Saskatoon Massive Hemorrhage Protocol (MHP) Additional Resources

Saskatoon Adult MHP – Informational Document (Clinical Protocol) - 2021

TXA Dosing Options

1. TXA dosing options
   - 1-g bolus over 10 min → 1-g bolus over 10 min

2. Immediate
   - 1-g bolus over 10 min → 1-g infusion over 8 hrs

3. Suggested for centres transferring patient out
   - 2-g bolus

TXA: Give ASAP

Every 15-min delay in TXA

Decreases survival by 10%

Image Credit: Treat the Bleed

MHP Activation Criteria

Consider an objective MHP trigger

ABC SCORE
≥2 or more of:
- Penetrating mechanism
- SBP ≤90 mmHg
- HR ≥120 bpm
- FAST ultrasound

Activation of whole team (e.g., overhead page)

Image Credit: Treat the Bleed
Temperature Management and Interventions: PREVENT HYPOTHERMIA!!

![Diagram showing temperature management and interventions](Treat the Bleed)

Further reading: [Guideline for prevention of hypothermia in severely injured trauma patients](#)

### Treatment Triggers in Bleeding Patients

<table>
<thead>
<tr>
<th>What test?</th>
<th>Treatment Trigger?</th>
<th>Recommended Therapy?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemoglobin</td>
<td>less than 70-80 g/L &lt;br&gt;Note: avoid over-transfusion to Hb greater than 100</td>
<td>RBC Transfusion</td>
</tr>
<tr>
<td>INR</td>
<td>greater than 1.8 or TEG suggests factor deficiency</td>
<td>Plasma Transfusion or Prothrombin Complex Concentrate (PCC – Octaplex®, Beriplex®), if anticoagulated with warfarin</td>
</tr>
<tr>
<td>Platelets</td>
<td>less than 75 x 10^9/L or bleeding due to antiplatelets (except ICH) or abnormal platelet mapping</td>
<td>Platelet Transfusion</td>
</tr>
<tr>
<td>Fibrinogen</td>
<td>less than 1.5 g/L; Obstetrics: less than 2.0 g/L or TEG suggests deficiency</td>
<td>Fibrinogen Concentrate (RiaSTAP®, Fibryga®)</td>
</tr>
<tr>
<td>Ionized Calcium</td>
<td>less than 1.15 mmol/L</td>
<td>Ca gluconate 50 mg/kg or Ca chloride 1g IV (slowly)</td>
</tr>
</tbody>
</table>

TEG = thromboelastography
Tips for Product Dosing:

### Adult Patients with Massive Hemorrhage: Tips for Product Dosing

<table>
<thead>
<tr>
<th>Product</th>
<th>Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RiaSTAP</strong> Mixing</td>
<td><strong>Instructions</strong></td>
</tr>
<tr>
<td><strong>Fibrinogen Concentrate</strong></td>
<td><strong>(FC)</strong></td>
</tr>
<tr>
<td><strong>Prothrombin Complex</strong></td>
<td><strong>Concentrate</strong></td>
</tr>
</tbody>
</table>

**4 g over 10 minutes**

**2000 IU over 10 minutes**

Image Credit: *Ontario MHP Toolkit – Adult Appendix E*

### Anticoagulant Reversal

#### Adult Patients with Massive Hemorrhage: Tips for Anticoagulant Reversal

**Warfarin**

*Dose for unknown INR*

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

**INR known in patients on Warfarin**

<table>
<thead>
<tr>
<th>INR 1.5-2.9</th>
<th>INR 3.0-5.0</th>
<th>INR &gt;5.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCC 1000 IU</td>
<td>PCC 2000 IU</td>
<td>PCC 3000 IU</td>
</tr>
</tbody>
</table>

**Alternate dosing**

PCC 25-50 IU per kg, to **maximum 3000 Units** in a single dose.

Note: PCC does not fully reverse Factor Xa inhibitors but is known to reduce bleeding.

**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

### Image Credit: *Ontario MHP Toolkit – Adult Appendix E*
**Antiplatelet Agents:** Consider platelet mapping to guide transfusion decision. 

*NOTE: Ticagrelor (Brilinta®) responds poorly to platelet transfusion due to its reversible P2Y12 binding mechanism. Elimination is via hepatic metabolism with an approximate T½ = 8 hours for the active metabolite. Consult Transfusion Medicine Physician on-call to discuss platelet transfusion in bleeding patients.*

**Obstetrical Hemorrhage**
- Maintain fibrinogen greater than 2 g/L at all times.
  - Risk of post-partum hemorrhage is 100% if fibrinogen is less than 2 g/L
  - If hypofibrinogenemic, give Fibrinogen Concentrate 4 g IV (requires Informed Consent for Blood Transfusion)
- Uterotonic medication type and dose are to be used based on individual patient care needs at the discretion of the treating Obstetrician. Dose examples are as follows:
  - Ergonovine 200 – 500 mcg IM. **Do not routinely give IV**; consider slow IV route (200 mcg over 1 minute) in exceptional circumstances only.
  - Hemabate 250 mcg IM or given via intramyometrial route. Repeat every 15 minutes as required to a maximum of 8 doses. Use caution in patients with asthma. **Do not give IV**.
  - Oxytocin 30 Units diluted into 500 mL normal saline (60 milliUnits/mL); administer at 40-80 mL/hr
    - C-section: Oxytocin 10 Units injected into intramyometrium may be considered.
- Bakri balloon

**Gastrointestinal Hemorrhage**
- Avoid TXA – no demonstrated benefit
- Goal post-transfusion Hb 90 g/L – over-transfusion may lead to harm
- Pantoloc 40 – 80 mg IV bolus, followed by 40 mg IV every 12 hours or infusion at 8 mg/hour
  - **Note:** May require dose adjustment in severe hepatic dysfunction. Consult Pharmacy.
- If variceal bleed suspected, add Octreotide Infusion 50 mcg/hour
- GI or General Surgery Consult for Endoscopic intervention and definitive recommendation.

**Chronic Renal Failure**
- Platelet dysfunction may be seen in **severe** renal insufficiency (eGFR less than 15 mL/min) or end-stage renal disease on renal replacement therapy. Nephrology Consultation is recommended.
  - Consider DDAVP 0.3 mcg/kg to maximum 20 mcg sc or IV infusion
    - Do not give via IV push; run as infusion in 50 mL normal saline diluent
    - Use with caution in patients with coronary artery disease or hyponatremia
Bleeding Disorders Management

Image Credit: Ontario MHP Toolkit – Adult Appendix G

Approach to Patients with Bleeding Disorders with Massive Hemorrhage

Suspect a bleeding disorder when:
- Bleeding is out of keeping with severity of injury
- Patient is not on antithrombotic therapy
- History of abnormal bleeding

Look for medical alert bracelet and/or bleeding disorder card
Connect with a Hemophilia Treatment Center (HTC) STAT

Give replacement therapy immediately for obvious or suspected bleeding or major trauma. Treat first, and then investigate.

Saskatchewan Bleeding Disorders Program: RN On-Call = 306-381-4185 (8 AM - 430 PM)
After-hours/weekends: Contact Hematologist On-Call = 306-655-1000

TREATMENT PROTOCOLS:
- Factor First Card → a signed prescription by a Hematologist! Give Factor First!
- Sunrise Clinical Manager (SCM) Saskatoon → Documents
- eHealth Viewer → under Clinical Documents – Consults

Other suggested resources:
- Treat the Bleed – MHP Module
- Clinical Guide to Transfusion – Chapter 11: Massive Hemorrhage and Emergency Transfusion