CMQCC **Peri-Partum Bleeding Algorithm: Checklist Format** Revision 22/01/12

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| **Stage O: All Births – Prevention & Recognition of OB Hemorrhage Prenatal Assessment & Planning** |
| * **Identify and prepare patients with special considerations:** Placenta Previa/Accreta, Bleeding Disorder, or those who Decline Blood Products
* **Screen and prevent anemia:** if oral iron fails, initiate IV Iron Sucrose as per established protocol to achieve hemoglobin over 110 g/L at delivery.
 |
| **Admission Assessment & Planning** | **Ongoing Risk Assessment** |
| **Verify Group & Screen** from prenatal record**If no Group & Screen in this pregnancy,*** Order Group & Screen

**If patient has red cell antibodies, (not passive anti-D from RHIG)*** Order Group & Screen

**Patients at high risk for hemorrhage or transfusion*** Order Group & Screen & Crossmatch (2 units)
 | * Evaluate for **Risk Factors** on admission, throughout labor, and postpartum. (At every handoff)

**If medium risk:*** + Order Group & Screen
	+ Review Hemorrhage Protocol

**If high risk: (in addition to above)*** + Order Group & Screen & Crossmatch (2 units)
	+ Notify OB Anesthesia
	+ set up cell saver on C5, consider TXA, uterotonics

**Identify** women who may decline transfusion* + Notify OB provider for plan of care
	+ Early consult - OB anesthesia, cell saver, blood conservation RN
	+ Review Consent Form
 | * **Evaluate for development of additional risk factors in labor:**
	+ Prolonged 2nd Stage labor
	+ Prolonged oxytocin use
	+ Active bleeding
	+ Chorioamnionitis
	+ Magnesium sulfate treatment
* **Increase Risk level convert to Group & Screen +/- Crossmatch (2 units)**
* **Treat multiple risk factors as high risk**
* **consider early uterotonics, set up cell saver on C5**
* **consider preemptive tranexamic acid**

**□ Monitor women postpartum for increased bleeding and hemodynamic instability** |
| **Admission Hemorrhage Risk Factor Evaluation** |
| **Low (No blood bank testing)** **Verify Group & Screen during pregnancy** | **Medium (Group & Screen)** | **High (Group & Screen & Crossmatch)** |
| No previous uterine incision | Prior cesarean birth(s) or uterine surgery | Placenta previa, low lying placenta |
| Singleton pregnancy | Multiple gestation | Suspected Placenta accrete or percreta |
| ≤ 4 previous vaginal births | > 4 previous vaginal births | Hemoglobin <100 g/L AND other risk factors |
| No known bleeding disorder | Chorioamnionitis | Platelets < 100 x109/L or falling on serial B/W |
| No history of PPH | History of previous PPH | Active bleeding (greater than show) on admit |
| Hemoglobin 110 g/L or higher | Large uterine fibroids | Known coagulopathy, fetal demise, physician concern |
|  | Hemoglobin 100-109 g/L |  |
| All Births – Prophylactic Oxytocin, Quantitative Evaluation of Blood Loss, & Close Monitoring |
| **Active Management of Third Stage*** Oxytocin infusion: vaginal birth 10 units IM followed by 20-units oxytocin/1000 mL solution at 125ml/hr unless directed otherwise by OB C/S 1-2.5 units slow IV bolus by anesthesia plus infusion OR carbetocin 20-100 mcg IV.

