



Transfusion Camp
April 5, 2024

St. Michael's

Inspired Care.
Inspiring Science.



Massive Hemorrhage Protocol (MHP) Translation to the Real World

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Disclosures

- Clinical trials: Sanofi, Roche
- None are relevant to the content of this talk
- I will not be covering pediatric implications – refer to the ORBCON MHP Tool
 - https://transfusionontario.org/wp-content/uploads/2021/10/MHP_Toolkit_v1_Oct2021.pdf

Learning Objectives

- Discuss how the different elements of MHP could be practically applied to management of bleeding adult patients

A regional massive hemorrhage protocol developed through a modified Delphi technique

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Abstract

Background: A massive hemorrhage protocol (MHP) enables rapid delivery of blood components in a patient who is exsanguinating pending definitive hemorrhage control, but there is variability in MHP implementation rates, content and compliance owing to challenges presented by infrequent activation, variable team performance and patient acuity. The goal of this project was to identify the key evidence-based principles and quality indicators required to develop a standardized regional MHP.

Methods: A modified Delphi consensus technique was performed in the spring and summer of 2018. Panelists used survey links to independently review and rate (on a 7-point Likert scale) 43 statements and 8 quality indicators drafted by a steering committee composed of transfusion medicine specialists and technologists, and trauma physicians. External stakeholder input from all hospitals in Ontario was sought.

Results: Three rounds were held with 36 experts from diverse clinical backgrounds. Consensus was reached for 42 statements and 8 quality indicators. Additional modifications from external stakeholders were incorporated to form the foundation for the proposed MHP.

Interpretation: This MHP template will provide the basis for the design of an MHP toolkit, including specific recommendations for pediatric and obstetrical patients, and for hospitals with limited availability of blood components or means to achieve definitive hemorrhage control. We believe that harmonization of MHPs in our region will simplify training, increase uptake of evidence-based interventions, enhance communication, improve patient comfort and safety, and, ultimately, improve patient outcomes.



Provincial Massive Hemorrhage Toolkit

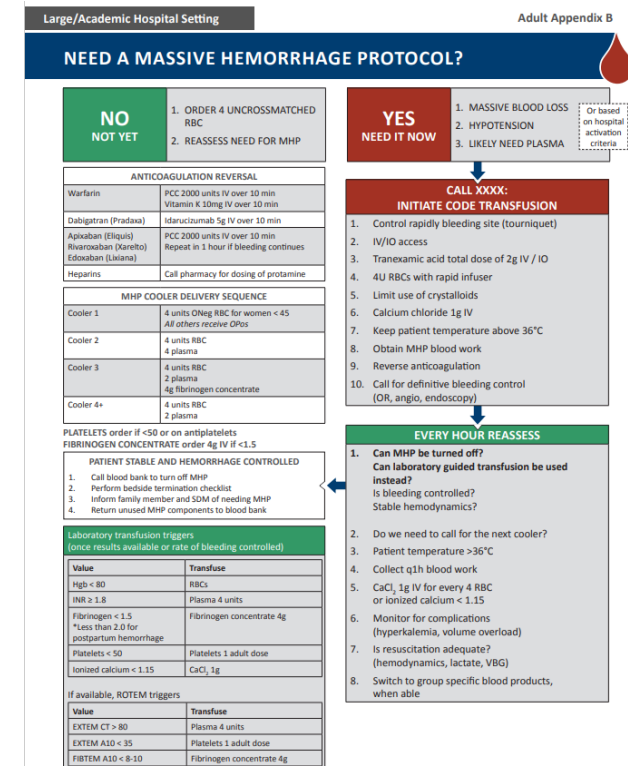
A comprehensive toolkit was developed to provide guidance for Ontario hospitals in the implementation of Ontario's Recommendations for Massive Hemorrhage Protocol. The toolkit addresses select patient populations and differences in hospital sizes, resources and geographical challenges.

Released April 30, 2021

Read more

View attachment

Download



Let's review:

