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Bloody Good News

Newfoundland and Labrador Provincial Blood Coordinating Program

Special Interest Articles:

- NL Takes on Lead Province Role from 2010 to 2012
- Informed Consent and Patient Notification
- TRALI

Individual Highlights:

Symposium on Issues in Blood Transfusion

The NL Provincial Blood Coordinating Program held its fourth annual meeting on November 20, with twenty-five participants attending, representing the four regional health authorities. This year's focus incorporated a theme of teamwork in the development of guidelines and policies.

The first presentation discussed the utilization of Intravenous Immune Globulin (IVIG) and the provincial perspective while assessing our role in the national scope. Discussion included the appropriateness of use and the frequency with which patients received IVIG. New products coming to the marketplace were introduced and an overview of the future direction of IVIG utilization was presented.

The second presentation included case studies of adverse reactions to transfusion involving multiple reactions.

The expertise of corporate trainer, Tom Brophy, engaged the audience in two team building exercises demonstrating the importance of communication and collaboration. The exercises emphasized the objectives while ensuring everyone had fun doing it proving that you can enjoy work and collectively reach your goals in a time efficient manner.

The final presentation identified the differences between standards, guidelines, and accreditation and how to incorporate these principles into document development. The topic of Reducing the Silo Effect demonstrated the importance of communication in the development of documents that work for all stakeholders.

NL Leads National Blood Portfolio

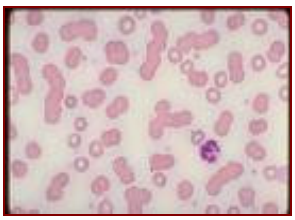
NL Department of Health and Community Services is ramping up to take the lead of the National Blood Portfolio. The provincial and territorial governments fund the blood system in Canada.

Each Provincial/Territorial representative (P/T rep) provides advice to the Deputy Minister and Minister of Health for their jurisdiction. On a rotational basis, each province/territory assumes the lead role every two years.

The Lead Province participants of the National Blood Portfolio include the Minister of Health, the Deputy Minister of Health, Senior Manager Lead Province, who may also serve as the P/T rep, Chair of National Advisory Committee (NAC), Program Manager of the Provincial Blood Coordinating Program, and policy analysts. Some of the functions of the Lead Province include acting as chair of various committees, development of policy options and related documentation on blood issues, and serve as the primary liaison between the P/Ts, CBS and the Federal Government. The Senior Manager is also responsible for drafting briefing notes to the Ministers related to Canadian Blood Services initiatives, such as Plasma Protein Products (PPP), Organs, Tissues, Donation and Transplantation (OTDT) to name but a few.

The Lead Province is also responsible for reporting the activities of the National Advisory Committee (NAC) on Blood and Blood Products. NAC consists of transfusion medicine experts from across the country. The members of NAC through various working groups identify issues/gaps related to areas that include new product guidelines, emergency blood management and massive transfusion, to name a few.

This opportunity will mean two busy years for the Department of Health and Community Services including the PBCP.



Rouleaux formation occurs when red blood cells form stacks or rolls. This is due to either an artifact or it may be due to the presence of high concentrations of abnormal globulins or fibrinogen. This formation of the red blood cells is found in multiple myeloma and macroglobulinemia.

Emergency Blood Management Plan

The National Advisory Committee on Blood and Blood Components has drafted a plan to address the management of labile blood components during an inventory shortage.
A threat to the blood supply can originate as a result of any type of disaster, including pandemic.

The plan is designed with four levels of alert - green, amber, red and recovery. The Green phase identifies that the blood component supply is within normal inventory levels as established by Canadian Blood Services and hospitals Blood Banks. Normal utilization activities occur.

The Amber phase identifies that there is a short term shortage of inventory and that inventory levels may not be sufficient to continue with routine transfusion practice.

The Red Phase indicates that a severe or prolonged shortage exists that could pose an imminent or severe threat to the blood supply. At this point, elective indications for transfusion may be triaged to ensure that urgent requests for blood components can be filled to meet urgent patient needs.

The Recovery phase indicates that inventories of blood components have returned to normal. During this return to normal, it is important that resumption of transfusion activity is monitored and transfusion acitivity is ramped up slowly so that recovering inventories are not depleted.

At any point in the amber phase or the red phase, improvements in inventory may support the return to recovery phase.

The PBCP, in collaboration with the RHA's and CBS, will establish a core committee that will communicate regularly in the event of a shortage so that ethical, responsible actions and patient care are not compromised.

Informed Consent and Patient Notification

Informed consent is the process by which a patient is educated regarding the benefits and risks surrounding a proposed medical treatment. Informed consent for transfusion must include educating the patient on the type of blood, blood component and/or blood product to be transfused. The patient must also be informed of the benefits and risks associated with the transfusion of each component and/or product.