**Ongoing Quantitative Evaluation of Blood Loss*** Using formal methods, such as graduated containers, visual comparisons and **Ongoing Evaluations of Vital Signs**
 |
| **If: Cumulative Blood Loss > 500ml vaginal birth or > 1000ml C/S with continued bleeding -OR- Increased bleeding during recovery or postpartum proceed to STAGE 1*****As you progress through the stages 1-3, ensure checkboxes from previous stages are being completed concurrently*** |

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| **STAGE 1: Peri-partum Bleeding Algorithm****Cumulative Blood Loss >500ml vaginal birth or >1000ml C/S with continued bleeding -OR- Increased bleeding during recovery or postpartum Vital signs >15% change or HR ≥ 100, BP normal or** **, urine output borderline, O2 sat <95% on room air -OR- Obstetrical shock index >0.9 (HR/SBP)** |
| **MOBILIZE** | **ACT** | **THINK** |
| **Primary nurse, Physician or Midwife** to:* Record time of declaration.

**Primary nurse** to:* Notify obstetrician or midwife (in-house and attending)
* Notify charge nurse
* Notify anesthesiologist (7010 days, 7071 nights)

**Charge nurse:*** Assist primary nurse as needed or assign staff member(s) to help
* **Bring PPH atony drug kits to room**
* **Evaluate with care team the need to transfer the patient to the main or Connell 5 OR’s**
 | **Primary nurse or designee:*** Establish IV access if not present, at least 18 gauge
* Increased IV **Oxytocin** rate, up to 500 mL/hour of 20 units/1000 mL solution as per physician
* Give bolus of Ringers Lactate as per physician (anticipate 1-2 litres via pressure bag)
* Tranexamic acid 1 g IV over 10 minutes; repeat at 30 minutes if bleeding continues; do not give if over 3 hours since onset of hemorrhage
* Apply vigorous fundal massage
* Empty bladder: straight cath or place Foley with urimeter

**2nd Line Uterotonic:** (**Ergonovine** OR **Carboprost/ Hemabate**® OR **Misoprostol**)* + - See chart page 5 for all dosing information
		- Carboprost (Hemabate®) 0.25 mg IM or intramyometrially (avoid in asthma), may repeat Q15-20 minutes (total max 2mg)
		- Ergonovine 0.25 mg IM (if not hypertensive); give once, if no response, move to alternate agent, C/S may give slow dilute IV; if good response may give additional doses q2 h.
		- Misoprostol 400 mcg SL and 400 mcg PR per protocol (once)
* Administer oxygen to maintain O2 sats at >95%
* Vital Signs, including O2 sat & level of consciousness (LOC) q 5 min minimum
* Monitor temperature q30 minutes and maintain temp >36.0°C
* Calculate, **record & inform team of** estimated blood loss q 5-15 minutes
* Record total fluids
* Order 2-4 units of Red Blood Cells (RBC) STAT
* Send for Group & Screen if not done

**Physician or midwife:*** Rule out retained products of conception, laceration, hematoma

**Surgeon (if cesarean birth and still open)****□** Inspect for uncontrolled bleeding at all levels; broad ligament, posterior uterus, and retained placenta | Consider potential etiology:* Uterine atony
* Trauma/Laceration
* Retained placenta
* Amniotic Fluid Embolism
* Uterine Inversion
* Coagulopathy
* Placenta Accreta

-C/S start using cell saver as soon as field clear of amniotic fluid and anticipate ongoing blood loss**Once stabilized:** Modified Postpartum management with increased surveillance |
| **If Continued bleeding or Continued Vital Sign instability, and < 1500 mL cumulative blood loss****proceed to STAGE 2** |

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| **STAGE 2: Peri-Partum Bleeding Algorithm****Continued bleeding or Vital Sign instability, and up to 1500 mL cumulative blood loss****Vital Signs/Symptoms: HR >120, BP**  **, respiratory rate****, urine output** **, anxious, OSI >1.0 (HR/sBP)****\*\*Vital signs may be relatively normal if appropriate volume resuscitation has occurred\*\*** |
| **MOBILIZE** | **ACT** | **THINK** |
| **Primary nurse (or charge nurse):*** Call obstetrician or midwife to bedside
* Call Anesthesiologist 7071
* Call OM at 7021
* Consider contacting RACE Nurse and RT if resources needed

