Vancouver General Hospital/UBC Hospital

Practice Guidelines for the use of Plasma and Platelets Prior to Invasive Radiology Procedures

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General considerations:

- Although the PT/INR and PTT are currently the best available laboratory indicators of hemostasis, there is no evidence that they adequately predict bleeding risk for invasive procedures[1,2]
- Frozen plasma does not reliably correct minimally prolonged coagulation parameters[2,3]
- In non-urgent situations, vitamin K should be administered for reversal of warfarin[4], rather than frozen plasma. For urgent reversal of warfarin, octaplex™ may be preferred over frozen plasma in some patients (requires consultation with hematopathologist, call local **54420**).
- The risk of bleeding must be seriously considered against the risk of adverse reactions associated with blood products. While the risks of viral transmission are minimal (e.g. risk of HIV, Hepatitis C < 1 in 3 million), **there continues to be significant immediate risks of transfusion that may result in serious morbidity and mortality**[5]:

- risk of bacterial contamination of platelets:	~ 1 in 1,000
- risk of TRALI (transfusion related acute lung injury):	~ 1 in 5,000
- risk of TACO (transfusion-associated circulatory overload) per transfusion episode	~ 1 in 700
- risk of death per blood component:	~ 1 in 285,000
- risk of emerging pathogens:	unknown

- For patients with congenital bleeding disorders, consider consultation with hematologist regarding the use of specific factor replacement, DDAVP, and antifibrinolytics[6]
- When comparing laboratory results from different hospitals, note that the reference ranges may vary depending on the reagents and instrumentation used by different labs
- Note: these recommendations are more conservative than the 2009 SIR Consensus Guidelines[7].

1. Minimal Risk Procedures only

- see attached document "Safety Guidelines" for list of procedures and protocol for discontinuing anticoagulation (if any)
- No special *testing* required

2. Moderate/Low Risk and High Risk Procedures

- see attached "Safety Guidelines" for list of procedures and protocol for discontinuing anticoagulation
- Check INR and platelet count
  - NO ANTICOAGULATION
    - INPATIENTS – within 72 hours
    - OUTPATIENTS – within 60 days
  - ANTICOAGULATION
    - ALL patients – within 48 hours of procedure (preferably 24 hours)

- *Reminder*: Stop ASA, other NSAIDs, clopidogrel/ticlopidine, and anti-platelet medications **5 days** prior to procedure (acetaminophen is acceptable)

- *Reminder*: If patient is on an anticoagulant, discontinue as follows:
  - for warfarin, stop **5 days** prior to procedure
  - for low-molecular weight heparin, give last dose 12-24 hours prior to procedure
  - for unfractionated heparin, discontinue infusion 4-6 hours prior to procedure

  Note: For patients at high risk of thrombotic complication if warfarin is stopped (e.g. mechanical heart valve, recent thromboembolic event), consider consultation with hematologist regarding bridging anticoagulation.

- Note: If patient has significant liver disease then check INR, PTT and platelet count 24 hours prior to procedure

A. Moderate/Low Risk Procedures

		VGH Reference Ranges
Optimal parameters:	INR $\leq$ 1.5	0.9 – 1.2
	PTT $\leq$ 50	27 – 43 seconds
	Platelets $> 50 \times 10^9$/L	150 – 400 x 10^9/L

- Note: Patients under the direct care of a hematologist *may* have parameters outside these values; nevertheless, certain procedures are still indicated and may be performed under those circumstances (such as Hickman Lines, etc.)

- INR results
  - if INR $\leq$ 1.5 then no further action required
  - if INR > 1.5 then give one dose vitamin K 2 mg po daily and re-check INR in a.m.
  - if INR not $\leq$ 1.5 on a.m. of procedure then consider FFP 10-15 ml/kg (one unit ~200 ml)

  Note: For patients at high risk of thrombotic complication if warfarin is stopped (e.g. mechanical heart valve, recent thromboembolic event), consider consultation with hematologist regarding bridging anticoagulation.

- PLATELET count
  - if < 50 x 10^9/L then transfuse 1 platelet dose for every desired increase of 15 x 10^9/L. Give platelets 1 hour prior to procedure (i.e. not 24 hours prior to procedure).

- *In urgent situations:*
  - check INR, PTT and platelets as soon as possible
  - if INR > 1.5 then transfuse FFP 10-15 ml/kg
  - if platelets < 50 x 10^9/L then transfuse 1 platelet dose for every desired increase of 15 x 10^9/L
- Re-starting anticoagulants:
  - warfarin and anti-platelet medications may be re-started the evening of the procedure

- LMWH can be re-started 24 hours after the procedure provided there is adequate hemostasis
- unfractionated heparin infusion can be re-started 6 hours after the procedure provided there is adequate hemostasis (no IV bolus required)

B. Core Renal Biopsy

- Although a "Low-Risk" procedure, patients undergoing renal biopsy warrant specific instructions[8]
- Blood pressure should be < 160/100 mmHg
- If creatinine > 175 μmol/L then consider DDAVP 0.3 mcg/kg IV (to a maximum of 20 mcg per dose) one hour prior to procedure
- (*Give one dose of DDAVP only*: hyponatremic seizures are a rare but serious side effect of DDAVP. For very high creatinine values, consider dialysis prior to procedure.)

