (rate, regularity and volume), blood pressure, capillary refill time, peripheral skin temperature and fluid balance (DH, 2006).

- Consider nurses patients in a supine position; it may be helpful to raise their legs by tilting the bed to increase cerebral perfusion (Resuscitation Council UK, 2006).

- If the hypotension is drug induced, stop the drug (if appropriate) and administer the antidote if indicated. For example, naloxone may be required if hypotension is thought to be opiate induced.

- Attach appropriate monitoring devices such as a cardiac monitor and pulse oximeter – be aware that if peripheral perfusion is poor, it may not detect a pulsatile flow or provide an oxygen saturation reading (Smith, 2003).

- A large bore (14G or 16G) IV cannula should be inserted as they have the highest flow rate and allow rapid infusion of drugs and IV fluids (Resuscitation Council UK, 2006). A second large bore cannula may be required to be inserted to provide an additional route for administering drugs and IV fluids.

- Blood should be taken for full blood count, urea and electrolytes, glucose, liver function tests, lactate and coagulation screen (Wyatt et al, 2006). If haemorrhage is suspected, a blood transfusion may be required (Jevon, 2008). Blood cultures will be necessary if sepsis is suspected.

- A rapid fluid challenge (over 5-10 minutes) of 1L of warmed crystalloid solution (Resuscitation Council UK, 2006) such as 0.9% normal saline should be prescribed. Care should be taken with patients who have cardiac failure (Gwinnutt, 2006; Wyatt et al, 2006) and a smaller volume (for example, 250ml) of IV fluid should be administered to them (Gwinnutt, 2006). These patients should be closely monitored using the ABCDE approach.

- Consider chest auscultation after each fluid bolus and central venous pressure monitoring may be required to assess for signs of fluid overload (Resuscitation Council UK, 2006). If signs and symptoms of fluid overload occur (for example, dyspnoea, increased heart rate and pulmonary crepitations on auscultation), the fluid infusion rate should be reduced and a doctor informed (Jevon, 2008).

- Monitor vital signs regularly; the target blood pressure is the patient’s normal or, if this is unknown, >100mmHg systolic (Resuscitation Council UK, 2006).

- Administer further IV fluids if patients show no signs of improvement. Continue to interpret fluid balance status (DH, 2008).

- If necessary, insert a urinary catheter and monitor urine output.

- If possible, identify and treat the specific cause of hypotension (see above).

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