**PHONE #:** * Notify Blood bank of hemorrhage; order products as directed

**Charge nurse:*** Notify 2nd OB
* Notify nursing supervisor
* Bring hemorrhage supplies to the patient’s location
* If considering selective embolization, call-in Interventional Radiology Team
* Assign single person to communicate with blood bank
* Assign second attending or clinical nurse specialist or medical social worker as family support person.
 | **Team leader** (OB Physician or OB Anesthesia or midwife):* Continued IV oxytocin and provide additional warmed IV crystalloid solution
* Additional 2nd line uterotonic medications: (**Ergonovine** OR **Carboprost/ Hemabate**® OR **Misoprostol) see** chart page 5 for dosing
* **Do not delay interventions (see right column)** while waiting for response
* Bimanual uterine massage
* Consider move to OR (if on postpartum unit, move to L&D or OR), apply monitors including cardiac leads
* Order 2 units RBCs and bring to the bedside (uncrossmatched if crossmatched RBC not already labelled and ready)
* Order MHP bloodwork panel STAT, send immediately with red labels

**Transfuse** * RBCs based on clinical signs and response, do not wait for lab results or crossmatch; use uncrossmatched O-negative, Kell-negative RBC if necessary
* If fibrinogen <2.0 g/L transfuse 4 grams of fibrinogen concentrate
* If INR<1.8 transfuse 4 units of Plasma
* If PLT <50x109/L transfuse 1 pool of Platelets

**Primary nurse (or designee):*** Establish 2nd large bore IV, at least 18 G on blood admin set with warmer
* Assess and announce Vital Signs and cumulative blood loss q 5-10 minutes
* Administer meds, blood products and draw labs, as ordered
* Monitor temperature q30 minutes and maintain temp >36.0°C

**Second nurse** (or charge nurse):* Place Foley with urimeter (if not already done)
* Obtain portable light and OB procedure tray
* Obtain blood products from the Blood Bank (or send designee)
* Assist with move to OR

**Blood Bank:*** Maintain 4 units of RBC ahead
* Thaw 4 units of Plasma, label 1 unit of platelets, and label 4 grams of fibrinogen
 | **Sequential advance through procedures** and other interventions based on etiology: **Vaginal birth**If **trauma (vaginal, cervical or uterine):*** Visualize and repair If **retained placenta:**
* D&C

If **uterine atony** or lower uterine segment bleeding:* Intrauterine Balloon (Bakri) If **above measure unproductive:**
* Selective embolization (Interventional Radiology if available & adequate experience)

**C-Section:*** B-Lynch Suture
* Intrauterine Balloon
* use cell saver

 If **Uterine Inversion:*** Anesthesia and uterine relaxation drugs for manual reduction

If **Amniotic Fluid Embolism:*** Maximally aggressive respiratory, vasopressor and blood product support

If **vital signs are worse than estimated or measured blood loss:** possible uterine rupture or broad ligament tear with internal bleeding; **move to laparotomy****Once stabilized:** Modified Postpartum management with increased surveillance |
| **Re-Evaluate Bleeding and Vital Signs****If cumulative blood loss > 1500mL, > 2 units PRBCs given, Vital Signs unstable or suspicion for DIC,****proceed to STAGE 3** |

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| **STAGE 3: Peri-partum Bleeding Algorithm****Cumulative blood loss > 1500mL, > 2 units PRBCs given, Vital Signs unstable or suspicion for coagulopathy****Vital Signs/Symptoms: HR >120 thready, BP** **, respiratory rate** **, urine output** **, confusion, shortness of breath, chest pain****\*\*Vital signs may be relatively normal if appropriate resuscitation has occurred\*\*** |
| **MOBILIZE** | **ACT** | **THINK** |
| **Charge Nurse or designee:*** Activate Massive Hemorrhage Protocol
* **Call “4444” for Code Transfusion Overhead**

