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| **Protocol** | |
| Developed By:  Professional Practice and Laboratory | Approved By:  All committees |
| Date of Origin: February 20, 2020 | Review or Revision Date: |

**Policy Statement**

The purpose of the Massive Hemorrhage Protocol (MHP) is to provide a consistent approach for all health care disciplines at the Listowel Wingham Hospitals Alliance (LWHA) to provide optimal care to all patients that require the initiation of the MHP. The purpose is to improve the patient’s outcome and provide the right products at the right time with minimal delay.

**Scope**

This protocol applies to all LWHA employees. Clinical staff must be able to demonstrate the knowledge, skill and judgement to assess and manage the patient who requires a massive transfusion as defined as the loss of more than one blood volume in a 24-hour period OR the loss of one half of the patients’ blood volume within a 3 hour period or bleeding at a rate of 150 ml/min OR as determined by the Most Responsible Physician (MRP).

**Acronyms**

LWHA: Listowel Wingham Hospitals Alliance

MRP: Most Responsible Physician

MHP: Massive Hemorrhage Protocol

**Responsibilities**

* It is the responsibility of the organization to provide education as outlined within the MHP to all staff included in this protocol on an annual basis.
* It is the responsibility of all LWHA employees to understand this protocol and to attend education and maintain competency related to this protocol. This includes:
  + Physician
  + Nursing
  + Laboratory staff
  + Registration staff

**Definitions**

RECORDER: any nurse who responds to the Code Transfusion can be designated to perform documentation during the code

RUNNER: a team member designated to retrieve the blood from lab after hours and then will be considered the designated Runner for the duration of the code

**Pre- Procedure**

1. Clearly identify the MRP in each Code Transfusion
   1. In the Emergency Department - Emergency Room Physician (recommended)
   2. In the Operating Room – Anaesthesiologist (recommended)
   3. In Obstetrics – Obstetrical physician or the Anaesthesiologist
2. Be aware of the conditions that may be associated with a Massive Transfusion Protocol, which may include but are not limited to: haemorrhage following trauma, gastrointestinal bleeding, ruptured aortic or abdominal aneurysms, post-partum bleeding and significant intraoperative blood loss.

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1. As per the LWHA Consent to Treatment Policy, in an *Emergency Situation*, the Health Practitioner may administer blood and blood products *without* consent to a patient who is incapable to make the decision with respect to treatment, and…
   1. it is not reasonably possible to obtain a consent or refusal on the patient’s behalf, or the delay required to do so will prolong the suffering that the patient is apparently experiencing or will put the person at risk of sustaining seriously bodily harm
   2. there is no reason to believe that the person while capable expressed a wish not to have the treatment

**Procedure**

1. The person who discovers and determines the crisis activates a CODE TRANSFUSION by calling switchboard (or delegating a staff member to call) and stating CODE TRANSFUSION, location and room number.
   * Alternatively staff can page directly overhead for help in LMH by pressing 66 or in WDH by pressing 82
2. Switchboard will:
   * Call overhead “CODE TRANSFUSION”, location, and room number 3 times.

* Call lab on call, if after hours

As directed:

* Call ER physician on call
* Call Anesthesia
* Call Surgeon
* Call in OR Nurse(s) on-call, if after 1500
* Call second Lab Technologist, if after 1500
  + If unable to contact, then call Lab Assistant
* Call other support personnel when requested
* If switchboard needs clarification about who to call they are asked to speak to a member of the nursing team

1. If after hours and the Lab Technologist is not on site, a delegated Runner responding to CODE TRANFUSION will be directed to go to the lab to package blood and blood products as per the *MHP: Packaging Blood Flow Sheet*.
   * The Runner will bring packaged blood/blood products to the location of CODE TRANSFUSION.
   * This person is now the designated RUNNER for the duration of the CODE TRANSFUSION. (see Appendix A Massive Hemorrhage Protocol: Packaging Blood Flow Sheet)
2. ALL available physicians and nurses in the hospital at the time should assist, as well as social work, pharmacist, ward clerk and diagnostic imaging.
3. Assign 1 nurse to be the RECORDER role responsible for entering orders into PowerChart and documentation of the code
   * Enters all bloodwork and x-rays as verbally ordered by the MRP

