All Wales Guidance for the Management and Use of Intraoperative Cell Salvage (ICS)

Produced on behalf of the Blood Health National Oversight Group (BHNOG): ICS Work Stream

Introduction

Cell salvage is a long-established method of recovering red blood cells in acute blood loss and preparing them for reinfusion to the patient, and an opportunity to avoid the need for transfusion of donor red cells; while blood components for transfusion play an important part in saving and improving lives, there are risks associated with their use and as supply is dependent upon voluntary donation then shortage is also a risk.

The Infected Blood Inquiry (IBI) Report[1], published in May 2024, identified that *"approximately 26,800 were infected with Hepatitis C after a blood transfusion, often linked with childbirth or surgery"[p21]*[2]. Volume 5 of the report focuses specifically on clinical practice relating to blood transfusion, where it is noted that: *"The system of blood transfusion is clearly safer now than it was, as a result of the initiatives described in this chapter. They are welcome. They have done much to improve a system in which – for too long and despite repeated advice – blood and blood components were given too readily, were frequently given in too great a quantity, with insufficient consideration of whether they were needed, and little or no consideration of alternatives which had less risk (not being biological products) such as tranexamic acid, pre-operative iron, or intra-operative cell salvage."[p53]*[3]

The NHS Wales Blood Health Plan[4] and its delivery through the Blood Health National Oversight Group has proactively progressed activity towards meeting the IBI recommendations relating to transfusion safety, particularly emphasising the importance of implementation of patient blood management (PBM) to reduce avoidable transfusions through optimising a patient's own blood. Welsh Health Circular 2025/017[5] was issued to support IBI recommendation 7a and highlights a number of PBM interventions.

Intraoperative cell salvage (ICS) should be a part of the PBM strategy of any healthcare organisation performing surgical procedures and should be utilised to its fullest possible extent. While the use of ICS is embedded in practice throughout Wales, this is variable; the purpose of this document, in part, is to reduce that variability and any potential inequity in access to ICS as a means of avoiding blood transfusion.

This guidance is intended to support hospitals to proactively manage the provision of cell salvage, and to optimise appropriate use; it is focussed on just ICS, however there are many elements covered that will be equally applicable to the provision and use of postoperative cell salvage.

Developed by the All Wales Intraoperative Cell Salvage Network (AWICSN) and consistent with other published UK guidance[6,7], the aim of this guidance is to:

- support organisations in –
  - providing trained and competent staff re: ICS use
  - auditing ICS use and evidencing effectiveness
- support clinical teams in –
  - identifying and maximising use of ICS is where indicated
  - utilising ICS safely and effectively

It should be read in conjunction with the Wales ICS Standards and Key Performance Indicators[8].

This guidance should be applied in practice alongside an ICS device manufacturer's instruction for use; where there is a disparity, the manufacturer's instructions should take precedence.

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1. Governance and effectiveness

Hospitals providing ICS should:

1.1 have a clinical and operational lead for ICS
1.2 have a policy regarding use of ICS
1.3 have a schedule of procedures undertaken where ICS use is appropriate
1.4 regularly review provision and usage of ICS
- which procedures use ICS and to what degree, and how to optimise both.

1.5 have a forum of key stakeholders for discussion of ICS provision and usage
1.6 have a clinical lead for ICS attending the hospital transfusion committee
1.7 have ICS provision identified in the organisation's governance structure
- with a route for escalating issues and concerns

1.8 have a mechanism for identifying and reporting ICS related adverse events to
- MHRA (Medicines and Healthcare products Regulatory Agency) for medical device issues
- SHOT (Serious Hazards of Transfusion) as an alternative to allogeneic blood

1.9 consider introducing 'key words' to facilitate easy identification of ICS related incidents reported in DATIX to support the above
1.10 ensure that ICS use is included in the surgical list team briefing
1.11 ensure that staff who set up and operate ICS (including use of suction) are appropriately trained and competent
1.12 ensure that ICS use is audited
1.13 ensure that ICS use is documented in the patient's records
1.14 have a mechanism to link ICS machine and collection/processing set used to the patient

ICS machines should:

1.15 be on the organisational asset register
1.16 have a service schedule in place (as per manufacturers recommendations)
1.17 ideally be subject to regular quality assurance – both machine and processed 'product'

When ICS is used, the following should be undertaken:

1.18 the patient's pre-operative haemoglobin (Hb) is documented
1.19 processed ICS red cells are labelled with the patients details and expiry time
1.20 if ICS salvage blood is not processed, the reason for this is documented
1.21 the volume of ICS red cells reinfused is documented
1.22 the volume of allogeneic red cells transfused in the peri-operative period is documented
1.23 the patient's post-operative Hb is measured and documented
1.24 if processed red cells are not reinfused, the reason for this is documented

