e-Network Forum
CALIFORNIA BLOOD BANK SOCIETY
"We help save lives of people who need blood"

How do blood banks know when a patient should get irradiated blood, if the patient's doctor forgets to order the blood to be irradiated?

A blood bank Technical Supervisor from a Midwest University Hospital is very familiar with the medical indications for the use of irradiated blood products and related issues, such as those discussed previously by the e-Network Forum at the following links:

- Is irradiation necessary for cellular blood products intended for patients receiving Fludarabine and/or similar drugs for low-grade non-Hodgkin's lymphoma?
- Hutchinson et al. Early diagnosis and successful treatment of a patient with transfusion-associated GVHD with autologous peripheral blood progenitor cell transplantation. Transfusion. 2002 Dec;42(12):1567-72.
- Practical concerns with the irradiation of Red Cells either before or after they have been frozen (and thawed)
- Should cellular blood products for exchange transfusion in neonates be routinely irradiated?
- Policies for storage of previously irradiated red cell units intended for transfusion to neonates
- Neonatal transfusion practices for prevention of CMV transmission
- Naiman JL et al. Possible graft-versus-host reaction after intrauterine transfusion for Rh erythroblastosis fetalis. N Engl J Med. 1969 Sep 25;281(13):697-701.
- Risk of hyperkalemia from irradiated Red Cells used to prime ECMO circuits in neonates
- Methods for documenting blood component irradiation
- Post-irradiation storage of Red Cells intended for transfusion to neonates
- The effect of irradiation on aliquots of blood in syringes
- Should we irradiate Red Cells transfused to patients with sickle cell anemia?

He asks the following questions:

- **How do blood banks know when a patient should get irradiated blood**, if the patient's doctor forgets to order the blood to be irradiated?
- Do any colleagues **employ an alert system**, similar to that used by nursing services to alert caregivers when a patient has a risk of severe allergic reaction to penicillin, aspirin or other drugs?
- Has anyone had **experience using Medic Alert bracelets** to indicate that a patient has a special transfusion need, such as a need for irradiated products?

ADDENDA Feb. 28, 2005

The following comments have been received.

1. **A medical technologist in Iowa** reports that their Meditech system alerts the technologist when an irradiated blood 'marker' had been applied to the patient's history record. **If the current order does not include irradiation**, it prompts the technologist to contact the doctor. In her opinion, this approach affords proper use of their resources in updating the patient's history.

2. **A former blood bank supervisor turned web designer** would like to inquire of the MT in Iowa **how the blood bank staff knows to place the "marker" in the patient's history to begin with** (other than just relying on the physician order). She would like to know more about how a patient's diagnosis and indication might flag the original blood order. Once the blood bank

knows the indication, it is easy to put a comment/marker/warning (whatever it is called in one's particular software package) into the computer database. In her opinion, the tricky part is how to make the blood bank aware of the indication for a patient's special transfusion requirements.

3. **A transfusion medicine physician and quality manager in Spain** reports that GVHD is an increasing concern, as seen by the SHOT report, in which patients with B-cell malignancies were listed as being at increased risk of GVHD. Other reports have identified treatment with purine analogues as an independent risk factor for this problem. He feels that we need a **proactive prevention strategy**, taking into account the fact that B-cell lymphomas are increasing in frequency and fludarabine is being used for maladies other than lymphomas (i.e. autoimmune disorders).

He adds, "If a patient needs irradiated blood, it is easy to flag his/her transfusion record as such and this way the patient will always get this kind of blood until deemed unnecessary. Universal leukoreduction cannot be relied upon to prevent GVHD. The real problem is how to manage patients who will or may need irradiation but do not have a transfusion record in the blood bank. This implies the following:

- Previously you have decided **which patients** need irradiation of cellular products.
- There is a **good communication** between the blood bank and those clinical/laboratory areas which identify patients needing irradiation.

Some hospitals in Spain have developed the **following strategies**:

- The **hospital pharmacy** periodically sends the list of new patients receiving fludarabine and purine analogues to the blood bank, so that a transfusion record is opened for those patients and the need of irradiation stated, in case they need transfusion in the future, even if the patient has never been transfused.
- The **Pathology Dept** sends the blood bank a monthly list of new patients with B-cell malignancies, so that the transfusion record is opened. These data can be crossed with data from the pharmacy, not to duplicate records.
- These strategies are being applied to **an increasing array of conditions** such as AIDS, severe systemic lupus, other malignancies."

