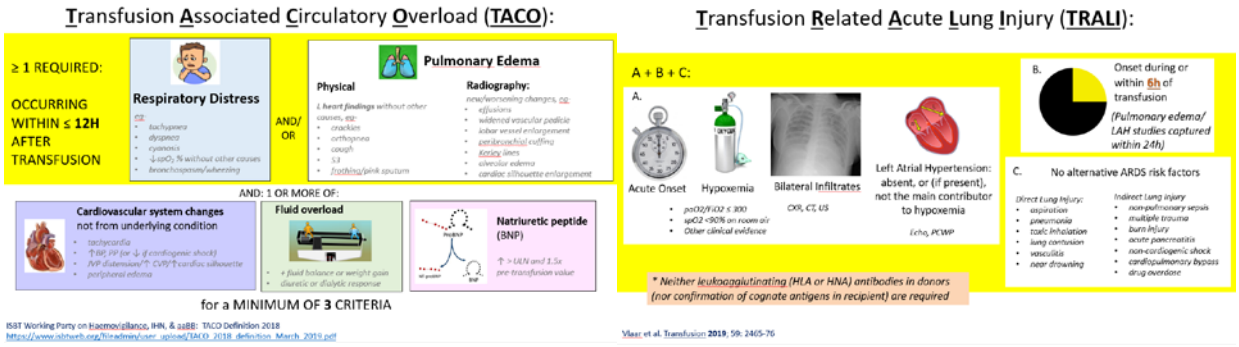
Dr. Christine Cserti-Gazdewich, Acute Non-Infectious Reactions

Minimum Disclosure Framework

in Layman's Terms & Logscale Frequencies

logscale		
1 2	**Common, minor events** (1 / 10^1-10^2)	non-serious **fever** non-serious **hives** make **antibodies** to donor antigens (RBC, HLA)
3 4 5	**Serious, potentially fatal events** (1 / 10^3-10^5)	**breathing trouble**: –volume-driven fluid excess –immune injury-driven fluid leaks –anaphylaxis / severe bronchospasm **bacterial contamination** of unit **botched process** (wrong sample or bag)
6	**Extremely rare events** (1 / 10^6 or less)	viral contamination of unit (**hepatitis, HIV**) **new** or **rare** (not tested-for) **bugs** fatal immune "take-over" by product

- Fever differential diagnosis
  - Low risk: FNHTR
  - High risk: bacterial contamination, bacterial sepsis, acute hemolytic transfusion reaction
- Dyspnea differential diagnosis: TACO, TRALI, Allergic, TAD



- Allergic reaction: ranges from cutaneous eruption to anaphylactic reaction
- Investigations:
  - Febriles: hemolysis, microbiology
  - Dyspneics: hemolysis, microbiology, CBS (donor ALA)
  - Hypotensives: hemolysis, microbiology
  - Anaphylactics: hemolysis, ?IgA/anti-IgA IgG
- Report all transfusion reactions to the blood bank and blood bank will report to outside channels (Canadian Blood Services, TTISS, Health Canada, etc.)

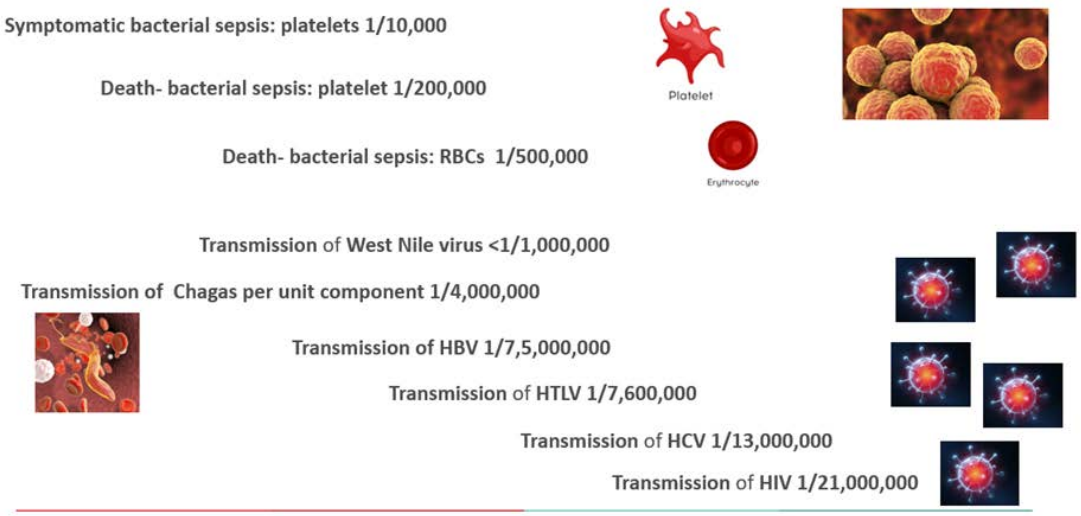
Dr. Steven Drews, Acute & Delayed Transfusion Transmitted Infections

