



Information for clinicians

Intraoperative cell salvage

Intraoperative cell salvage (ICS) collects the patient's blood lost during surgery, processes it in theatre and provides a product of concentrated red cells in normal saline for reinfusion during or immediately after surgery.

How does it work?

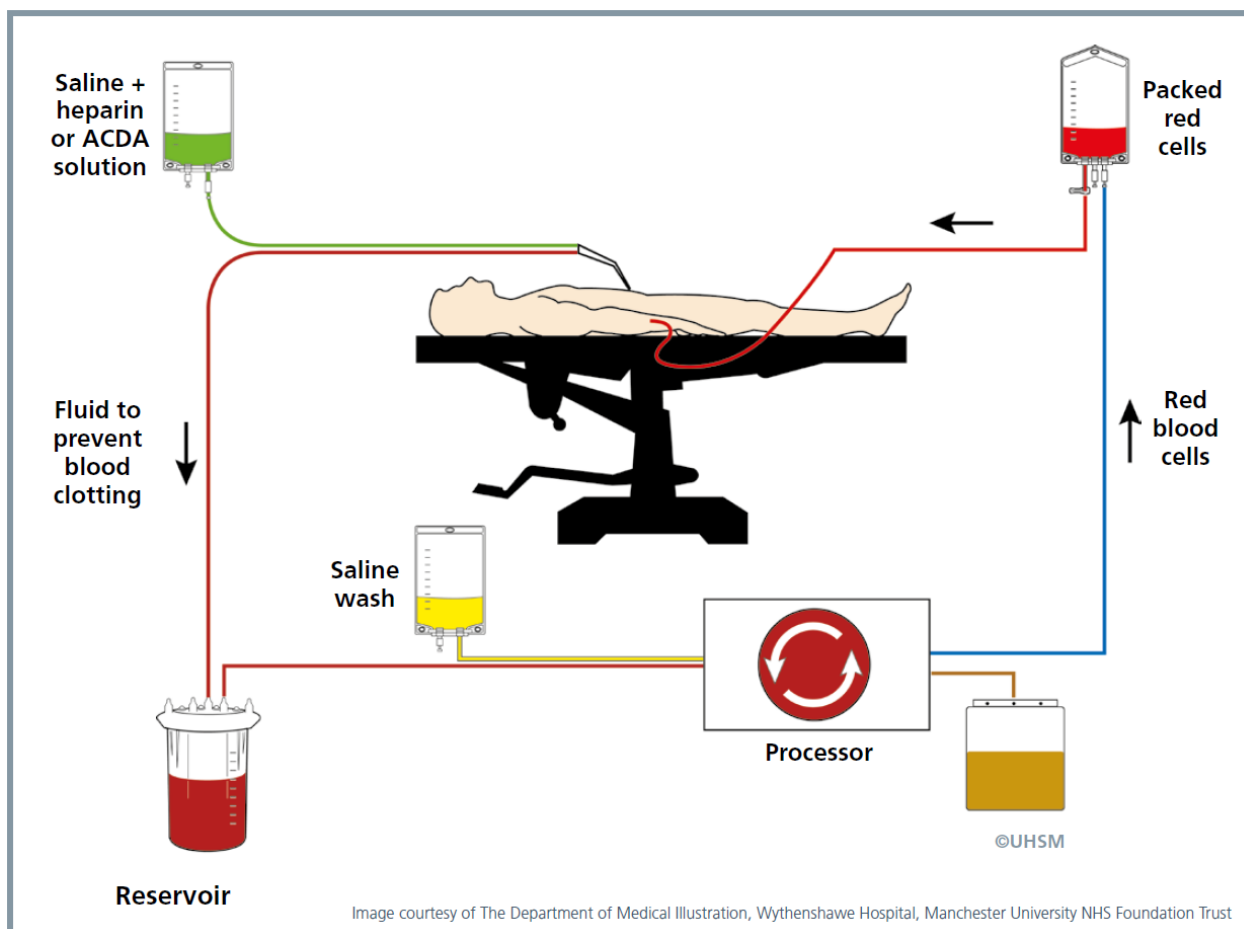
Blood lost during surgery is aspirated and collected using a cell salvage machine. Anticoagulant is added to prevent clotting. The blood is then filtered to remove large particles, centrifuged, and washed to produce red cells suspended in saline for reinfusion to the patient. The product contains no clotting factors, platelets, or plasma proteins as these are washed out during the processing. The anticoagulant is also removed during processing.

