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Guideline Statement for Massive Transfusion of the Surgical Patient

Introduction

The control of hemorrhage during emergency surgical procedures is vital to maintaining the patient's homeostasis. The massive loss of blood and electrolytes has systemic life-threatening effects, including hypovolemic shock that require the surgical team to quickly implement the appropriate interventions to stabilize the patient.

AST developed the following Guideline Statement to provide support to health care facilities (HCF) in the reinforcement of protocols regarding massive transfusion in the perioperative setting. The purpose of this Guideline Statement is to provide an outline that health care providers in the perioperative setting can use to develop and implement policies and procedures for massive transfusion. The protocol example is presented with the understanding that it is the responsibility of the HCFs to develop, approve and establish policies and procedures for massive transfusion according to established HCF protocols, state and federal medical laws. HCFs should develop policies and procedures, as to the duties of each person on the surgical team as related to massive transfusion of the surgical patient. This includes integrating these policies and procedures with the facilities established blood-products protocol.

Assumption

The Guideline Statement and information contained herein are written and published based on the acknowledgement that Certified Surgical Technologists (CST) have studied the basic information related to hemostatic agents, blood and blood-products used for transfusions. Therefore, it is not necessary to provide that information in the guideline, but rather specifically concentrate on the protocols for massive transfusion.

AST Guideline Statement

The CST is qualified to assist the perioperative team in the methods used to control hemorrhage during scheduled and emergency surgical procedures.

Additionally, the CST is qualified to assist the perioperative team in the procedures for massive transfusion of the surgical patient in an emergency situation. This includes obtaining and setting up the equipment needed for transfusions, such as the blood-warming unit.

Example Protocol for Massive Transfusion

The purpose of this protocol is to facilitate the rapid availability and delivery of blood and blood-products when a massive transfusion situation occurs and provide guidelines for the decision-making process.

Massive transfusion in adults is defined as 50% of the total blood volume being replaced in a four-hour period or replacement of the total blood volume (TBV) in less than 24 hours; children it is defined as more than 40 mL/kg replacement.^{2,6}

Blood loss can be categorized as follows⁴:

- Category 1: 15% of the TBV has been lost; no treatment required.
- Category 2: 15% - 30% of TBV has been lost; usually requires IV fluid. Patient signs and symptoms include fatigue, lightheadedness, paleness.
- Category 3: 30% - 40% of TBV has been lost; IV fluid and blood transfusion required. Patient signs and symptoms include irritability, confused, weak, fatigue, paleness.
- Category 4: More than 40% loss of TBV. Requires aggressive emergency treatment with IV fluids and blood transfusion. This is a life-threatening condition in which treatment must be immediately started to replace blood and fluids, as well as stop the hemorrhaging.

A patient that experiences a moderate to catastrophic loss of blood will be in hemorrhagic shock. Based upon the above categories, 20% of blood-volume loss produces mild shock; 20-40% blood-volume loss produces moderate shock; and 40% blood-volume loss produces severe shock.¹

Therefore, not only is fluid and/or blood replacement a priority in treating the patient, but the accompanying symptoms of shock must also be treated.⁵ The question to ask is when should blood be transfused when the patient has experienced a minor to moderate loss of blood. The rule of thumb is if hypotension is still present after the infusion of 2L of crystalloid fluid, a blood transfusion is most likely needed.

The only contraindication that could possibly prohibit blood or blood-product transfusion is due to religious affiliation.

Example Massive Transfusion Protocol in the O.R.

(Adopted from Massive Transfusion Protocol. Lancaster General Hospital, Lancaster, PA, 2005.)

1. The physician notifies the surgical team to implement the Massive Transfusion Protocol which includes implementing the facilities Blood Products Protocol.

Suggestions: Member of the nonsterile surgical team notifies the surgery department supervisor of the physician order to activate the Massive Transfusion Protocol.

2. Blood Bank is notified of the activation of the Massive Transfusion Protocol and physician's orders are confirmed as to what is needed, ie whole blood or packed cells, or fresh frozen plasma, and the number of units.

Suggestions: Member of the nonsterile surgical team notifies the Blood Bank. The nonsterile team member confirms with the surgery department supervisor and surgery team that the Blood Bank is aware of activation of the Massive Transfusion Protocol and they have the needed inventory of blood and blood-products.

3. Surgery personnel are assigned to coordinate the communication between the surgery team and Blood Bank, serve as runners to obtain blood and/or blood-products from the Blood Bank for delivery to the O.R., deliver blood samples to the lab, and if necessary, directly communicate lab values to the O.R.