**Switchboard will call**:* Blood bank & Portering
* Anesthesia OB staff (day 7010, night 7071)
* Anesthesia OR manager (day 7071)
* Anesthesia Assistant (day 7079, night pager)
* Perfusion (on call)
* RACE team

**Consider calling:**2nd on-call gynecology surgeon 2nd on-call OB/GYN residentgeneral surgeonadult intensivist/ICU2nd AnesthesiologistOR staffInterventional RadiologyRN supervisor, CNS, manager**Blood Bank:*** + Keep 1 MHP pack ahead at all times
 | **Establish team leadership and assign roles****Team leader** (OB physician + OB anesthesiologist, anesthesiologist and/or and/or intensivist):**□ Order Massive Haemorrhage Protocol (MHP) if required*** Transfuse MHP blood packs (RBC and plasma)
* Transfuse platelets (PLT<100x109/L)
* Transfuse 4 grams of fibrinogen (fibrinogen <2.0 g/L)
* **Move to OR** if not already there, apply all monitors immediately
* Send MHP bloodwork stat with red labels and q60 min

**Anesthesiologist** (as indicated):* Arterial line, ABG’s/hemocue/bloodwork
* Vasopressor support
* Call perfusionist for cell saver if abdomen open
* Consider intubation & central hemodynamic monitoring
* Calcium replacement (every 4 RBC units)
* Electrolyte monitoring (monitor for hyperkalemia via q60 min labs & ECG)

□ Monitor temperature* Announce VS and cumulative measured blood loss q 5-10 minutes
* Warm patient (Bair hugger, fluid warmer for fluid and blood products)

□ Communicate all laboratory results q60min**Primary nurse:*** Apply sequential compression stockings to lower extremities
* Circulate in OR

**Second nurse and/or anesthesiologist/AA:*** Continued to administer meds, blood products and draw labs, as ordered
* Set up arterial line, obtain induction drugs as needed (ketamine)

**Third Nurse (or charge nurse):**□ Recorder, additional supplies (set up 2nd rapid infusion fluid warmer) | **Selective Embolization (IR), cell saver****Interventions based on etiology not yet completed****Prevent hypothermia, acidemia Conservative or Definitive Surgery:*** Uterine Artery Ligation
* Hysterectomy

**For Resuscitation: Aggressively Transfuse****Based on Vital Signs, Blood Loss****During uncontrolled hemorrhage transfuse a minimum of 1 plasma for every 2 RBC units:****4-6 PRBC: 4 FFP: 1 apheresis Platelets, Fibrinogen concentrates if <2.0****Unresponsive Coagulopathy:*** Role of rFactor Vlla and PCC are unknown. May consider risk/benefit of rFactor Vlla and PCC in consultation with hematologist or transfusion medicine physician on call.
* Dose of rFactor VIIa = 90 ug/kg (60 kg female = 5 mg iv push over 5 min)
* Dose of PCC = 2000 IU over 10 minutes iv push