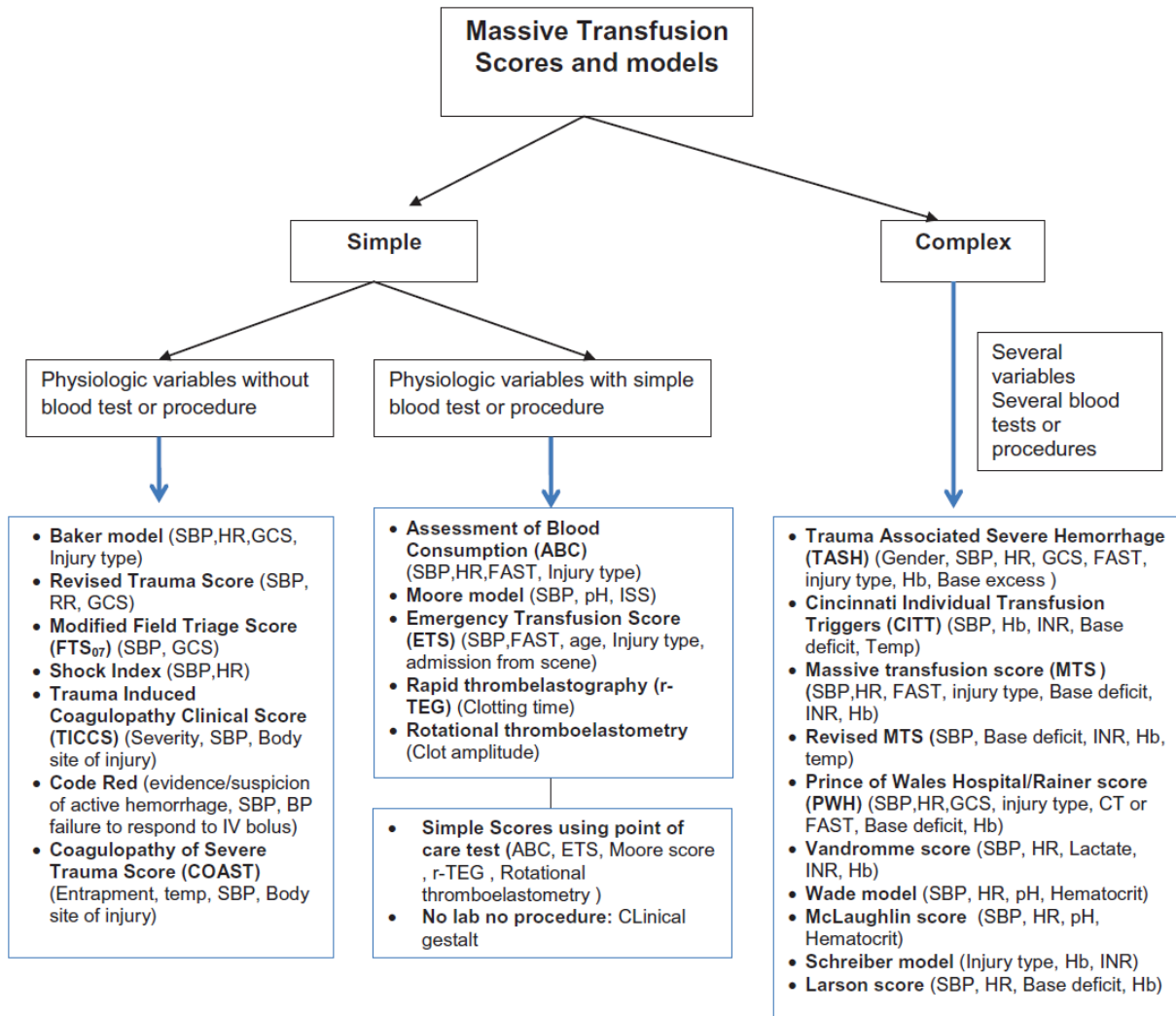
MHP = T⁷

	The Seven T's
1	Triggering and Treatment of Bleeding
2	Team (incl. Training and Communication)
3	Tranexamic acid
4	Temperature
5	Testing
6	Transfusion
7	Termination and Tracking Performance

Triggering

- Activating MHP (Massive Hemorrhage Protocol) = code
 - In Ontario hospitals, should be announced overhead as **CODE TRANSFUSION**
 - Announcing overhead instantaneously alerts all relevant parties and may bring additional resources
 - Should be called by the same name in all hospitals (MHP)
 - Should be activated by a single call to Locating/Switchboard with dissemination to all team members
- Triggering criteria
 - May differ from hospital to hospital – KNOW YOURS
 - May be different for different patient populations

Triggering



Life-threatening bleeding requiring mobilization of blood bank, laboratory and clinical resources

Anticipated need for at least 4 RBC immediately AND component therapy (platelets (PLT), plasma, and /or fibrinogen concentrate)

A non-obstetrical patient with systolic BP<90 mmHg and/or requiring vasopressors

A peri-partum woman with marked ongoing blood loss

$$\text{Shock Index} = \text{HR/sBP}$$

Should MHP be activated?

- 37 year old, 2 hours post-vaginal delivery, found by nurse on the floor. Vitals: 90/40, HR 120, oxygen saturation 97% RA, 37.0C. Patient is awake and complains of feeling dizzy. Her gown is soaked with blood.
- A. Yes
- B. No

Should MHP be activated?

- 68 year old with known liver cirrhosis is seen in ED. Patient reports vomiting blood, “about a cup or two”, about 30 minutes ago and feels nauseated. Vitals: 157/95, HR 100, oxygen saturation 96% RA, afebrile.
- A. Yes
- B. No

Should MHP be activated?