C. High Risk procedures

		VGH Reference Ranges
Optimal parameters:	INR ≤ 1.3	0.9 – 1.2
	PTT ≤ 50	27 – 43 seconds
	Platelets > 80 x 10^9/L	150 – 400 x 10^9/L

- INR results
  - if INR ≤ 1.3 then no further action required
  - if INR > 1.3 then give one dose vitamin K 2 mg po daily and re-check INR in a.m.
  - if INR not ≤ 1.3 on a.m. of procedure then consider FFP 10-15 ml/kg (one unit ~200 ml)

Note: For patients at high risk of thrombotic complication if warfarin is stopped (e.g. mechanical heart valve, recent thromoboembolic event), consider consultation with hematologist regarding bridging anticoagulation.

- PLATELET count
  - if < 80 x 10^9/L then transfuse 1 platelet dose for every desired increase of 15 x 10^9/L. Give platelets 1 hour prior to procedure (i.e. not 24 hours prior to procedure).

- *In urgent situations:*
  - check INR, PTT and platelets as soon as possible
  - if INR > 1.3 then transfuse FFP 10-15 ml/kg
  - if platelets < 80 x 10^9/L then transfuse 1 platelet dose for every desired increase of 15 x 10^9/L
- Re-starting anticoagulants:
  - warfarin and anti-platelet medications may be re-started the evening of the procedure
  - LMWH can be re-started 24 hours after the procedure provided there is adequate hemostasis
  - unfractionated heparin infusion can be re-started 6 hours after the procedure provided there is adequate hemostasis (no IV bolus required)

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Quick Reference

Procedure**	Optimal Lab Parameters	Instructions
Minimal Risk ➢ biopsy of superficial site or fine needle ➢ 'simple' vascular venous procedures	No lab testing required	- ASA and Antiplatelet agents acceptable - stop warfarin 3 - 5 days before (see guidelines) - stop LMWH last dose 12h before - stop IV heparin 3-4h before
Moderate/Low Risk ➢ diagnostic angiography ➢ 'complex' venous interventions ➢ core liver biopsy ➢ prostate biopsy ➢ lung biopsy ➢ catheter drainage ➢ 'low risk' Neuro	INR ≤ 1.5 PTT < 50 s Plts > 50 x 10^9/L	- stop anticoagulants - check labs 24-72h/60d prior to procedure - if INR > 1.5 then give vit K 2 mg po daily and repeat labs a.m. of procedure - if INR > 1.5 after vit K, then consider FFP 10-15 ml/kg - if plts < 50 x 10^9/L then give 1 dose per desired increase of 15 x 10^9/L
➢ renal biopsy*	*BP < 160/100 *Creat < 175 μmol/L	- *if creat > 175 μmol/L then consider ONE DOSE of DDAVP 0.3 mcg/kg IV (max 20 mcg)
High Risk ➢ invasive arterial (interventions) ➢ invasive CNS ➢ invasive liver, biliary or PNL/ nephrostomy	INR ≤ 1.3 PTT ≤ 43 s Plts > 80 x 10^9/L	- stop anticoagulants - check labs 24-72h/30d prior to procedure - if INR > 1.3 then give vit K 2 mg po daily and repeat labs a.m. of procedure - if INR > 1.3 after vit K, then consider FFP 10-15 ml/kg - if plts < 80 x 10^9/L then give 1 dose per desired increase of 15 x 10^9/L

** see safety guidelines for complete list

References:

1. Segal JB, Dzik WH. Paucity of studies to support that abnormal coagulation test results predict bleeding in the setting of invasive procedures: an evidence-based review. *Transfusion* 2005; 45:1413-1425.
2. Holland L, Sarode R. Should plasma be transfused prophylactically before invasive procedures? *Current Opinion in Hematology* 2006; 13:447-451.
3. Stanworth SJ, Brunskill SJ, Hyde CJ, McClelland DBL, Murphy MF. Is fresh frozen plasma clinically effective? A systematic review of randomized controlled trials. *British Journal of Haematology* 2004; 126:139-152
4. Guidelines for frozen plasma transfusion. Transfusion Medicine Advisory Group of B.C. 2006; *Draft*
5. Canadian Blood Services. Clinical Guide to Transfusion 2006
6. Douketis JD, Woods K, Crowther MA. Anticoagulant management of patients undergoing elective surgery who require temporary interruption of warfarin therapy. 2005, 2nd Edition
7. SIR– Consensus Guidelines for Periprocedural Management of Coagulation Status and Hemostasis Risk in Percutaneous Image-guided Interventions. *Journal of Vascular Radiology* 2009; 20:S240-S249
8. Shidham GB, Siddiqi N, Beres JA, Logan B, Nagaraja HN, Shidham SG, Piering WF. Clinical risk factors associated with bleeding after native kidney biopsy. Nephrology 2005; 10:305-310