Key Points

The most common transfusion transmitted infection is Bacterial sepsis

To reduce the risk of bacterial contamination
- Skin disinfection
- Diversion of the first 40mL of blood
- Detection of bacterial contamination in ALL platelet units

Transmission of blood borne viruses is extremely low



To reduce risk of other infections
- Donor health assessment questionnaire
- Infectious disease testing

Infectious marker testing for all donations at CBS

Agent	Assay	Window Period (days)
HIV	anti-HIV-1/2 HIV-1/2 NAT	8
HCV	anti-HCV HCV NAT	4.1
HBV	HBsAg anti-HBc HBV NAT	22.4
HTLV	anti-HTLV I/II	51
Syphilis	Antibody	na

1 Mosquito season and travellers
2 At risk donors
na = not available

- serological tests are performed on individual donor samples, duplicate repeat runs on positives
- NAT is performed on pools of 6 samples from with resolution of reactive pools down to individual specimen
- all screening tests done prior to product release

Dr. Marissa Laureano – Informed Consent

Key points

- Studies have shown that we can improve our informed consent process for transfusion
- Obtaining informed consent for blood is crucial for multiple reasons:
    - Ethical obligation: We need to respect patient autonomy, allow patients to be involved in their care, and allow for discussion
    - Legal obligation
    - Standards: Consent is required by the Canadian Standards Association and Canadian Society for Transfusion Medicine
- There are three key requirements of consent:
    - It must be voluntary
    - The patient must be properly informed
    - The patient should have the capacity to make decisions
- Who should obtain consent?
    - The most responsible physician, resident, fellow, or nurse practitioner ordering the transfusion
- Important elements of informed consent for blood:
    - Patient or substitute decision maker (SDM) providing consent
    - Indication for the transfusion
    - Possible benefits and risks
    - Potential consequences of not having the treatment
    - Alternative treatments
    - The choice made by the patient or SDM
- Discussing transfusion risks
    - The discussion should be tailored to the patient
    - Explore common risks and risks that are uncommon but severe
- Informed consent must also be obtained for blood derivatives
    - Blood derivatives include: albumin, IVIG, prothrombin complex concentrate (PCC), fibrinogen concentrate, Rh immunoglobulin (RhIg), and plasma-derived factor concentrates
- The discussion between the patient and healthcare practitioner is one of the most important aspects of informed consent for blood
- Reference: ORBCON informed consent pocket card https://transfusionontario.org/wp-content/uploads/2020/06/InformedConsent2017.pdf

Dr. Nadine Shehata – Alloimmunization Secondary to Pregnancy and Transfusion in Women of Child bearing Age

Alloimmunization (the development of an antibody to a foreign red cell antigen) occurs in women who are exposed to foreign paternal antigens during pregnancy or to foreign red cell antigens from red cell transfusion as alloantibody development occurs when an individual does not have the antigen of which she is exposed. If the alloantibody is an IgG alloantibody, it can traverse the placenta (IgM antibodies do not traverse the placenta), bind to the cognate antigen on the red cells of the fetus causing destruction of red cells and thus fetal anemia (hemolytic disease of the fetus (HDF). Anemia can extend to the neonatal period (hemolytic disease of the newborn (HDN)).

The risk of development of an alloantibody is not only dependent on exposure but also on the immunogenicity of the red cell antigen, the volume of red cell antigen exposed (higher volumes of red cell antigen exposure is associated with higher the risk of developing alloantibodies during pregnancy), the gestational age when the antigen develops in utero (earlier in gestation is associated with increases the risk of developing alloantibodies during pregnancy) and the ability for the mother to develop a cytotoxic antibody.