- 19 year old male is brought to ED by ambulance. He has 2 obvious gun shot wounds to his Rt. lower chest and upper abdomen. He is actively bleeding. He is confused and combative. Vitals: 95/60, HR 130, oxygen saturation 92% RA, Temp 36C.
- A. Yes
- B. No

Treatment of Bleeding

- Damage control resuscitation
 - Immediate hemorrhage control
 - Pressure, damage control surgery, angiography, etc.
 - Restoration of blood volume and physiologic/hematologic stability
 - IV fluids
 - Early transfusion
 - Avoid too much crystalloid
 - Correct hypothermia
 - Correct acidosis
 - Correct calcium



Expert Support for MHP

Any patient on whom MHP was activated and who cannot receive definitive management locally, must be considered for transfer ASAP



Team



BIG Hospital

- Physician Lead
- Nursing Lead
- Charting Nurse
- RT
- Anesthesia
- Rapid Response/Code Team
- Porter
- MLT – Transfusion Medicine
- MLT – Core lab (Hematology, Coagulation, Biochem)
- OB: back up anesthesia, second call OB, neonatologist, NICU RN
- Chaplain



SMALL Hospital

- Physician Lead
- Nursing Lead
- Charting Nurse
- Code Team
- Anesthesia if available
- Porter
- MLT – Transfusion Medicine and Core Lab
- OB: Obstetrician on call

Team

Challenges

- Team members with different levels of experience
- Team members that may not have worked together previously
- Team members that are geographically separated
- Professional silos and hierarchies

Solutions

- Training, competency maintenance and assessment
- Debriefing after each MHP
- Wearing signs with MHP role designation
- Effective communication
- Regular time-outs
- Smart records and checklists

Team: Make it Easy to Do it Right

Use smart records, bundles, checklists, posters with job aids, apps

Use signs to identify roles

Adult Appendix C

ADULT PATIENTS, DEFINITIVE CARE AT HOSPITAL

To be repeated on each page

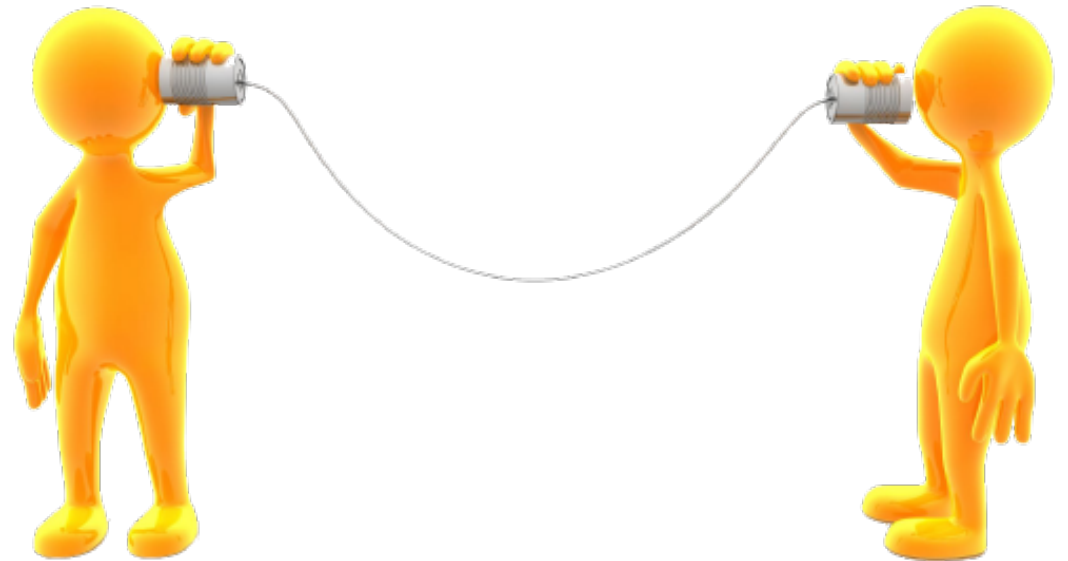
MASSIVE HEMORRHAGE PROTOCOL (MHP) CHECKLIST

TIME	ACTION	INITIALS
ACTIVATION & PACK 1 (date __/__/__ time __:__)		
	MHP Lead RN:	
	Call to hospital locating (ext. ----) to activate CODE TRANSFUSION	
	Provide patient number, name, sex, age, location, and information regarding patient use of antiplatelet or anticoagulants to blood bank at ext. ----	
	Antiplatelets: <input type="checkbox"/> Yes; Anticoagulant: <input type="checkbox"/> Yes, drug name: _____	
	<input type="checkbox"/> Ensure identification band is affixed to patient	
	<input type="checkbox"/> Obtain group and screen sample	
	<input type="checkbox"/> Obtain baseline blood work	
	Tranexamic acid: Administer 2 gram iv bolus in 100 mL over 20 minutes. <i>Hold if: more than 3 hours from injury/onset of hemorrhage or given pre-hospital or pre-activation or patient has a gastrointestinal hemorrhage</i>	
	Hypothermia prevention:	
	<input type="checkbox"/> Measure and document patient temperature	
	<input type="checkbox"/> Obtain blood warmer for all infusions	
	<input type="checkbox"/> If patient temperature less than 36°C start active warming	
	Definitive hemorrhage control: Notify if required:	
	<input type="checkbox"/> Operating Room <input type="checkbox"/> Interventional Radiology <input type="checkbox"/> Gastroenterology	
	Obtain 1st MHP pack (if not obtained before activation):	
	Pack arrival time (____:____)	
	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 4 units Red Cells (RBCs)	
	<i>Use Rh-negative blood only for females under 45 years</i>	
	<i>Avoid additional boluses or infusions of crystalloid except on physician order</i>	
	<input type="checkbox"/> Platelets: If platelet count below 50 x10 ³ /L or patient on an antiplatelet drug, transfuse 1 pool of platelets	
	<input type="checkbox"/> Fibrinogen: if fibrinogen less than 1.5 g/L, 4 grams of fibrinogen concentrate over 5 min by iv push	
	<input type="checkbox"/> Calcium: 1g Calcium Chloride or 3g Calcium Gluconate iv push after pack 1	
	Anticoagulant reversal:	
	<input type="checkbox"/> If Warfarin: PCC 2000 IU iv over 10 minutes AND <input type="checkbox"/> Vitamin K 10 mg iv	
	<input type="checkbox"/> If Xa inhibitors (e.g., apixaban, rivaroxaban): PCC 2000 IU iv over 10 minutes	
	<input type="checkbox"/> If Dabigatran: Idarucizumab 5 grams iv over 10 minutes	
	<input type="checkbox"/> If Heparin: consult Pharmacy for protamine dosing	
PACK 2 (time __:__)		
	<input type="checkbox"/> Obtain hour one blood work	
	<input type="checkbox"/> Review last set of blood work to ensure at target: Hemoglobin greater than 80 g/L, INR less than 1.8, fibrinogen greater than 1.5 g/L, platelets greater than 50x10 ³ /L	
	<input type="checkbox"/> Measure and document patient temperature	
	<input type="checkbox"/> If patient temperature less than 36°C start active warming	
	Obtain 2nd MHP pack (if needed):	
	Transfusions based on laboratory measures where feasible	