4. **A transfusion service supervisor in Northern California** acknowledges that they have a similar concern about knowing when to use irradiated blood products. Presently, they rely on the nursing staff to contact them with the information on newly diagnosed patients (or new to their facility). They have indeed had a few close calls where a 'random' unit had been issued to the ward but caught before transfusion by a vigilant RN who realized that she hadn't given Transfusion Services the appropriate information. They are in the process of converting to **an Electronic Medical Records system where the physician will be required to complete certain on-screen fields before ordering the crossmatch (or a product)**. The physician will be blocked from proceeding until answering yes or no to the need for **irradiated and CMV negative components**. Once a 'yes' is entered, that information will be interfaced with the LIS computer system, so the need for irradiation will go directly into the patient history. Hopefully this will avoid any additional near misses.

5. **A blood bank supervisor in Colorado** reports that the **first time a patient has an order for leukoreduced or irradiated products they add a "marker" to the patient's history file**. It is usually **other** attending physicians that don't realize the patient has special needs. If irradiated products are not ordered, the transfusion service staff calls the nursing unit to have them check it out. Sometimes the physician feels that the patient no longer requires irradiated products. When this happens they remove the marker from the history file with a comment noting which doctor made the request. They are currently using the Meditech information system.

6. **A transfusion medicine physician who directs a busy service in Los Angeles** reports that patients undergoing chemotherapy or radiation therapy at her hospital are assigned to the hematology/oncology unit, and orders originating from that location are flagged. In addition, transfusion medicine consultations, chart reviews, or surgical pathology reports may result in recommendations for a patient to receive irradiated blood products. **Orders for irradiated blood are coded as a special transfusion need** in the computer record (MISYS) which then flags that need for subsequent blood transfusions.

ADDENDA Mar. 1, 2005

7. The blood bank Technical Supervisor from Iowa (#1 above) replies to the former blood bank supervisor (#2 above) that when he commented on the the issue the first time, he had read the question as relating to perpetuating irradiated blood after an initial order of it. His lab has no formal method of questioning a physician's blood order as it relates to irradiation. However he points out that if they suspect that it is needed, they would contact the physician or nurse for clarification. **Clues that would prompt such contacts include** :

- the patient's diagnosis
- the name of one of the physicians on the order or prior orders
- white blood cell or absolute neutrophil count. or other lab data

The responding colleague has struggled with this problem for decades. He laments that perhaps the blood banking community can finally bring pressure to implement some of the suggestions of some of the other e-Network Forum contributors.

ADDENDA Mar. 7, 2005

8. **A colleague in Florida**, in reference to item #3 above, asks if there is a consensus on **how long** irradiated blood products should be continued **following treatment with nucleotide analogs (such as Fludarabine)**. From his reading it looks like it should be at least 12-18 months, but some may advocate lifetime. His institution is in the process of writing a rule to alert physicians using Physician Order Entry of the need to order irradiated cellular components for these patients, and the need to build this into their decision alert.

ADDENDA Mar. 8, 2005

9. **The Medical Director of a Pediatric Transfusion Medicine service in a Boston hospital** reports that they do not believe there is any sure way to ensure that a blood bank is always aware of a patient's need for irradiated blood. Hence, **they irradiate ALL red cell, platelet, and whole blood units**, except for emergency situations when there is no irradiated blood in inventory. They irradiate the blood products **at the time of crossmatch** if there is not an irradiated unit in inventory already. In his experience, the **main difficulty with this approach** at a pediatric hospital is that irradiation hastens release of potassium from red blood cells and infants receiving massive transfusions may suffer from hyperkalemia. This is especially challenging if there is a high crossmatch:transfusion ratio, since that can result in a relatively large inventory of irradiated units in the blood bank. He acknowledges that in effect, they have **traded one challenge for another**.

10. **A transfusion Medicine Specialist in a teaching hospital in New Zealand** reports that her experience is that blood order requests do NOT always indicate that a patient should receive irradiated blood components when they need them. Because of this they seek information from as many sources as possible, to minimize the risk that a patient who needs irradiated blood fails to receive it.

