1. SCOPE

This document is intended for use in the Grande Prairie Regional Hospital (GPRH).

2. OBJECTIVES

To define the process and clinical decision making for the initiation and management of a massive hemorrhage protocol (MHP).

3. TARGET AUDIENCE

Physicians, Nurses, Laboratory & Transfusion Medicine personnel and other clinicians directly involved in the management of patients experiencing exsanguination (aka a Massive Hemorrhage). Massive hemorrhage can occur in the context of:

- Major trauma
- Acute gastrointestinal (GI) bleeding
- Post-partum/peri-partum hemorrhage
- Other surgical scenarios

4. PROCESS

1. Points of Emphasis

1.1 Massive Hemorrhage means, for the purposes of this document only, blood loss greater than 150 mL/min or replacement of 50% of blood volume in 3 hours or greater than 100% of blood volume in less than 24 hours.

1.2 Massive transfusions are indicated to reduce the risk of death in patients who are undergoing exsanguination / massive bleeding, have a potential for massive bleeding, or already sustained significant blood loss.

1.3 The Massive Hemorrhage Protocol (MHP) will be initiated after it has been identified that the patient is, or soon will be undergoing massive blood loss as per Appendix A or B of this document.

1.4 The health care professional (HCP) in charge of the patient's location or his/her designate shall ensure that the Physician is notified and has assessed the patient.

1.5 The HCP in charge of the patient's location or his/her designate shall be responsible to contact Transfusion Medicine (TM) to initiate the protocol and to designate a runner to transport blood products to the patient care unit.

1.6 Positive patient identification, monitoring of vital signs and documentation of transfusion must be performed as per AHS Transfusion of Blood Components and products policy and procedure.

1.7 Patients with unknown ABO group will be issued group O red blood cells (RBCs) and group AB (or low titer group A) plasma until ABO group is confirmed. Blood group of products may be switched at the discretion of T and or the TM Physician.

1.8 MHP activation can only occur once the patient has been arrived on site and patient registration information (real identity or alias) can be provided. However, unmatched red cells and fibrinogen concentrate can be issued to the anticipated location of arrival (Emergency Department, Operating Room or Labour & Delivery) if required

2. Procedure

2.1 Pre Transfusion

a. Identify the hemodynamically unstable patient based on clinical assessment.

b. Ensure adequate venous access, using 2 large bore peripheral vascular access devices (PVAD) and/or central venous access device (CVAD).

c. Collect baseline labs including type and screen if possible when getting venous access.

d. Select required blood tubing and consider use of rapid infuser.

e. Infuse all fluids via blood warmer, when available.

2.2 Activation

a. Activation of MHP requires a physician's order.

b. The HCP or designate shall contact TM to initiate the MHP. The HCP shall provide TM with their:

i) Name;

ii) patient name (or alias);

iii) patient age;

iv) patient sex;

v) pMRN / ULI number;

vi) location;

vii) ordering Physician; and

viii) Indication for MHP

c. Order MHP in Connect Care to initiate the orders for laboratory testing and medications. Note: This does not order any blood components or plasma protein products – those must be called to TM. See Connect Care Blood Administration Guide

d. The initial MHP box will consist of:

   i) adult – 4 units of RBCs and 2 grams of fibrinogen if not already provided with uncrossmatched blood box.

   ii) pediatric – number of RBC units and grams of fibrinogen dependent on patient weight. (This may be adjusted depending on the patient's weight at the discretion of the TM physician.)

e. As soon as the MHP is initiated, the Patient Care Unit should immediately send a porter or designate (e.g. Unit Attendant, Service Attendant, etc) with a pick-up slip to the TM Lab to pick up the MHP box.

f. Blood products are to be initiated within 60 minutes of removal from TM refrigerator or approved sealed TM transport box.

g. Lab will thaw and package 2 units of plasma (2 units of AB or low titre A if unmatched or 4 units if group is known) and 2 additional units of RBCs to be picked up and taken to the patient location.

h. If hemostasis is not achieved with the first MHP box and additional blood products are given, continue monitoring patient. The MHP blood work of hemoglobin, platelets, INR and fibrinogen are ordered as part of the Connect Care panel every 30 minutes. A baseline creatinine, calcium and electrolytes should be monitored; these parameters should be ordered every hour.

i. The attending Physician shall be contacted by the TM Physician on call who may make adjustments to products based on patient's blood work and condition.

j. Inform TM when control of bleeding has been obtained, or when resuscitation efforts have been withdrawn. Return unused blood components and products to TM as soon as possible. Discontinue MHP in Connect Care. See Connect Care Blood Administration Guide

2.3 Physiologic Goals

a. The aim of treatment is to achieve a hemoglobin between 70-100g/L.

b. The INR is to be maintained below 1.8.

c. Fibrinogen levels for obstetrics are to be greater than 2.0g/L and for trauma greater than 1.5g/L.

d. Monitor and correct calcium levels.

e. Monitor and correct potassium levels.

f. Ensure that the patient is being actively warmed to keep core temperature greater than 36°C

g. Prevent / reverse acidosis

5. DEFINITIONS

MRHP means Most Responsible Health Practitioner

6. RESOURCES

- Appendix A: *Grande Prairie Regional Hospital Massive Hemorrhage Protocol >50kg.*
- Appendix B: *Grande Prairie Regional Hospital Massive Hemorrhage Protocol ≤50kg.*
- Transfusion of Blood Components and Blood Products policy PS-59