Team Communication

- How? Established, reliable and mobile means to communicate
- Who? MHP clinical team, laboratories, porter, other services
- When? Trigger/terminate, location change, clinical status change, goals of care change, transfer of care



Tranexamic Acid

- Was TXA given? When? How much?
 - If none given
 - Intentional? (ex. Contra-indication)
 - Unintentional? If within 3 hours of bleeding start, administer 2g IV bolus ASAP
 - If only 1g given
 - If within 3 hours of bleeding start, administer additional 1g IV bolus



<https://www.theglobeandmail.com/life/health-and-fitness/hospitals-shun-cheap-drug-used-to-stop-bleeding/article4178385/>

TXA can be given IV, IO and IM

Trauma - TXA 2g IV within 1hr
PPH – TXA 1g IV within 1 hr, repeat in 30min if still bleeding
GIB – no empiric TXA

Should TXA be given?

- 68 year old with known liver cirrhosis is seen in ED. Patient reports vomiting blood, “about a cup or two”, about 30 minutes ago and feels nauseated. Vitals: 157/95, HR 100, oxygen saturation 96% RA, afebrile.
- A. Yes
- B. No



Should 2nd dose of TXA be given?

- 20 year old female was riding a bicycle and was hit by a car head-on about 5 hours ago. She was taken to the nearest hospital where she was found to have multiple orthopedic injuries and imaging concerning for intra-abdominal bleeding. She was given 1g TXA and 2 units of uncrossmatched Group O Rh negative RBC. She was suspected to have head injury and was then transferred to a trauma centre. On arrival in Trauma Bay, she has decreased LOC, BP 90/40, HR 120.
- A. Yes
- B. No

Temperature

- Check temperature within 15 min of MHP activation and then every 30 min or continuously
- Promote normothermia (aim for temperature 36°C) by passive and/or active warming



WARM THE ENVIRONMENT

- Use radiant heaters
- Raise the temperature of the room

WARM THE PATIENT

- Apply warming convective air blankets under and over the patient
- Use chemical warming pads
- Use heat and moisture exchanger on endotracheal tube



RETAIN PATIENT'S OWN WARMTH

- Remove any wet or damp clothing or blankets
- Use plastic to wrap patient
- Use hat to cover patient's head

WARM ALL FLUIDS PRIOR TO INFUSION

- Warm syringes under warming blanket
- Use pediatric blood and fluid warming devices



**MONITOR TEMPERATURE FREQUENTLY/
CONTINUOUSLY (GOAL >36°C)**

Temperature

- Use warmer to administer
 - IV crystalloid
 - RBC and Plasma



<https://belmontmedtech.com/rapid-infusion-pump>

Testing

- **Tests to assess organ damage and/or adequacy of resuscitation**
 - Blood gases, lactate, troponin, creatinine
- **Tests to assess Hgb and hemostatic function**
 - CBC
 - Standard: INR, aPTT, fibrinogen
 - Specialized: ROTEM/TEG (thromboelastometry)
 - Consider that abnormal test results might be from anticoagulants in older patients
 - aPTT up = dabigatran
 - INR up = warfarin, apixaban, rivaroxaban, edoxaban

Testing

- Perform at activation/termination and at pre-defined intervals (at least hourly during MHP, prior to each pack, etc.)
- Lab calls (and clinical team should be ready to receive!) critical results

Big Hospital	Small Hospital
CBC (Hgb, PLT)	CBC (Hgb, PLT)
INR, fibrinogen ROTEM	INR, fibrinogen if available
Lactate or ABG/VBG	Lactate or ABG/VBG
Ionized calcium	Calcium
Lytes, Creatinine, Trp	Lytes, Creatinine, Trp