- They **highlight the requirement for irradiated blood in an electronic patient management system** as soon as it is realized that the patient needs irradiated products. This alert also appears in the blood bank management system.
- They regularly **acquire lists of the patients who are receiving purine analogs from the pharmacy** and enter that information on the blood bank management system
- They maintain a **100% irradiated red cell and platelet inventory for pediatric/ neonatal patients**. They also irradiate all **platelets** that are supplied to **hematology/ oncology** patients.

In spite of all the above measures some patients have slipped through the net. She asks rhetorically "**Is there really any foolproof system?**"

ADDENDA Apr. 17, 2006

11. **A medical technologist** reports that her hospital transfusion service recently received an order for two units of **irradiated, leukocyte reduced RBCs** for transfusion of a group O, Rh positive **pregnant sickle cell disease patient** who was suffering a sickle cell 'crisis' at 23 weeks gestation. The physician did not request that the RBC donors be CMV seronegative or that the phenotype of the donor RBCs be matched with the C, E and K-antigen phenotype of the patient. The patient had a negative screen for unexpected red cell antibodies. The technologist

contacted the local blood supplier and requested two units of group O, Rh positive, leukocyte reduced, irradiated RBCs, as requested by the physician. However, she also requested (in accordance with their local transfusion service policy) that the RBCs be **CMV seronegative** (because the patient was pregnant), and that the red cells be **Hgb S negative** and **C-, E-, K-antigen negative** because the patient has sickle cell disease. The inquiring medical technologist is **uncertain why the donor red cell units had to be irradiated**, but did comply with the physician's order. She is aware that intrauterine transfusions must be irradiated to prevent Graft versus Host Disease (GVHD) of the fetus/newborn, but she was not aware of random donor RBCs causing GVHD in pregnant women. She 'assumes' that the physician ordered the RBCs to be irradiated because pregnancy imposes some degree of immunosuppression so as to not reject the fetus, and because at her hospital the fetus would be transfused with leukocyte reduced, CMV seronegative, irradiated RBCs if it needed a transfusion shortly after birth. She wonders **if there are clear guidelines or documentation that supports giving irradiated RBCs to a pregnant woman?** If so, might the new mom's "slight immunosuppression" continue for several days or weeks beyond delivery so that there might be a **concern should the mother require blood products just after delivery as well as during pregnancy?**

Please submit comments to the e-Network Forum.

Page 2

Printable PDF of these pages

Ira A. Shulman, MD
CBBS e-Network Forum Editor & Moderator

Posted: February 27, 2005

Addenda: Feb. 28; Mar. 1, 7 & 8, 2005; Apr. 17, 19, 21 & 23; May 25; June 16, 2006; Dec. 29, 2007; Jan. 10, 2008

e-Network Forum
CALIFORNIA BLOOD BANK SOCIETY
"We help save lives of people who need blood"

How do blood banks know when a patient should get irradiated blood, if the patient's doctor forgets to order the blood to be irradiated? *Page 2*

ADDENDA Apr. 19, 2006

12. **A transfusion medicine physician at an academic medical center in Pennsylvania** reports that his hospital **uses irradiated blood products for all patients** who need transfusion, so that they do not have to rely on those who order the products to know (and inform the blood bank) that irradiated products are indicated.

13. **A Consultant Hematologist for the National Blood Service in the UK** reports that in his opinion there is **no need to irradiate blood products merely because they need to be transfused to a pregnant patient**.

14. **Dr. Susan F. Leitman, Chief of the Blood Services Section, Department of Transfusion Medicine at the National Institutes of Health** (attribution used with permission) reports that she is **not aware of a case of TA-GVHD having occurred in a pregnant woman**, nor is she aware of a mechanism whereby pregnancy alone would confer a degree of immune suppression sufficient to increase the risk of TA-GVHD. She wonders if the physician who ordered irradiated RBCs as reported in the case above and in the ADDENDUM of Apr. 17, 2006, might have done so with the goal of protecting the fetus (as opposed to the mother) from TA-GVHD risk, and therefore confused the well-documented incidence of TA-GVHD following intrauterine transfusion with a 'hypothetical' risk of TA-GVHD from a maternal transfusion. However, the risks do not overlap since a fetus is not at risk of TA-GVHD from passenger lymphocytes transfused to its mother. Dr. Leitman acknowledges that all blood product transfusions are irradiated at the NIH, as that institution practices 'universal irradiation.' However, she adds that in an institution not practicing universal irradiation, she would **not recommend irradiation of cellular blood products merely because a transfusion recipient is pregnant**. With regards to the use of CMV seronegative blood for a pregnant woman, at the very least she **would want to know the CMV serostatus of the mother** before this was considered. She is also of the opinion that there is **no specific indication for leukocyte reduction of units transfused during pregnancy**, in an institution which is not practicing universal leukoreduction. Dr. Leitman agrees that providing **phenotype-compatible red cell units to sickle cell disease patients is a medically justifiable practice**, whenever possible. Finally, it is interesting to her that the CMV negative, phenotype-compatible blood product order (see case report) was generated by the transfusion service (per their policies) and not by the ordering physician, making it sound as though the ordering physician may not even be aware of these practices. At the NIH, the transfusion medicine staff meet bimonthly with the major sickle cell treating physicians to review odd or unusual cases and to review and refresh transfusion and apheresis guidelines.