**Method**

* + Trauma Survey/Control causes of bleeding
  + Initiate IV access with 2 large bore IV’s (#18 gauge or larger), or intraosseous (IO) access if unable to quickly obtain IV access
    - Attempt to draw blood from IV insertion for lab testing
    - Baseline bloodwork to include:
      * CBC, INR/aPTT, fibrinogen, lactate, VBG, calcium, electrolytes, creatinine, troponin, group and screen (see Trauma/MHP order set in Cerner)
  + Infusion of Normal Saline, as ordered by the MRP
  + Prepare standard blood tubing with 0.9% Sodium Chloride (Normal Saline)
  + Support patient warming (Bair Hugger and fluid warmer, if available)
  + Monitor temperature (continuous) - if unable to obtain continuous temperature monitoring, should be assessed within 15 minutes of the initiation of the protocol and every 30 minutes thereafter
  + Initiate continuous cardiac monitoring and vital signs
  + Give Standard Dose of Tranexamic Acid (TXA) as ordered by the MRP within the first hour of protocol activation - follow administration directions in Ottawa manual
  + Transfuse with emergency issued, uncrossmatched packed Red Blood Cells (RBC) on hand as per protocol (use pressure bag device to maximize administration time and blood/fluid warmer for temperature support)
    - * Initial transfusion protocol includes:
        + 4 units of O Rh-positive packed RBC for ALL males and for females *GREATER THAN* 45 years of age
        + 4 units of O Rh-negative packed RBC for all females *LESS THAN* 45 years of age
      * Physician to sign Physician Approval for Transfusion form issued with each unit of uncrossmatched blood (within 24 hours)
  + Administer Fibrinogen Concentrate (RiaSTAP) 4 grams after the first 4 units of RBC have infused as per MRP order
    - * Highly beneficial in obstetrical hemorrhage patients
      * Fibrinogen levels, once drawn, are sent out for processing and resulting. DO NOT delay giving Fibrinogen Concentrate to obtain the result
  + Administer thawed Plasma when made available from the lab per MRP order

**Manage and Monitor Blood Product Administration**

* Receive and cross-check all blood products. Any Nurse/Physician/Lab personal can check products
* Only allow checked-blood to be administered to the patient
* Administer Packed Red Blood Cells (PRBC) using a pressure bag and fluid warmer device, if available
* RECORDER to document medications as they are given, blood products as they are administered and monitor for lab results in PowerChart
* RUNNER to communicate with lab as needed and report results to team.
* Keep all empty blood bags in one biohazard container that is free of other waste (empty bags should be kept in one location in case a blood transfusion reaction occurs)
* Bloodwork should be repeated hourly and/or prior to the next issuing of blood/blood products and should include:
  + - CBC, INR, lactate, VBG, calcium, electrolytes, creatinine, troponin
* Prepare for transport to Secondary or Tertiary Center
  + - *Call for transfer should be made as soon as possible from protocol activation*
* Notify lab if patient expires or cancel MHP when no longer required
* Return any unused blood products to lab promptly - only red cells should be placed in cooler
  + - Thawed Plasma and PRBC’s need to be kept in their own separate coolers
* Review the tips below to ensure products are managed and administered correctly

**Tips and Information**

* Initial administration of blood will be uncrossmatched blood
  + Box 1 will contain:
    - 4 units O Rh-positive RBC (if male or female over the age of 45); OR
    - 4 units O Rh-negative RBC (if female under the age of 45)
    - Fibrinogen Concentrate (RiaSTAP) will accompany this box to allow time for reconstitution – must sit for 20 minutes after reconstitution before administration
      * Fibrinogen Dose: 4 g (4 g = 4 boxes)
  + Box 2 will contain:
    - 4 units crossmatched PRBC
    - 4 units thawed Plasma (maintain a 2:1 ratio of PRBC:Plasma)
  + Blood supply will be depleted after Box 2. *Early transfer to secondary or tertiary care must occur*. If more blood is required, the Lab will need to ship in units from area hospitals (requires early communication).

**\*\*This is based on having the maximum blood inventory. If less than 4 units are available, substitute the next most appropriate blood donor type based on the patient’s age, sex or if available, blood group\*\***

* If Lab on site:
  + Lab will package and bring cooler of PRBC’s to the area the MHP is in progress and pick up blood that has been drawn or draw blood
* If after hours and Lab on call (after 2300 at Listowel Monday-Sunday; after 2300 at Wingham Monday-Friday and after 1500 at Wingham Saturday-Sunday):
  + Plasma will not be available until they arrive
  + Upon arrival, Lab will respond to the unit where the MHP protocol is active to receive report and collect bloodwork that has been drawn or draw blood
* Frozen plasma requires 30 minutes to thaw
* Use standard blood filter tubing for blood administration
* Only use normal saline with blood products
* Once MHP is activated, the lab will phone abnormal CBC and INR/aPTT results prior to repeat confirmation
  + A high or unmeasurable INR/aPTT during MHP suggests a critically low fibrinogen level (*indication for Plasma and Fibrinogen Concentration*).
* Approximately 250 mL of Plasma is considered 1 unit - some stocked Plasma will be approximately 500 mL
* Consider urgent reversal for anticoagulants

**Other Products Available at LWHA**

* Factor VIII
* Prothrombin Complex
* Vitamin K

**Resources**

Appendix A: Massive Hemorrhage Protocol: Packaging Blood Flow Sheet

Appendix B: Massive Hemorrhage Algorithm

**References**

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Callum, JL, Yeh, CH, Petrosoniak, A, McVey, MJ, Cope, S, Thompson, T, et al. (2019). A regional massive hemorrhage protocol developed through a modified Delphi technique. CMAJ Open, 7(3), E546-E561.