Testing

Having order sets/bundles, prepared packs with tubes and requisitions, and regular time-outs/reminders ensure labs are not forgotten

BLOOD DRAW TOOL

MHP Blood Draw and Testing Protocol									
Lab tests ¹		Adult	Pediatric	Baseline	#1	#2	#3	#4	#5
INR, aPTT (baseline only), Fibrinogen	Sodium Citrate (Blue)	2.7mL	1.8 mL	x	x	x	x	x	x
ROTEM/TEG	Sodium Citrate (Blue)	2.7 mL	1.8 mL	x	x	x	x	x	x
Na, K, Cl, Mg, Urea	Serum (Red/Gold)	4.5 mL	2.0 mL	x	x	x	x	x	x
Glucose (baseline only)	Serum (Red/Gold)	NA		x	NA	NA	NA	NA	NA
Ionized Calcium ²	Serum (Gold)	4.5 mL	2.0 mL	x	x	x	x	x	x
Venous Lactate ²	Lithium Heparin (Green)	4.5 mL	2.0 mL	x	x	x	x	x	x
G&S (baseline only) ³	EDTA (Pink)	6.0 mL	1.0 mL ⁴	x	NA	NA	NA	NA	NA
CBC	EDTA (Lavender)	4.0 mL	1.0 mL	x	x	x	x	x	x
Venous Lactate	Lithium Heparin (Syringe)	-	-	x	x	x	x	x	x
Arterial Lactate	Lithium Heparin (Syringe)	-	-	x	x	x	x	x	x
Blood gas (pH and base excess)	Lithium Heparin (Syringe)	-	-	x	x	x	x	x	x
Ionized Calcium	Lithium Heparin (Syringe)	-	-	x	x	x	x	x	x
Na, K, Cl	Lithium Heparin (Syringe)	-	-	x	x	x	x	x	x

¹Lab draws appear in appropriate draw order - Sodium Citrate should always be draw n first.

²Can be bundled up (i.e., done together with a blood gas sample, if device/analyzer is available).

³Follow facility specific policies regarding ABO confirmation and requirement for second specimen.

⁴500uL for neonates

Prioritize samples as per MHP lead and as available at your facility - vacutainer/microtainers may differ depending on facility and patient population.

Pick the best answer

- 78 year old is brought to ER by ambulance. She was crossing the street and was hit by a sedan turning left at approximately 60km/hr. She is obtunded, has multiple orthopedic injuries and her FAST is positive. “Atrial fibrillation, warfarin” is engraved on medic alert bracelet. Vitals: 120/55, HR 100, oxygen saturation 97% RA.
- A. She needs STAT imaging – send her to CT scan
- B. Activate MHP
- C. Order 2 units of uncrossmatched RBC and 2000U PCC STAT
- D. Order 2000U PCC STAT

Urgent Reversal of Anticoagulants

Adult Patients with Massive Hemorrhage: Tips for Anticoagulant Reversal

Warfarin



Prothrombin complex concentrate (Octaplex® or Beriplex®) 2000 units IV over 10 min
Vitamin K 10 mg IV over 10 min

Dabigatran (Pradaxa®)



Idarucizumab (Praxbind®) 2.5 g IV twice (total 5 g) over 10 min

Rivaroxaban (Xarelto®)



Prothrombin complex concentrate (Octaplex® or Beriplex®) 2000 units IV over 10 min
Repeat at 1 hour if still bleeding

Apixaban (Eliquis®)

Edoxaban (Lixiana®)

Heparin



Unfractionated Heparin (UFH)

- 1 mg per 100 units of UFH administered within past 4 hours
- 25 mg IV will reverse heparin infusions running at a rate of approx. 1,500 units/hour

Low Molecular Weight Heparin (LMWH)

- If administered within 8 hours: 1 mg of protamine per 100 units anti-Xa or 1 mg per 1 mg of enoxaparin
- If administered more than 8 hours ago: 0.5 mg of protamine per 100 units anti-Xa or 0.5 mg per 1 mg of enoxaparin

Thrombosis Canada
Thrombose Canada
<https://thrombosiscanada.ca>

Patients with Bleeding Disorders

Remember...

FactorFirst

PROMPT INFUSION will halt bleeding, minimize long-term complications and can save life. If bleeding persists, follow the guidelines for life or limb-threatening bleeds and call the:

Hemophilia Treatment Centre

Physician: _____
 Nurse: _____
 Day Phone: _____
 Night Phone: _____

Delay in the restoration of hemostasis to the patient with hemophilia or von Willebrand disease may be life or limb-threatening.

PROMPT TRIAGE AND ASSESSMENT.

- Determine the severity of the bleed.
- Recognize that bleeding in the head, spine, abdomen or pelvis may initially be occult and potentially life-threatening.
- **TREAT FIRST AND INVESTIGATE LATER – "FACTOR FIRST"**.
- Avoid invasive procedures such as arterial punctures unless the patient has factor replacement.
- **NO** IM injections and **NO** ASA.
- The patient or guardian may be your most important resource, so do ask about specific treatment protocols.
- Contact the patient's Hemophilia Treatment Centre where a hematologist is always on call.
- Provide clear discharge instructions and arrange a follow-up plan or admit to hospital if necessary.