ADDENDA Apr. 23, 2006

15. **At the Los Angeles County+USC Medical Center**, a pregnant sickle cell disease patient who needs a transfusion would **routinely receive leukocyte reduced (CMV low risk) red cells**, since essentially all RBC units used at that facility are leukocyte reduced. Furthermore, a pregnant sickle cell disease patient would receive donor RBCs that are **matched to the patient's C, E, K phenotype**. The LAC+USC blood bank **does not routinely provide irradiated RBCs for pregnant patients**, unless specifically requested (and justified) by the patient's physician. Furthermore, **RBC units used for adults with sickle cell disease are not screened for hgb S**, unless specifically requested (and justified) by a clinician who wants to quantify and trend a patient's hgb S levels (such as by serial hemoglobin electrophoresis).

ADDENDA May 25, 2006

16. **A colleague who works in the UK at the Leeds teaching hospitals** reports that their **blood bank receives data directly from pharmacy** as to which patients are receiving the following drugs, which qualify the patient to receive irradiated cellular blood products:

Fludarabine phosphate (Fludara®)
Cladribine (Leustatin®)
Alemtuzumab (Campath®)
Other purine analogues

Their local practice is based on the recommendations of the UK SHOT program which said in 2003 'Prevention of TA-GvHD in patients receiving purine analogues is the responsibility of prescribers, but can and must be supported by the pharmaceutical industry and pharmacists and by suppliers of laboratory IT systems. All patients should receive an information card and leaflet and haematologists must ensure that there is an effective system of flagging special transfusion requirements in the laboratory. Referrals for shared care must include timely communication of all relevant information.' In the 2004 SHOT report it says 'Robust systems for noting patients' special requirements should be developed together with a policy of empowering patients to be more aware of their own special needs.'

ADDENDA June 16, 2006

17. **A colleague in Jefferson, New York** reports that his hospital transfusion service uses a **commercial computer/software system** which allows the operator to insert a special need (such as irradiated cellular products) for a patient. **If the special need is not fulfilled** (i.e., a non-irradiated product is selected for a patient with a special need for irradiated products, either at product selection or release) the **computer will require a password to actively override** the system in order to release the product. The respondent reports that they have **had very good experience** with this system and that it can be used to indicate a specific patient must receive special phenotyped blood products as well as CMV antibody negative products, etc.

ADDENDA Dec. 29, 2007

18. **A Blood Bank Supervisor, at a Medical Center in Jacksonville, Florida** reports that she is **aware of at least one facility that stocks only irradiated blood products** to avoid using a non-irradiated unit for a patient who needs irradiated blood products. Her question is "Are others doing this?"

ADDENDA Jan. 10, 2008

19. In response to the question posed in addendum #18 **Dr. Paul Holland** (attribution used with permission) reports he is **aware of three hospitals** which only stock irradiated red cells and platelets to ensure that patients at risk of T-A G-v-H D only get irradiated blood components. The three centers are 1) the **Clinical Center at the NIH**, 2) **MD Anderson** Hospital in Houston, and 3) **Childrens' Hospital of Philadelphia**. Also, according to Dr. Holland, **in Japan, all units are irradiated** because of the limited HLA diversity of their population.

Please submit comments to the e-Network Forum.

Page 1

Printable PDF of these pages

Ira A. Shulman, MD
CBBS e-Network Forum Editor & Moderator

Posted: February 27, 2005

Addenda: Feb. 28; Mar. 1, 7 & 8, 2005; Apr. 17, 19, 21 & 23; May 25; June 16, 2006; Dec. 29, 2007; Jan. 10, 2008