Suggestions: CSTs, surgical assistants and RNs can serve in the various roles to coordinate the communication between the various departments and the surgery department.

4. The blood-warming unit must be obtained and set up.

Suggestions: CSTs or surgical assistants can obtain the blood-warming unit and set it up for use.

5. Lab values are obtained after each five units of whole blood or packed cells are transfused, hourly, or as requested by physician and/or anesthesia provider. Recommended lab tests include CBC, platelet count, PTT, fibrinogen, and ionized calcium.

Suggestions: CSTs or surgical assistants can deliver blood samples to the laboratory department and if necessary, directly communicate the blood test results to the O.R.

Surgical assistants, under the direct supervision of the physician, can properly interpret the results of the lab tests.

6. Documentation is completed according to the Blood Products Protocol.

Suggestions: The CST and surgical assistant can assist on the documentation in the various patient records such as the clinical record, intake/output record, and patient's chart.

7. The physician notifies the surgical team and other O.R. personnel that the massive transfusion status of the patient is discontinued.

Suggestion: Nonsterile members of the surgical team notify the surgery department supervisor and runners that the massive transfusion status has been discontinued. This information is also communicated to the blood bank and laboratory department.

Choice of Intravenous Fluids: Colloid vs. Crystalloid

Advocates of colloid argue that the solutions remain in the intravascular space and are more effective in increasing the blood volume. However, advocates of crystalloid assert that the capillaries will allow albumin to escape into the intravascular space when the patient is in shock. Due to being readily available, safe, and lower in cost as compared to colloids, crystalloid solution, eg Lactated Ringer's solution, remains the IV fluid of choice.¹ This is important for the CST to remember when retrieving fluids to be given to the patient.

Reminders When Transfusing Blood or Blood Products

While waiting for the type and crossmatch to be completed, the transfusion of type-specific blood is appropriate in order to avoid delay of treating the patient.¹ If the recipient's blood type is not known and the transfusion must be started prior to confirming blood type, type O Rh-negative (universal donor) blood should be obtained. In this instance, packed red blood cells should be transfused instead of whole blood to minimize the transfer of anti-A and anti-B antibodies.⁷

Whole blood is usually preferable to packed cells, because it provides additional volume. It must be remembered that banked blood will be low in factors V and VIII and platelets. Therefore, it is recommended that fresh frozen plasma should be infused for every five to 10 units of transfused blood to avoid dilutional coagulaopathy.¹ The surgical team should confirm that the blood bank is prepared to deliver the plasma when needed.

As mentioned in the suggested protocol for massive transfusion, the calcium level of the patient should be monitored. The reason is that the citrate in banked blood will bind the circulating calcium. The members of the nonsterile surgical team, such as the circulator, should confirm with the anesthesia provider that calcium chloride is available to administer to the patient; 500 mg should be given for every four units of transfused blood.¹

Complications of Massive Transfusion

The following are complications that are associated with massive transfusion¹:

- Hypothermia
- Transfusion reactions
- Coagulopathies
- Decreased calcium level
- Pulmonary insufficiency
- Disseminated Intravascular Coagulation

Competency Statements

Competency Statements	Measurable Criteria
<p>1. CSTs can obtain blood and/or blood-products from the blood bank including verifying with blood bank personnel the patient information on the bags of blood or blood-product.</p> <p>2. CSTs can serve as runners to deliver blood samples to the lab, obtain blood and/or blood-products from the blood bank for delivery to the O.R., and communicate blood sample lab results to the O.R.</p> <p>3. CSTs are qualified to set up a blood warming unit.</p> <p>5. CSTs can assist in the documentation, such as the clinical record and patient's chart.</p>	<p>1. Educational standards as established by the <i>Core Curriculum for Surgical Technology</i>.³</p> <p>2. The subject area of transfusion, blood, and blood-products is included in the didactic studies as a surgical technology student including the treatment protocols for emergency situations such as hypovolemic shock and hemorrhage.</p> <p>3. Surgical technology students demonstrate knowledge of the transfusion equipment, such as the blood- warming unit through didactic studies.</p> <p>4. As practitioners, CSTs perform patient care duties by assisting the surgeon and surgical team during routine and emergency transfusions.</p> <p>5. CSTs complete continuing education to remain current in their knowledge of hemorrhage, transfusion of the surgical patient, and patient care duties, as related to transfusion, including following the policies of the HCF in completing annual in-service requirements.</p>

References

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