Patient Information:

Name: _____
 Date of Birth: _____
 Diagnosis: _____
 Severity: _____ Level: _____
 Response to desmopressin (DDAVP): no yes to _____ %
 Inhibitors: no yes
 Other Medical Information: _____
 Date of Recommendation: ____/____/____
 Signature of Physician _____

Recommended Treatment:

Product and Dose/kg for Life or Limb-threatening Bleeds:

Product and Dose/kg for Moderate/Minor Bleeds:

Use Universal Precautions

LIFE OR LIMB-THREATENING BLEEDS

- Head (intracranial) and neck
- Chest, abdomen, pelvis, spine
- Iliopsoas muscle and hip
- Massive vaginal hemorrhage
- Extremity muscle compartments
- Fractures or dislocations
- Any deep laceration
- Any uncontrolled bleeding

MODERATE/MINOR BLEEDS

- Nose (epistaxis)
- Mouth (including gums)
- Joints (hemarthroses)
- Menorrhagia
- Abrasions and superficial lacerations

TREATMENT FOR LIFE OR LIMB-THREATENING BLEEDS

PATIENT MUST RECEIVE PRODUCT URGENTLY

Hemophilia A: (all severities)
 Recombinant factor VIII concentrate 40-50 units/kg

Hemophilia B: (all severities)
 Recombinant factor IX concentrate 100-120 units/kg >15 yrs
 Recombinant factor IX concentrate 135-160 units/kg <15 yrs
 The dosage for recombinant factor IX is substantially higher because of its lower recovery, particularly in children.

Von Willebrand Disease:
 A VWF factor concentrate containing factor VIII such as Humate-P 60-80 Ritocetin cofactor units/kg

It is critical to raise the factor level to 80-100% urgently for all life or limb-threatening bleeds.

TREATMENT FOR MODERATE/MINOR BLEEDS

PATIENT MUST RECEIVE PRODUCT WITHIN 30 MINUTES WHENEVER POSSIBLE

Hemophilia A: (severe/moderate)
 Recombinant factor VIII concentrate 20-30 units/kg

Hemophilia A: (mild)
 Desmopressin (Octostim/DDAVP) 0.3 mcg/kg (max 20 mcg) -SC,IV

Hemophilia B: (severe/moderate/mild)
 Recombinant factor IX concentrate 35-50 units/kg >15 yrs
 Recombinant factor IX concentrate 50-70 units/kg <15 yrs
 The dosage for recombinant factor IX is substantially higher because of its lower recovery, particularly in children.

Von Willebrand Disease:
 Type 1 and Type 2A or 2B known to have used desmopressin safely and effectively - (Octostim/DDAVP) 0.3 mcg/kg (max 20 mcg) -SC,IV
 For patients not responding to desmopressin (such as Type 3 or Type 2B) use a VWF factor concentrate containing factor VIII such as Humate-P 60-80 Ritocetin cofactor units/kg

For mucosal bleeds in all above add:
 Tranexamic Acid (Cyklokapron) 25 mg/kg po tid 1-7 days (contraindicated if hematuria)

Dosages are patient specific - these are general guidelines only. Round doses up to the nearest vial. If the products listed are not available, please call the nearest Canadian Blood Services or Héma-Québec Centre.

GUIDELINES FOR EMERGENCY MANAGEMENT OF HEMOPHILIA AND VON WILLEBRAND DISEASE

FactorFirst

 Canadian Hemophilia Society
 Help Stop the Bleeding

 AHDC Association of Hemophilia Clinic Directors of Canada

www.hemophilia.ca/emergency

Transfusion: Large Hospital



TM Shipments (q30min):

- Box 1 : 4 RBC
 - Box 2: 4 RBC , 4 plasma
 - Box 3: 4 RBC, 2 plasma, 4g FC
 - Box 4+: 4 RBC, 2 plasma
-
- Transfuse platelets based on platelet count
 - Give more FC as per fibrinogen level
 - Switch to lab-based transfusion as soon as practically possible

For OB hemorrhage, issue 4g FC with Box 1



RBC

- O Rh negative RBC to individuals of child-bearing potential (females <45 years old) and O Rh positive RBC to all others
- Switch to group specific RBC when group determined
- Switch to crossmatched RBC when compatibility testing completed

Plasma

- AB plasma
- Switch to group specific or compatible plasma when group is known/plasma thawed

Platelets

- Any group

Fibrinogen Concentrate

Transfusion: Small Hospital



TM Shipments

- **Box 1: 4 RBC**
- **Box 2: 4 RBC and where plasma not stocked 2,000IU PCC, 4g FC**
- **Box 3 and subsequent:** transport out
- Transfuse platelets based on platelet count

RBC

- O Rh negative RBC to individuals of child-bearing potential (females <45 years old) and O Rh positive RBC to all others
- Number of units may vary