At the same time, information on alternatives to transfusion and their associated benefits and risks must also be presented (CSTM Standard 1.9, Canadian Standards for Hospital Transfusion Services).

The patient's physician must supply the information in a language the patient understands and in a setting that provides the patient with sufficient time to comprehend the information.

The patient must be able to ask questions and receive satisfactory answers. The discussion should take place within a timeframe that permits the patient to avail of alternative treatments, i.e. autologous blood donation or drug therapy.

In the case of the incompetent adult, where there is no advanced health care directive, or a minor child, it is the physician's responsibility to provide this information to the substitute decision maker or legal guardian.

It is also the patient's right to refuse consent for transfusion. The physician must ensure that the patient is aware of and understands the consequences of refusing the transfusion.

It must be documented in the patient's medical chart that a discussion has occurred and the completed consent or refusal form must become part of the patient's chart.

CSTM Standard 1.8, states that current risks associated with transfusion practices must be communicated to healthcare professionals. This will ensure that the patient is supplied with accurate information.

The patient or substitute decision maker or legal guardian must be informed that the patient has received a transfusion. Written notification of transfusion must be provided to the patient. (CSTM Standard 1.10)

Documentation of the transfusion must also be recorded in the patient's medical chart, hospital discharge summary and the follow-up letter from the attending physician to the referring physician. Only the patient or his/her legal guardian or substitute decision maker shall received notification of transfusion. The notification of transfusion will be placed on the medical record of deceased patients.

"Nothing in the world is more dangerous than sincere ignorance and conscientious stupidity."

Martin Luther King Jr. (1929-1968)

Transfusion Related Acute Lung Injury (TRALI)

Characterized by an acute onset of respiratory distress, Transfusion Related Acute Lung Injury (TRALI) is a potentially life-threatening complication of the transfusion of blood components containing plasma, including autologous units. Intravenous Immune Globulin (IVIg) and cryoprecipitate have also been implicated in this type of reaction.

TRALI is one of the three main causes of transfusion-associated mortality, the others being ABO incompatibility and bacterial contamination. The mortality rate associated with TRALI is between 5 and 10%. Recipients of all age groups and either sex may be equally affected by TRALI. Though the incidence of TRALI is estimated as 1:5000 transfusions, the syndrome is under-recognized and under-reported worldwide. Reports of severe respiratory distress following transfusion had been described in medical literature since 1951.These reports had been identified by several different names, however all included symptoms of acute respiratory distress, acute pulmonary edema, hypotension and fever. In 1983, it was recognized that these symptoms identified a specific syndrome – that of an acute lung injury (ALI) related to transfusion.

Although the syndrome was recognized as an adverse reaction to transfusion it was not until 2005, at the Canadian Blood Services (CBS) Consensus Conference Panel on TRALI, that a panel of international transfusion medicine experts developed a definition of Transfusion Related Acute Lung Injury.

TRALI symptoms develop during or within 6 hours of transfusion. Recipients experience a rapid onset of acute respiratory distress, hypotension, cyanosis and fever. A chest x-ray usually reveals bilateral pulmonary edema not associated with cardiac failure (non-cardiogenic edema), and patchy infiltrates that, within several hours, progress to a complete "white-out" of the lung. The jugular venous and pulmonary wedge pressures are normal in TRALI as opposed to fluid overload. Hypotension experienced in a TRALI reaction does not usually respond to intravenous fluid therapy. The clinical picture of TRALI may run from mild to severe. TRALI is diagnosed by the exclusion of other causes of respiratory distress and pulmonary edema, i.e. pneumonia or myocardial infarction. Other classifications of adverse transfusion reactions such as bacterial contamination and anaphylaxis should be ruled out.

Treatment of recipients experiencing a TRALI reaction is mostly supportive. Supplementary O_2 therapy is usually sufficient in mild cases, however admission to the intensive care unit, intubation and mechanical ventilation may be required for severe cases. Corticosteroids and diuretics are not recommended for treatment of TRALI. Complete recovery usually occurs within 72-96 hours without long term sequelae.

Patients who experience a longer recovery period, often up to 7 days, appear to suffer no permanent damage. There are three hypotheses of the mechanics of TRALI. The first involves white cell antibody-antigen interaction. The infusion of donor anti-HLA (human leukocyte antigens) or anti-HNA (human neutrophil antigens) antibodies, present in donations from multiparous females or people who have previously been transfused, react with the recipient's white cell antigens. This hypothesis suggests that the antibody-antigen binding activates complement, C5a, which in turn causes the neutrophils to adhere to the pulmonary endothelium, increase permeability and cause pulmonary edema due to the accumulation of fluid from capillary leakage. This antibody-antigen interaction has been demonstrated in the majority of cases reviewed in literature.

