Clinical Update

Irradiated blood components

For prevention of transfusion-associated graft-versus-host disease (TA-GVHD)

- TA-GVHD is a rare but almost universally fatal complication of transfusion caused by proliferation and engraftment of transfused donor T-lymphocytes in the bone marrow of susceptible recipients.
- Irradiation (or cold storage ≥ 21 days for red cells) inactivates viable T-lymphocytes in cellular blood components.

Updated Australian and New Zealand Society of Blood Transfusion (ANZSBT) Guidelines (2024)[1]

- ANZSBT Guidelines for Prevention of Transfusion-Associated Graft-Versus-Host Disease 2nd Edition, January 2024 provide comprehensive guidance.
- South Australian Blood Management Council (SA BMC) supports the use of these updated guidelines to inform local health service practice and procedures.
- The updated ANZSBT guidelines **replace** the SA Health 'Clinical Guidance on the Use of Irradiated Blood Components' (2019) and the associated Quick Reference Guide (QRG).
- The ANZSBT guidance may not be appropriate in all patient situations, and individual or local circumstances may dictate an alternative approach.

Types of blood components requiring irradiation

- Irradiation is relevant to cellular blood components: **red cells, platelets and granulocytes** (and whole blood). All platelets and buffy coat granulocytes supplied by Australian Red Cross Lifeblood are irradiated, and some red cells are irradiated (red cells have a shortened shelf-life post-irradiation of 14 days).
- **Important!** Haemopoietic progenitor cells, donor T-lymphocytes and CAR-T cells **must not be irradiated** as they will be rendered ineffective.
- Cellular blood components from HLA-matched (compatible) donors or from related donors **must** be irradiated (except as indicated above as 'must not be irradiated').
- All granulocytes **must** be irradiated (both buffy coat granulocytes provided by Lifeblood and apheresis granulocytes collected by health services).
- Non-cellular blood components: Cryoprecipitate, fresh frozen plasma and manufactured plasma products **do not** require irradiation as they do not contain viable T-cells[1].

Emergencies when irradiated units are indicated but unavailable

- **Important!** In the event of critical and life-threatening bleeding, transfusion should not delayed if irradiated units cannot be sourced immediately and a delay in transfusion may result in death[1] [ANZSBT flow chart, page 47].
- Lymphocyte proliferation and risk of TA-GVHD declines with red cell storage.
- Cold-stored red cells in storage for 21 days or more are irradiation equivalent[1] [R4].
- Red cells in storage for 14 days or more may be considered TA-GVHD safe and utilised for patients at risk of TA-GVHD when irradiation equivalent red cells are not available[1] [PP4].
- In patients at risk of TA-GVHD who need emergency transfusion, the use of the shortest expiry (oldest) suitable red cells is acceptable if irradiated (or equivalent) units are not available[1] [from PP26]. For neonates and infants, decision-making should incorporate the age of suitable red cells given the increase in extracellular potassium after irradiation.
- Where an irradiation equivalent or TA-GVHD safe component is issued where an irradiated component was otherwise indicated, the unit must be tagged accordingly[1] [R12]. E.g. 'Considered irradiation equivalent (or safe) for the prevention of graft versus host disease,' or similar wording[1] [page 26].

Irradiated blood components (continued)

Clinical indications for irradiated blood components

- The associated Irradiated blood components – QRG with summary tables is a template for SA local health services to endorse or adapt/update, based on 2024 ANZSBT guidelines.
- Refer to ANZSBT guidelines for the complete tabulated list of recommendations [R] (p 9 - 11), practice points [PP] (p 12 - 14) & appendices with risk assessment table & flow charts:
  - 'Flow chart for clinical indications for irradiation in intrauterine, neonatal & paediatric transfusions' [p 46]
  - 'Flow chart for clinical indications for irradiation in adult & paediatric transfusions' [p 47]
- Some patients without an indication for their primary condition, may require irradiation for other indications (e.g. cytotoxic therapy) or for the specific component type being transfused. Cross-referencing between the different sections of the guidelines is required.
- The guideline indications may not cover all clinical scenarios or evolving best practice and may require an alternative approach based on local clinical policies and expert advice.
- Individual clinical risk assessment with emerging therapies should be considered. **Seek expert advice when in doubt.**
- **Red cells for intrauterine and exchange transfusion** should be as fresh as possible (<5 days old) at irradiation and must be used within 24 hours of irradiation.

Communicating & documenting irradiation requirements

- Systems and education to ensure timely communication and documentation of patients' special requirements should be developed and implemented.
- Processes are required to ensure irradiation requirements are identified and communicated across clinical and laboratory services involved in the care of at-risk patients[1] [PP7].
- The clinician requesting the crossmatch or blood product is responsible for ensuring irradiated components are requested for appropriate patients. It is the clinician's responsibility to ensure that accurate clinical information appears on the request form.
- The special requirements must also be documented on the prescription each time the product is prescribed, and the blood product checking procedure must ensure the blood product is checked for compliance with any special requirements on the prescription.
- Refer to SUNRISE EMR QRG for documenting transfusion special requirements to record the requirement in the patient's EMR **Transfusion Problem List** (generates an alert).
- The hospital Blood Bank/Transfusion Laboratory must be notified of all new requirements or changes to existing requirements so that they can be recorded in the Laboratory IT system, to ensure the correct blood is issued (and ordered if not available).
- Clear communication channels should be developed with local Blood Bank/Transfusion Laboratory, pharmacy, shared-care hospitals to further minimise the risk of TA-GVHD.
- Patients at risk of TA-GVHD should be made aware of their need for irradiated blood components by the prescribing clinician & be provided with appropriate written information.
- All incidents, including cases of TA-GVHD, should be reported via SLS or local incident reporting system. This includes 'near misses', such as when a non-irradiated component is transfused to a patient where irradiated products were indicated but no harm occurred.

For more information, refer to local Health Service guidance or contact your Blood Bank / Transfusion Laboratory.

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