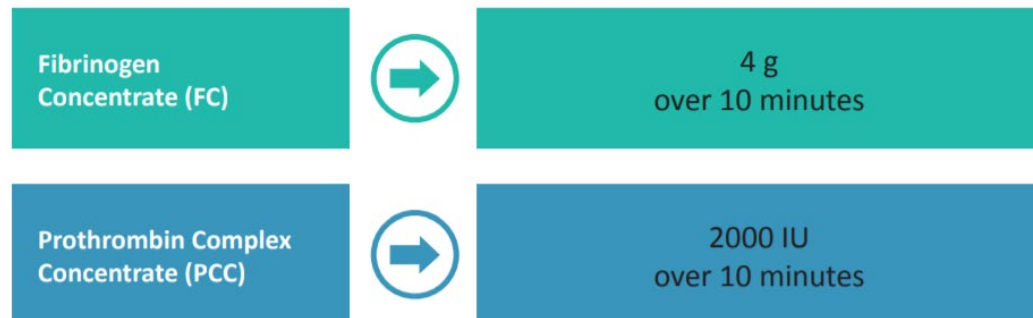
Platelets

- If not stocked, order
- If patient is transferred out before platelets are transfused, communicate this to receiving hospital

Transfusion

If returning to TM, please ensure to return in the same transport container as received!

Component	Transport	Storage at bedside	Blood warmer?
RBC	Cooler (temp controlled)	Cooler	Yes
Plasma	Cooler (temp controlled)	Cooler	Yes
If warm/just thawed	Plastic bag	Bedside, ambient temp	Yes
Platelets	Plastic bag	Bedside, ambient temp	No
Cryoprecipitate	Plastic bag	Bedside, ambient temp	No



Transfusion

- Switch from 2:1 ratio RBC to FP to lab-guided transfusion as soon as practically possible to avoid over-transfusion
- **Ontario Provincial MHP Targets**

Laboratory Test	Transfusion
Hemoglobin < 80g/L	RBC
INR > 1.8	Plasma 15mL/Kg (3-4 units)
Platelets < 50	1 adult dose of PLT
Fibrinogen < 2.0g/L (OB hemorrhage) Fibrinogen < 1.5g/L (all others)	Fibrinogen concentrate 4g

Termination

- Terminate MHP
 - Termination criteria: hemorrhage is controlled or patient succumbed
 - Termination process
 - Call Transfusion Medicine, release porter, etc.
 - Return coolers and any unused blood components to transfusion medicine ASAP
 - Complete charting and hand-over care if applicable
- Debrief
 - Why?
 - Debriefing improves psychological well-being and communication after trauma resuscitation
 - Structured audiovisual interdisciplinary debriefing improves patient survival
 - Who?
 - Multi-disciplinary team
 - What?
 - What went well? What could have been done better? What processes need to be fine-tuned or changed?

Select one incorrect answer

Massive transfusion may be complicated by:

- A. RBC alloimmunization; individuals of child-bearing potential should have antibody screen 6 weeks to 6 months after transfusion
- B. Hypercalcemia
- C. TACO
- D. Mistransfusion

Tracking Performance

- According to studies, compliance with MHP is not optimal
 - Canadian study:
 - Bawazeer et al: 1.4-94.5% for various interventions
 - American studies
 - Cotton et al: 27% overall protocol compliance
 - Plackett et al: 27-97% for various interventions
 - Significant variability between surgeons
- **Full compliance is an independent predictor of survival**
- **We must strive to do better for our patients**

Tracking Performance

How?

- Audits
- Mortality and morbidity rounds
- Utilization review at a multidisciplinary committee

What metrics should be tracked? (Ontario MHP)

- Proportion of patients receiving TXA within 1 hr of protocol activation
- Proportion of patients in whom RBC transfusion is initiated within 15 min of protocol activation.
- Proportion of patients transferred for definitive care with initiation of call for transfer within 60 min of protocol activation
- Proportion of patients achieving a temperature $>35^{\circ}\text{C}$ at termination of the protocol
- Proportion of patients with Hgb between 60-110 g/L during protocol activation
- Proportion of patients transitioned to group specific RBCs and plasma within 90 min of arrival/onset of hemorrhage
- Proportion of patients with appropriate activation (>6 RBC in first 24 hrs or before this level in patients dying due to hemorrhage within 24 hrs)
- Proportion of patients without any blood component wastage (including plasma that is thawed and not used before expiry)



