

Transfusion Medicine Boot Camp for Non-Physician Prescribers

Materials based on Transfusion Camp 2017-2018 with permission from Dr. Yulia Lin and TM Boot Camp Medical Staff

Afternoon Seminar on Day 3

Massive Transfusion

Case 1

A 56 year old man with atrial fibrillation is brought by air ambulance to the emergency department after a collision into a tree while downhill skiing. He is on warfarin – dose has been stable for 6 months without dose adjustment. He is intubated and ventilated. He is hypotensive (systolic blood pressure 85 mmHg) and tachycardic (127 bpm). He has received 2 L of saline en route to the trauma room (no RBCs). His abdomen is distended and he is suspected to have a ruptured spleen and/or an unstable pelvic fracture. Tranexamic acid has been administered and the patient is being prepped for urgent laparotomy and pelvic fixation.

1. The next best intervention at this time would be:
 - A. Administer 2000 IU of PCC
 - B. Transfuse 4 units of plasma
 - C. Transfuse 10 units of cryoprecipitate
 - D. Check aPTT, INR and fibrinogen to determine what type of factor replacement (if any) is required before administering blood products
2. It is determined that the first gram of tranexamic acid was administered as a bolus in the ambulance, but a subsequent 8 hour infusion of the second gram was not started, as per the CRASH-2 dosing protocol. It is now two hours after the initial trauma occurred and the patient is about to be taken to the OR. The best approach to giving additional tranexamic acid in this situation is:
 - A. Bolus the 2nd gram as soon as possible, prior to taking the patient to the OR
 - B. Measure the fibrinogen level and if <1.0 g/L start the infusion of the 2nd gram
 - C. Wait until eight hours after the first dose was given, and then bolus the 2nd gram.
 - D. Wait until the patient has started post-operative DVT prophylaxis and then start infusion
3. The patient's INR is brought down to less than 1.5 prior to surgery and hemostasis is achieved intraoperatively. Later that evening, however, the INR has climbed back to 1.9 and output from abdominal drains becomes increasingly bloody. The most likely explanation is:
 - A. An inadequate dose of factor replacement was given
 - B. Oral vitamin K was administered earlier in the day
 - C. The patient has an underlying diagnosis of cirrhosis
 - D. The patient was actually taking a different anticoagulant
4. To ensure that blood bank inventory is optimally managed for a massively bleeding patient, the most important laboratory test to collect is:
 - A. Activated partial thromboplastin time (aPTT)
 - B. Blood group and antibody screen
 - C. Complete blood count

D. Fibrinogen level

Case 2

A 37 year old G3P2 is post C-section delivery after a failed trial of labour. The C-section was uncomplicated and the placenta was removed without incident. Her hemoglobin was 113 g/L and her MCV was 74 pre-section. The nurse pages you because her HR has increased to 120 from 85 bpm, sBP dropped from 110 to 85 mmHg, and she has just passed a huge amount of blood per vagina approximately 1 hour post C-section. The patient is disoriented and is difficult to rouse.

5. Which of the following is associated with a lower risk of post-partum hemorrhage?
 - A. Caesarean section delivery
 - B. Extended oxytocin infusion during labour induction
 - C. History of antidepressant medication
 - D. Manual removal of retained placenta

6. Which of the following statements regarding the management of post-partum hemorrhage is true?
 - A. Fibrinogen concentrates are approved by Health Canada for treatment of post-partum hemorrhage
 - B. Once it occurs, initiation of rapid transfusion support is more important than attempting source control
 - C. Thrombotic complications may occur following the use of recombinant factor VIIa
 - D. Tranexamic acid is of benefit when given more than three hours after onset of bleeding

Case 3

A 24 year old woman is en route to the trauma room direct from the scene. She was a passenger on a motorcycle involved in a motor vehicle collision. The driver was pronounced dead at the scene. She is expected to arrive in under 15 minutes. You are told she has head, thoracic and orthopedic injuries. She was thrown approximately 25 metres. You are told she is tachycardic and hypotensive despite 2L saline by ORGNE.

7. Which of the following normal practices can be waived in the setting of massive blood loss?
 - A. Attachment of patient wristband with unique identifiers
 - B. Careful inversion of laboratory specimen test-tubes prior to delivery to the lab
 - C. Disregard for advanced directives prohibiting the use of blood transfusion (eg., Jehovah's Witnesses)
 - D. Matching for patient antibodies against minor blood group antigens

The patient survives initial damage control resuscitation efforts and is brought to the OR, where she becomes progressively more stable after her spleen is removed and the pelvis packed. She has now been transfused a total of 8 units of RBCs, 4 units of plasma, 2 platelet pools and 10 units of cryoprecipitate. Her most recent labs show: hemoglobin 82 g/L, INR 1.9, platelet count 65, and fibrinogen 2.1.

8. What secondary complications should you watch for in a massively bleeding patient?
- A. Hypercalcemia
 - B. Hypokalemia
 - C. Hypothermia
 - D. Seizures

The patient survives to the ICU phase of care. She is still requiring boluses and inotropes for fluid resuscitation. There is no obvious ongoing blood loss. Blood work shows all metrics are within target range, including hemoglobin at 98 g/L. Her lactate is still high at 8, although this is down from 12. Her pH has also improved from 7.10 to 7.33.

9. Given her ongoing need for fluid boluses and inotropes, what is the role of 5% albumin for her resuscitation?
- A. Albumin increases the mortality rate, compared to saline, in trauma patients and therefore is contraindicated.
 - B. Albumin should be administered for critical hypoalbuminemia (<20)
 - C. Resuscitation with albumin should be started after 4 L of crystalloid
 - D. There is no role for albumin in the resuscitation of hypovolemic trauma patients

18 days later, the patient has been discharged to a high intensity unit and is gradually doing better. Her course has been complicated by ALI, moderate shock liver, ATN (Cr peak of 275), single episode of ventilator associated pneumonia and a deep vein thrombosis for which she is now on full dose LMWH. Her hemoglobin had been stable at 85 g/L for several days, but has dropped this morning to 69 g/L. No bleeding is apparent. Her bilirubin has increased from 23 to 64 despite her ALT gradually improving. The blood bank calls and tells the RN there will be a delay to issue the blood as the antibody screen is newly positive.

10. What is the likely cause of the hemoglobin drop?
- A. Anemia due to acute illness due to elevated hepcidin
 - B. Delayed hemolytic transfusion reaction
 - C. Erythropoietin suppression from acute renal failure
 - D. Iatrogenic anemia from excess laboratory testing