**Once Stabilized:** Modified Postpartum Management with increased surveillance; consider ICU |

See KHSC Parenteral Drug Therapy Manual for detailed information

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| **UTEROTONIC AGENTS for POST PARTUM Bleeding Algorithm** |
| **Drug** | **Dose** | **Route** | **Frequency** | **Side Effects** | **Contraindications** | **Storage** |
| Oxytocin10 units/ml | 5-10 units IMthen 20 units per1000 ml at 125ml/hour | IV infusion pump (anesthesia may give slow IV bolus 1-2.5 units) | Continuous infusion(1-3 units slow IV bolus may be given Q3 minutes) | Nausea, vomiting, hyponatremia with prolonged IV admin, flushing, headache, coronary vasospasm, chest pain, ECG changes**↓↓ BP and ↑ HR with high doses**, esp IV push and with hypovolemia,uterine hyperstim | Hypersensitivity to oxytocin, Cardiac disease, beware in Hypovolemia | Room temp |
| Ergonovine0.25 mg/ml | 0.25 mg | IM(anesthesia may give diluted slow IV) | -Q 2-4 hours-Max total dose 1 mg for IV route | Nausea, vomiting**Severe hypertension**, if injected undiluted or too rapidly | Hypertension, Preeclampsia, Cardiovascular disease Hypersensitivity to drug **Caution** if multiple doses of ephedrine have been used, may exaggerate hypertensive response w/possible cerebralhemorrhage | Refrigerate Protect from light |
| Carboprost (Hemabate®) (15-methyl prostaglandin F2 alpha)250 mcg/ml | 250 mcg | IM or intra- myometrial (**NOT given IV)** | -Q 15-90 min-Max 2 mg (8 doses)-If no response after several doses, it is unlikely that additional doseswill benefit. | Nausea, vomiting, diarrhea Fever (transient), Headache Chills, shivering Hypertension **Bronchospasm** | Caution in women with hepatic and renal disease, asthma, hypertension, active cardiac or pulmonary disease Hypersensitivity to Carboprost | Refrigerate |
| Misoprostol (Cytotec®)100 or 200 mcg tablets | 800 mcg Total dose | SL/PO/PR,Suggest: 400mcg SL & 400mcgPR | Once | Nausea, vomiting, diarrhea, abdominal painShivering, Fever (transient) | Allergy to prostaglandin Hypersensitivity to Carboprost | Room temp |
| Carbetocin (Duratocin®) 100 mcg/mL | 100 mcg(20-100mcg) | IV | Once(max 100 mcg) |  Same as oxytocin, **not reversible****ED95 for elective C/S ~20mcg** | Hypersensitivity to oxytocin or carbetocin. N&V, flushing.Cardiac disease, beware inhypovolemia | Room temperature |
| Tranexamic Acid 100 mg/mL | 1 g | IV | May repeat in 30 minutes | Nausea, vomiting, diarrhea Hypotension especially whenadministered too rapidly | Relative contraindications: Prior active thromboembolicdisease, seizure disorder | Room temp Protect from light |

See KHSC Parenteral Drug Therapy Manual for detailed information

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| **BLOOD PRODUCTS** |
| **Red Blood Cells (PRBC)**(approx. 60 min. for crossmatch compatible – once sample is in the lab and assuming no antibodies present) | Best first-line product for blood loss - 1 unit = 300 ml volumeIf antibody positive, may take hours for crossmatch, in some cases, such as autoantibody crossmatch compatible may not be possible; use incompatible inurgent situations with guidance from transfusion medicine/hematology |
| **Frozen Plasma (FP)**(approx. 30 min. to thaw for release) | Highly desired if > 2 units PRBCs given, or for prolonged PT, PTT - 1 unit = 280 mlvolume; during MHP 1:2 ratio with RBC and if coagulopathic 15 mL/kg (4 units) |
| **Platelets (PLTS)**Platelets available 24/7 and can be released in minutes | Transfuse with Platelets < 50,000Each unit provides an increment of 25-50 |
| **Fibrinogen concentrate** | Give 4 grams of fibrinogen if ongoing bleeding and levels less than 2.0 g/L or rate ofhemorrhage precludes waiting for test result |
| **rFactor Vlla** | 90 ug/kg (60 kg = 5 mg iv push over 5 minutes) |
| **Prothrombin Complex Concentrate** | 2000 IU over 10 minutes slow iv push |

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| **Massive Haemorrhage****Protocol (Obstetrics)** | **Transfusion Pack 1** | **Transfusion Pack 2** | **Transfusion Pack 3** | **Separate order** |
|  | **4 units RBC’s** | **4 units RBC’s** | **4 units RBC’s** | **platelets** |
|  |  | **4 units FFP** | **2 units FFP** | **Additional fibrinogen** |
|  |  |  **Fibrinogen concentrates (4 grams )** |  |  |