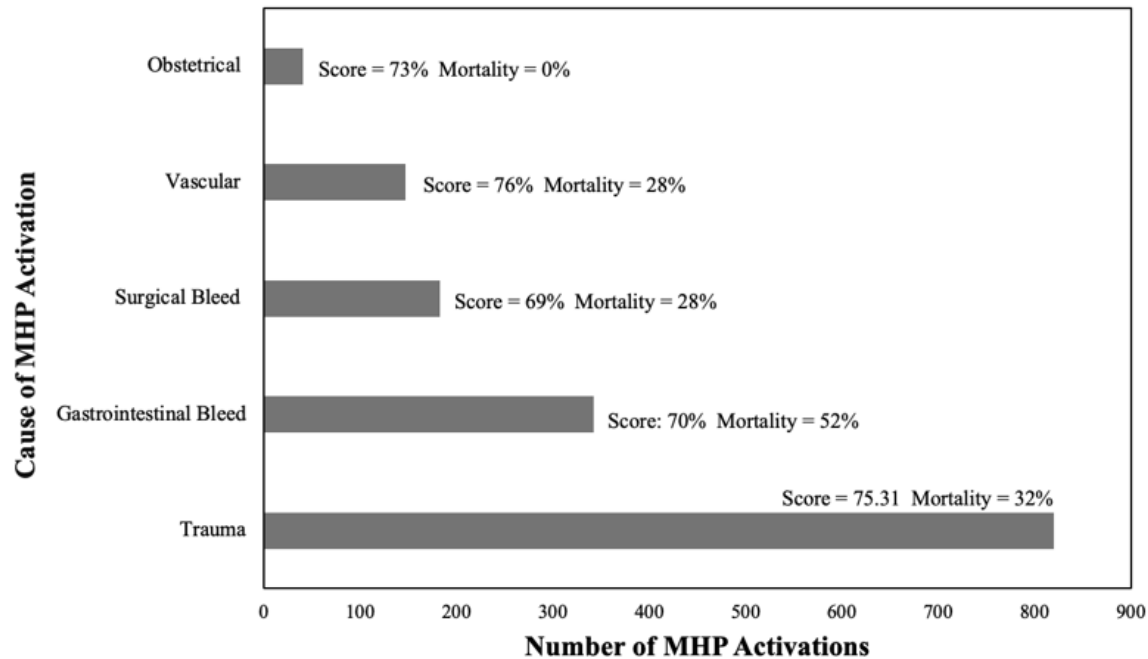
Ontario MHP: Tracking Performance

Quality Metrics	% Adherence
Hgb maintained over 60 g/L for the first 24 hours	92
RBCs administered within 15 minutes of activation	86
Transition to group specific blood products within 90 minutes	75
No blood products were wasted during the MHP activation	75
Patient temperature $\geq 35^{\circ}\text{C}$ at termination	74
MHP activation was appropriate	60
TXA administered within 1 hour of activation	52
Initiation of patient transfer within 1 hour of activation	50
Hgb below 110 g/L at 24 hours	46

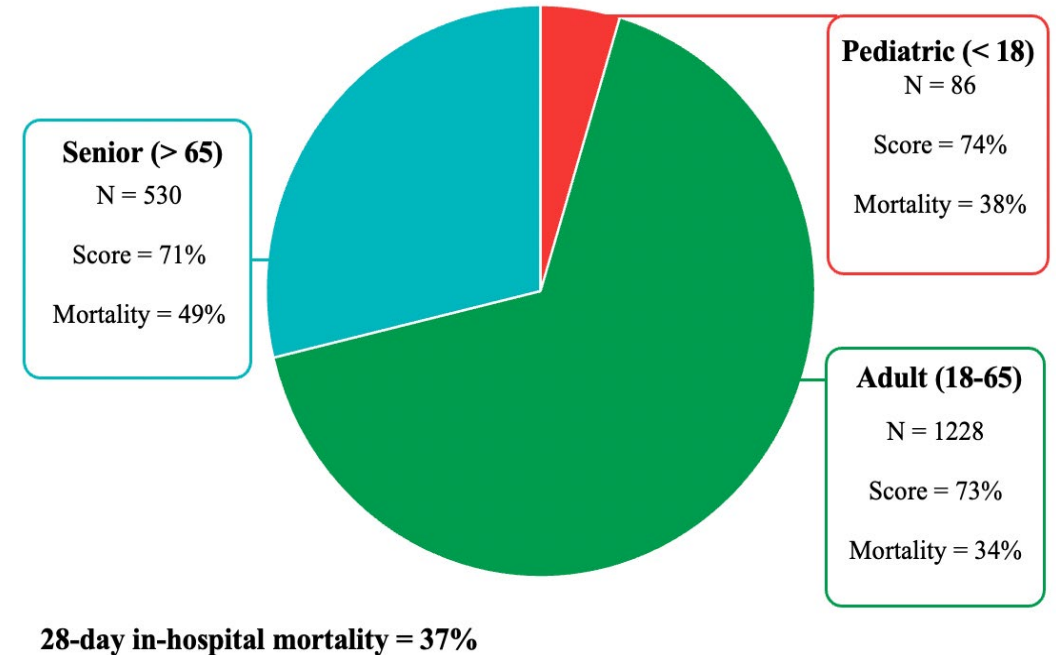
January 2019 to July 2022, 15 Ontario hospitals and 1844 patients

Ontario MHP: Tracking Performance

Mean MHP score by cause with mortality rates



Mean MHP Score by age group with mortality rates



Homework:

Review MHP Simulation in Trauma

- <https://transfusionontario.org/en/simulation-mhp-1-trauma-case/>
- Debriefing
 - What was done well?
 - What could be improved upon?
 - Did I learn anything new?
 - Does this video reflect my real world experience with MHP?

Coming soon - Ontario MHP 2.0

Questions