2. Patient selection

ICS should be available for use in:

2.1 all surgery where there is an anticipated blood loss of ≥500 mLs or 15% total blood volume in patients <50 kg body weight
- the predictive element of this can be augmented by accurate measurement and documentation of intraoperative blood loss
- determination of applicable procedures can also be guided by their requirement for allogeneic red cells

2.2 caesarean section where significant post-partum haemorrhage is predicted

2.3 all surgery where there is a risk of blood loss, but if required the provision or use of allogeneic red cells cannot be depended upon; for example where the patient
- has a rare blood group or multiple red cell alloantibodies making it difficult to secure compatible donor red cell units
- has an objection to receiving allogeneic blood component transfusion

ICS use should be considered on an individual patient basis for sickle cell disease and thalassaemia[9,10,11]

2.4 recognising the increased risk of damage to red cells in these conditions, and accounting for any additional interventions that might have been undertaken

Exercise caution with ICS use where there are agents or contaminants in the surgical site, such as:

2.5 clotting agents, irrigation solutions (antibiotic, antiseptic), bone cement, body fluids other than blood, amniotic fluid, bowel contents, urine, infection, fat, cancer cells, metal implant debris
- it should be determined if ICS is appropriate (the benefit outweighs the risk), and established / clearly communicated when to use waste suction and when to use ICS suction, and any other risk reduction measures to be implemented[12,13]

Where ICS use is being considered, whenever possible the patient should:

2.6 be informed of this consideration and provided with any information resources available

2.7 give consent to having ICS (or not) and this should be documented in the patients record

Where a patient is reinfused with ICS salvaged red cells:

2.8 they should be informed of this

3. ICS operation and reinfusion

ICS equipment (machine and set) should be:

3.1 set up by a healthcare worker trained to do so
- ICS policy should specify which groups of staff this applies to in which settings

3.2 set up immediately prior to planned use
- where not used as planned, it may be stored in a clean area for use on another patient: this should be labelled with the time and date and name of the person who set it up, and may be used within 8 hours of being set up or should be disposed of[14]

3.3 set up in readiness for immediate use in an emergency where this practice has been agreed:
- ICS equipment set up as this should be used within 24 hours when unprimed, or 8 hours once primed with anticoagulant solution, or be disposed of[14]

When ICS is in use:

3.4 the type(s) of anticoagulant to be used should be specified in the ICS policy:
- heparin is a medicine, so must be prescribed for use and ICS set up using this must be done by an appropriately qualified staff member

3.5 suction of blood into the ICS system should only be done by a trained healthcare professional:
- the person doing this should be clearly identified at the start of the procedure
- there should be clear communication throughout the procedure as to when ICS suction is to be used and when waste suction is

3.6 where there is significant amount of blood soiling of surgical swabs, or where seeking to salvage as many red cells as possible, 'swab washing' should be considered[14]

3.7 it is recommended that ICS processing is set to automatic mode unless there a specific clinical reason to run in manual mode; the risks versus benefit of doing so should be clearly identified and appropriate measures taken to reduce risks.

When ICS salvaged blood has been processed:

3.8 ICS salvaged red cells ready for reinfusion should be labelled with the patient's details and an expiry/reinfuse by time and date before leaving theatre:
- it is recommended an expiry time of 4 hours after completion of ICS processing is used, however this should be agreed locally and documented in policy[15]

3.9 reinfusion should be prescribed on the All Wales Transfusion Record; this should include:
- the volume for reinfusion
- the rate/duration of reinfusion, which should account for the expiry time

4. Roles

Hospitals should identify who has responsibility for:

4.1 consenting the patient for use of ICS
4.2 making the decision to use ICS on the patient
4.3 raising ICS use in the team briefing, including any specific considerations
4.4 labelling the processed salvaged red cells
4.5 prescribing reinfusion of the processed red cells
4.6 documenting ICS use in the patient's records
4.7 informing the patient they have received ICS salvaged red cells
4.8 auditing ICS use

Hospitals should define which staff can:

4.9 set-up the ICS machine and collection/processing set
- the choice of anticoagulant used may dictate which staff this is

4.10 operate the ICS machine
4.11 suction blood from the surgical site

References

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14. UKCSAG (2024). **ICS Technical Factsheet No. 1: Blood Collection and Processing** (v1)
15. UKCSAG (2024). **ICS Technical Factsheet No. 2: Reinfusion of Cell Salvaged Blood** (v5)

    All UKCSAG factsheets can be accessed here: https://www.transfusionguidelines.org/transfusion-practice/uk-cell-salvage-action-group/technical-factsheets-and-frequently-asked-questions-faq