APPENDIX A: Greater than or equal to 50kg Massive Hemorrhage Protocol Flowchart

Appropriate Initial Interventions

√Intravenous access: 2 large bore IVs ± CVC
√Crystalloid: as per attending physician
√Labs: **Order MHP labs**
√ Continuous Monitoring
√ Aggressive rewarming
Blood warmer if rate >50 ml/kg/h
√ Prevent/reverse acidosis
√ Correct hypocalcemia: **Ca gluconate 3 g IV slowly ****
** If using calcium chloride, it MUST be infused into a central line due to the risk of tissue necrosis with peripheral lines.
√ Transfuse with unmatched RBCs if needed

Other considerations

√Heparin reversal
Protamine 1 mg IV / 100 U of heparin
√ Warfarin reversal
Vitamin K 10 mg IV
Prothrombin Complex –dose as per INR based protocol
√ Consider antifibrinolytics
Tranexamic Acid 1 g IV bolus (if not already administered) followed by 1g over 8 hours

Oral Anticoagulation Venous Thromboembolism Prophylaxis For Adult Patients Policy PS-09 (ahsnet.ca)

Only open blood transport box if products are to be transfused

General Guidelines for Blood Product Replacement in Adults:

RBCs	No threshold Dose: MD discretion
Plasma	If INR>1.8 Dose: 10-15 mL/kg
Platelets	If Plt <50 x 10^9/L or <100 x 10^9/L if CNS injury Dose: 1 platelet pool
Fibrinogen	If Fibrinogen: ≤1.5 g/L (Trauma) ≤ 2.0 g/L (Obstetrical) Dose: Fibrinogen: As per TM physician recommendation

Greater than or equal to 50kg Massive Hemorrhage Protocol Flowchart

Identify & Manage Bleeding

4 units RBC transfused in ≤ 4 hours and ongoing major bleeding. **Consider** activating MHP.

6 units RBC transfused in ≤ 4 hours and ongoing major bleeding. **Activate MHP.**

DEDICATED PORTER OR RUNNER

1. Take specimen and pick-up slip immediately to the laboratory and wait for Initial Pack to be ready.
2. Deliver Initial Pack to patient location.
3. Return immediately to TM with pick-up slip to collect Second Pack.
4. Remain assigned to patient until MHP is stopped regardless of change in location.

COMMUNICATE

- TM physician will contact the MRHP.
- Notify TM if the patient location is changing.

ACTIVATE MHP

Order MHP in Connect Care.
Call Transfusion Medicine (TM) and provide:
- Name/alias, pMRN/ULI, sex, weight
- Current patient location
- Indication for MHP
- Name of clinical contact and MRHP

Record name of TM contact.
Send dedicated porter or runner to TM lab.

Initial Pack
Red Blood Cells x 4 units
Fibrinogen Concentrate x 2 g

Second Pack
Red Blood Cells x 2 units
Plasma x 2-4 units (unmatched: max 2 units AB or low titre A)
Platelets (**Only** if requested or directed by TM physician)

Q30 min

Hemostasis & resolution of coagulopathy?

No:
- Call TM if additional blood products are required.
- The TM physician can adjust packs based on labs as needed.

Repeat MHP labs.

Yes:

Stop MHP
- Notify TM
- Return unused products ASAP
- Resume standard ordering practices

Massive Hemorrhage is defined as blood loss > 150 mL/min or replacement of 50% of blood volume in 3 h or greater than one blood volume in < 24 h.

APPENDIX B: Less than 50kg Massive Hemorrhage Protocol Flowchart

Appropriate Initial Interventions

√Intravenous access: 2 large bore IVs ± CVC
√Crystalloid: as per attending physician
√Labs: **Order MHP labs**
√ Continuous Monitoring
√ Aggressive rewarming
Blood warmer if rate >50 ml/kg/h
√ Prevent/reverse acidosis
√ Correct hypocalcemia**:
Adults: Ca gluconate 3 g IV slowly
Pediatrics: Ca gluconate 30 mg/kg/dose
** If using calcium chloride, it MUST be infused into a central line due to the risk of tissue necrosis with peripheral lines.
√ Transfuse with unmatched RBCs, if needed

Other considerations

√Heparin reversal
Protamine 1 mg IV / 100 U of heparin
√ Warfarin reversal
Vitamin K 10 mg IV
Prothrombin Complex as per TM protocol dosing for INR and weight
√ Consider antifibrinolytics
Tranexamic Acid 10-15mg/kg bolus (if not already administered), followed by 1mg-5mg/kg/h infusion

General Guidelines for Blood Product Replacement:

RBCs	No threshold Dose: MD discretion
Plasma	If INR>1.8 Dose: 10-15 mL/kg
Platelets	If Plt <50 x 10^9/L or <100 x 10^9/L if CNS injury Dose: Adult: 1 platelet pool Pediatric: 10 mL/kg to max of 1 pool or apheresis adult dose (250 mL)
Fibrinogen	If Fibrinogen: ≤1.5 g/L (Trauma) ≤ 2.5 g/L (Obstetrical) Dose: Fibrinogen: 30-60 mg/kg