Another theory is that of a "two-hit" mechanism. The " first hit" is thought to be the patient's clinical condition, for example pneumonia, sepsis or massive transfusion, which causes activation of pulmonary endothelium cells. This activation then "primes" neutrophils, which subsequently adhere to the pulmonary endothelium. The "second hit" is the infusion of biologic response modifiers (BRMs) found in the blood component. These BRMs, which accumulate in stored blood, include anti-HLA or anti-HNA antibodies and lipids, react with the primed neutrophils and cause endothelial damage, capillary leakage, non-cardiogenic pulmonary edema and acute lung injury.

Definitions from CBS Consensus Conference Panel on TRALI:

Acute Lung Injury (ALI):
- Acute onset
- Hypoxemia –
  - PaO_2/FiO_2 <300mm Hg
  - O_2 sats <90% on room air or other clinical evidence of hypoxemia
  - Bilateral infiltrates on frontal chest x-ray

Risk Factors for ALI:
- Direct Lung Injury:
  - Aspiration
  - Pneumonia
  - Toxic inhalation
  - Lung contusion
  - Drowning
- Indirect Lung Injury:
  - Severe sepsis
  - Shock
  - Multiple traumas
  - Burn injury
  - Acute pancreatitis
  - Drug overdose
  - Cardiopulmonary bypass

TRALI:
- Acute Lung injury (ALI) occurring within 6 hours of completion of a blood component transfusion
- No pre-existing ALI
- No other risk factor for ALI

Possible TRALI:
- ALI occurring within 6 hours of completion of a blood component transfusion
- No pre-existing ALI
- One or more risk factors for ALI

Transfusion Related Acute Lung Injury (TRALI) cont'd

This theory is used to explain cases of TRALI where HLA and HNA antibodies are not detected in the donor and TRALI that occurs when autologous units are transfused. To explain TRALI in neutropenic patients, a third theory has been put forward. High levels of donor derived vascular endothelial growth factor (VEGF) may cause shape changes in and damage to the pulmonary vascular endothelium leading to capillary leakage. Donor antibodies to class II HLA antigens residing on the recipient pulmonary vascular endothelium may also elicit this type of response.
TRALI will continue to be a risk of transfusion therapy. Its frequency may be reduced by appropriate use of blood and blood components. In an effort to reduce the incidence of TRALI many countries now collect plasma for transfusion from male donors and female donors who have not been pregnant. Plasma from female donors who have been pregnant is mainly used for production of plasma products, such as IVIG and albumin.
If it is suspected that a patient has experienced a TRALI reaction it is important that Canadian Blood Services (CBS) is notified so that companion products from implicated units can be removed from the blood centre's inventory, or if already distributed, quarantined or removed from hospital blood bank stock. Blood samples should be collected from the recipient and, along with a completed TRALI Patient Data Form, be forwarded to a CBS reference laboratory for investigation. The samples will be tested for human leukocyte and human neutrophil antigens. Blood samples from the implicated donor(s) will be tested for antibodies to the leukocyte and neutrophil antigens on the recipient's white cells. An implicated donor who tests positive for the antibodies will be permanently deferred from donating.

Answer from Vol 3, Issue 3

Who is this professor of Haematology at the University of London, St. Mary's Medical School who wrote the first and best-known textbook about transfusion in clinical medicine, first published in 1951, a classic that is now edited by others, but was so famous that it was, and still is, simply known by his name?

Professor P.L. Mollison

Case Study #8

A 58 year old female on Warfarin for atrial fibrillation was admitted to hospital with a spontaneous abdominal hematoma. Laboratory tests reveal an INR of 3.4 and a hemoglobin of 89g/L. She received Vitamin K for reversal of the INR. The patient had been transfused within the past three months but her pregnancy history was unknown. She was not transfused under anesthesia. The patient was pre-medicated, Benadryl 50mg. IV, prior to receiving three units frozen plasma and two units red cells between 1825 and 0355 hours. Pre-transfusion vitals were T37.9, P 74, R 20 and BP 120/60. At 0355 hours, the patient experienced SOB and hypoxemia – O_2 sats 89%. Post-transfusion vitals were reported as: T 37.9, P 80, R 24 and BP 137/80. The transfusion was stopped and the patient treated with supplementary O_2. A chest x-ray performed at the time of the reaction did not support a diagnosis of TACO or TRALI.

1. Classify type of reaction

2. What was the relationship of the adverse event to the transfusion?

3. What was the severity of the reaction?

4. What was the outcome of the adverse event?

Case Study #7 Interpretation

1. *Transfusion Related Acute Lung Injury (TRALI)*
2. *Relationship of adverse event to transfusion – Possible*
3. *Severity of the reaction – Grade 2 (severe)*
4. *Outcome – Minor*

Each newsletter will contain an interesting case study for you to review. The type of adverse event and answers to the questions will be provided in the next edition of the newsletter

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