4.12: Technical aspects of transfusion

4.12.1: Intravenous access

Blood components can be transfused through most peripheral or central venous catheters, although the flow rate is reduced by narrow lumen catheters and long peripherally inserted central catheters (PICC lines).

They should be transfused through an administration set with a 170–200 m integral mesh filter. Paediatric administration sets with a smaller prime volume are available for small-volume transfusions. Although special platelet administration sets are available, it is safe to use a standard blood administration set, but platelets should not be transfused through a set previously used for red cells as some platelet loss will occur. It is not necessary to prime or flush blood administration sets with physiological (0.9%) saline but a new administration set should be used if blood components are followed by another infusion fluid. Although there is little evidence, current guidelines recommend changing blood administration sets at least every 12 hours to reduce the risk of bacterial infection.

Blood and other solutions can be infused through the separate lumens of multi-lumen central venous catheters as rapid dilution occurs in the bloodstream. Where possible, one lumen should be reserved for the administration of blood components.

4.12.2: Infusion devices

There are two main types: gravity delivered or infusion pumps. Devices must be CE marked and used according to the manufacturer’s instructions (including the use of compatible administration sets). Infusion devices must be maintained in accordance with the manufacturer’s guidelines and the pre-administration check should include a check of the device and its settings. The device should be monitored regularly during transfusion to ensure the correct volume is being delivered at the correct rate.

4.12.3: Rapid infusion devices

These are used in situations such as major haemorrhage. Infusion rates range from 6 to 30 L/hour and most incorporate a blood-warming device. They should be used with a large-gauge venous access catheter.

4.12.4: Blood warmers

Rapid infusion of red cells recently removed from the refrigerator may cause hypothermia. Concerns include impaired coagulation in surgical or trauma patients and cardiac arrhythmias if cold blood is transfused rapidly into a central catheter or in neonates and small infants having large-volume transfusions. The National Institute for Health and Care Excellence (NICE) in England recommends that, in all patients undergoing elective or emergency surgery, ‘intravenous fluids (500 mL or more) and blood products should be warmed to 37°C’.
Blood warmers may also be used in patients with clinically significant cold antibodies (discuss with a transfusion medicine specialist).

Only CE-marked blood warmers should be used. Some operate up to 43°C but are safe if used in accordance with the manufacturer’s instructions. Improvised blood-warming, such as immersion of the pack in hot water, in a microwave or on a radiator must never be used.

4.12.5: Compatible intravenous fluids

It is good practice to avoid the co-administration of any intravenous fluid through the same line used for blood components, unless a multi-lumen central venous catheter is used. Solutions containing calcium (e.g. Ringer’s lactate) or calcium-containing colloids (e.g. Haemaccel™ or Gelofusine™) antagonise citrate anticoagulant and may allow clots to form if mixed in the same infusion line. Hypotonic solutions, such as 5% dextrose in water, can cause haemolysis of red cells in laboratory experiments but the clinical significance of this is uncertain and no clinical adverse events have been reported.

4.12.6: Co-administration of intravenous drugs and blood

Drugs should never be added to a blood component bag.

Wherever possible, intravenous drugs should be administered between transfusions or administered through a second venous access device (or the separate lumen of a multi-lumen central venous catheter). If this is not possible, the transfusion should be temporarily stopped and the line flushed with 0.9% saline before and after administration of the drug.

Some patients using patient-controlled analgesia (PCA) devices delivering opioid pain killers, such as those on palliative care or with sickle cell pain crises, have very poor peripheral venous access and it is convenient (and kind) to use the administration line used for transfusion. Standard concentrations of morphine, hydromorphone or meperidine have no harmful effect on co-administered red cells.