Because of these factors, not all mothers develop an alloantibody that is capable of causing HDFN. Once a woman develops an alloantibody however, there is a risk of severe HDFN e.g. fetal anemia although some women do not have HDFN. The D, K and c antigen are associated with more severe HDFN.

Preventing alloantibody development prevents the risk of HDFN particularly severe disease. Prevention of alloimmunization is achieved by reducing exposure to paternal antigens and/or red cell antigens vua red cell transfusion. The only paternal red cell antigen exposure that can be prevented/reduced is exposure to paternal D antigen by administering Rh immune globulin (RhIG) to the mother prophylactically or when there is fetal maternal hemorrhage (entry of fetal blood into the maternal circulation) as occurs during normal pregnancy or risk of fetal maternal hemorrhage (as occurs with trauma during pregnancy).

RhIG is a plasma derived product from donors with high anti-D antibodies. It is administered prophylactically at 28 weeks gestation to D negative mothers and after delivery if the neonate is D+. The prophylactic dose at 28 weeks gestation administered to a D negative mother assumes the father is D+. RhIG is also given within 72 hours of a sensitizing event (from fetal maternal hemorrhage) but may be given up 10 days after such an event.

Reduction of exposure of red cell antigens from red cell transfusion is achieved by red cell transfusion avoidance unless necessary (e.g. bleeding or symptomatic anemia) or if red cell transfusion is required, by administering K antigen negative red blood cells (which can be requested from the blood bank) to women of child bearing age to prevent alloimmunization to the K antigen.

Red blood cell transfusion is often prescribed according to hemoglobin concentrations. During pregnancy the hemoglobin concentration decreases because of hemodilution (increased blood volume relative to red cell mass). As such, hemoglobin concentrations decrease in pregnancy to a maximum of approximately 15g/L by the third trimester. As there are no trials of hemoglobin transfusion thresholds for red cell transfusion during pregnancy, transfusion is administered with anemia in pregnancy if the mother is symptomatic or bleeding or if the fetus is symptomatic (e.g. fetal tachycardia). Nonetheless the most common cause of anemia in pregnancy is iron deficiency so that ensuring mothers are iron replete by using prenatal vitamins and checking CBCs at the end of the first trimester to ensure a mother is not becoming anemic potentially results in a reduction of anemia and need for transfusion. Iron deficiency anemia can be treated with iron salts during the entire pregnancy and iv iron (iron sucrose) in the second and third trimester.

Dr. Yulia Lin, Pre-operative Patient Blood Management

What is patient blood management?

- Patient-centered and organized approach in which the entire health care team coordinates efforts to improve results by managing and preserving a patient's own blood
    1. Treat Anemia
    2. Minimize blood loss
    3. Appropriate use of blood

Why is treating preoperative anemia so important?

1. Preop anemia is associated with increased mortality
2. Preop anemia is potentially modifiable (both as a risk factor and a treatable condition)
3. Preop anemia is common ~ 1/3 of pts going for surgery have anemia!
4. Preop anemia is associated with transfusion
5. Transfusion is a bad outcome
6. The donor supply is precious resource

How to treat preoperative anemia?

- Autologous blood
    - Only to be used for patients with very rare blood type, for whom blood donors cannot be easily found
- Diagnose iron deficiency anemia
    - Check the CBC 4-6 weeks preop.
    - For high blood loss major surgery, the target is preop Hb if 130 g/L in both males and females
    - Iron deficiency anemia is defined as:
        - Ferritin < 30 mcg/L; or
        - Ferritin < 100 mcg/L AND transferrin saturation < 20%
    - Low iron stores defined as:
        - Ferritin < 100 mcg/L
- Treat iron deficiency anemia
    - Always remember to identify the cause (Bleeding is the most common source)
    - Start with oral iron salts when possible
    - Consider iv iron when
        - Oral iron is not tolerated or ineffective
        - Short time to surgery < 4-6 weeks
        - Severe anemia, e.g. Hb < 100 g/L
        - Active bleeding
- Consider the role of erythropoiesis stimulating agents in
    - Patients with religious objections to blood
    - Patients with multiple alloantibodies where it is difficult to find blood
    - Patients with high blood loss surgery (although cost-effectiveness less clear here)