The reinfusion of the patient's own red cells is superior to transfusion of donor cells in that they have better oxygen carriage, have retained deformability, and do not reduce the patient's immune system. ICS can be used in major haemorrhage events with the product being available for reinfusion within minutes of collection.

Operational issues

The ICS collection and processing occurs in theatre during surgery. To ensure safe practice, the processed product is collected in a labelled bag and the red cells reinfused, usually in recovery. Tranexamic acid should be used in all cases unless there is a specific contra-indication.

Clear labelling is an essential safety requirement to ensure the component is transfused back to the same patient.



Who is eligible for ICS?¹

ICS should be considered for all surgical patients where blood loss is anticipated to exceed 500mls or 10% of the circulating blood volume. It should be immediately available in situations where large volumes of blood may be lost in a short period of time.

The contra-indications of ICS are few and include patient refusal, heavy contamination of the surgical field with bacteria-rich material, substances which cause red cell haemolysis, and substances that should not be administered intravenously. ICS is not recommended in patients with sickle cell disease but is commonly used in some cancer surgery.

Cell salvaged blood may be the only transfusion option in patients who refuse donor products, have multiple red cell antibodies or in situations when blood stocks are compromised.

Patient selection for ICS is at the discretion of the surgeon and anaesthetist caring for the patient. It is important that the patient is informed regarding transfusion options before surgery and gives consent for transfusion.

ICS is commonly used in:

- Cardiac surgery
- Obstetrics including surgery for ruptured ectopic pregnancy
- Emergency trauma surgery (orthopaedic, general, vascular)
- Revision/complex joint replacement surgery
- Complex spinal surgery
- Vascular surgery

Benefits of ICS:

- Provides an immediately available source of normally functioning red cells
- Negates the need to consider transfusion thresholds and tolerance of permissive anaemia
- Reduces the risk of acute transfusion reactions
- Reduces the risk of generating red cell antibodies
- Reduces the immune-modulatory effect of pre-donated red cells that have adverse effects upon peri-operative infection and outcomes after cancer surgery
- Cell salvage may be the only source of red cells available during stock crisis or antibody compatibilities
- Patients receiving only cell salvage and avoiding allogeneic blood transfusion can continue as blood donors

Training

All staff involved in the cell salvage process should be trained and competency-assessed in a manner appropriate to their role.

Reporting of adverse events

Adverse incidents and reactions related to ICS are reportable to the Serious Hazards of Transfusion (SHOT) UK haemovigilance scheme.

Further information

UK Cell Salvage Action Group

<https://www.transfusionguidelines.org/transfusion-practice/uk-cell-salvage-action-group>

National Institute for Health and Care Excellence (NICE) {NG24} (2015)

<https://www.nice.org.uk/guidance/ng24/chapter/Recommendations#alternatives-to-blood-transfusionfor-patients-having-surgery-2>

UK Cell Salvage Action Group Patient Information Factsheet

<https://www.transfusionguidelines.org/transfusion-practice/uk-cell-salvage-action-group/patient-factsheet>

Association of Anaesthetists

<https://anaesthetists.org/>

Reference

1. Klein AA, Bailey CR, Charlton AJ, Evans E, Guckian-Fisher M, McCrossan R et al. Association of Anaesthetists Guidelines: cell salvage for peri-operative blood conservation 2018. *Anaesthesia* 2018;73(9):1141-50

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This leaflet was prepared by NHS Blood and Transplant in collaboration with the National Blood Transfusion Committee.

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