Assessing bleeding risk in patients undergoing minimally invasive procedures

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UNIVERSITY OF TORONTO & CANADIAN BLOOD SERVICES

30 OCTOBER 2020

Coming to you from Toronto

We acknowledge the land we are meeting on is the traditional territory of many nations including the Mississaugas of the Credit, the Anishnabeg, the Chippewa, the Haudenosaunee and the Wendat peoples and is now home to many diverse First Nations, Inuit and Métis peoples. We also acknowledge that Toronto is covered by Treaty 13 with the Mississaugas of the Credit.

Disclosures

- No conflict of interest
- Opinions discussed are my own
- May discuss off-label use of fibrinogen concentrate and tranexamic acid
- Article summarizing information discussed today available at: https://transfusionontario.org/en/june-2020/


The ORBCoN Ontario Regional Blood Coordinating Network

June 2020 Report

In this Issue

National Blood Donor Week,
New updates to transfusionontario.org,
Bleeding risk assessment for bedside and interventional radiology guided procedures: Consensus guidelines and beyond

Bleeding risk assessment for bedside and interventional radiology guided procedures: Consensus guidelines and beyond

Aditi Khandelwal MDCM FRCPC, Internal Medicine and Adult Hematology Fellow, Transfusion Medicine, University of Toronto & Canadian Blood Services

Scope

Case based discussion

Adults

2019 IR guidelines

Minimally invasive procedures

Bleeding risk assessment

Bleeding prevention

Objectives

1. Discuss a framework for bleeding risk assessment
2. Provide tools to assess patient related bleeding risk
3. Impart limitations of laboratory testing
4. Highlight opportunities to reduce unnecessary care

Unnecessary care in Canada

Wastes health system resources

Increases wait times for patients

Can lead to patient harm

Canadians have

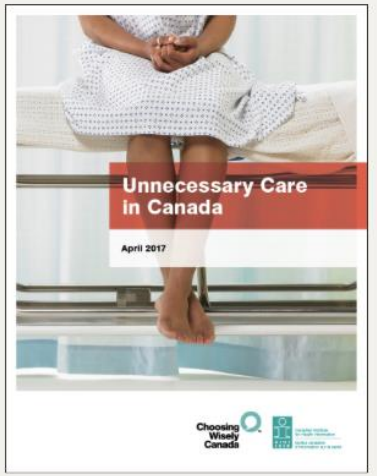
1 million+

potentially unnecessary medical tests and treatments each year.

of patients indicated in the 8 selected Choosing Wisely Canada recommendations had tests, treatments and procedures that **are potentially unnecessary**.

There is room to reduce unnecessary care.

Substantial variation exists among regions and facilities in terms of the number of unnecessary tests and procedures performed — **this points to an opportunity to improve.**



Choosing Wisely Canada is a campaign to help clinicians and patients engage in conversations about unnecessary tests and treatments, and make smart choices.

Unnecessary Care in Canada explores 8 out of 200+ Choosing Wisely Canada recommendations across sectors of the health system: primary care, specialist care, emergency care and hospital care.

Choosing Wisely Canada™

CIHI

cihi.ca

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CAIR endorsed SIR Guidelines 2019

STANDARDS OF PRACTICE

Society of Interventional Radiology Consensus Guidelines for the Periprocedural Management of Thrombotic and Bleeding Risk in Patients Undergoing Percutaneous Image-Guided Interventions—Part II: Recommendations

Endorsed by the Canadian Association for Interventional Radiology and the Cardiovascular and Interventional Radiological Society of Europe

Indravadan J. Patel, MD, Shiraz Rahim, MD, Jon C. Davidson, MD, Sue E. Hanks, MD, Alda L. Tam, MD, T. Gregory Walker, MD, Luke R. Wilkins, MD, Ravi Sarode, MD, and Ido Weinberg, MD

Assessing peri-procedural bleeding risk

Classify as Low (<1%) vs. moderate & high

1

Procedure related risk

Screening patients for bleeding disorder

Use Thrombosis Canada Tool Or SIR Guideline

2

Bleeding Risk

4

Laboratory assessment in select patients

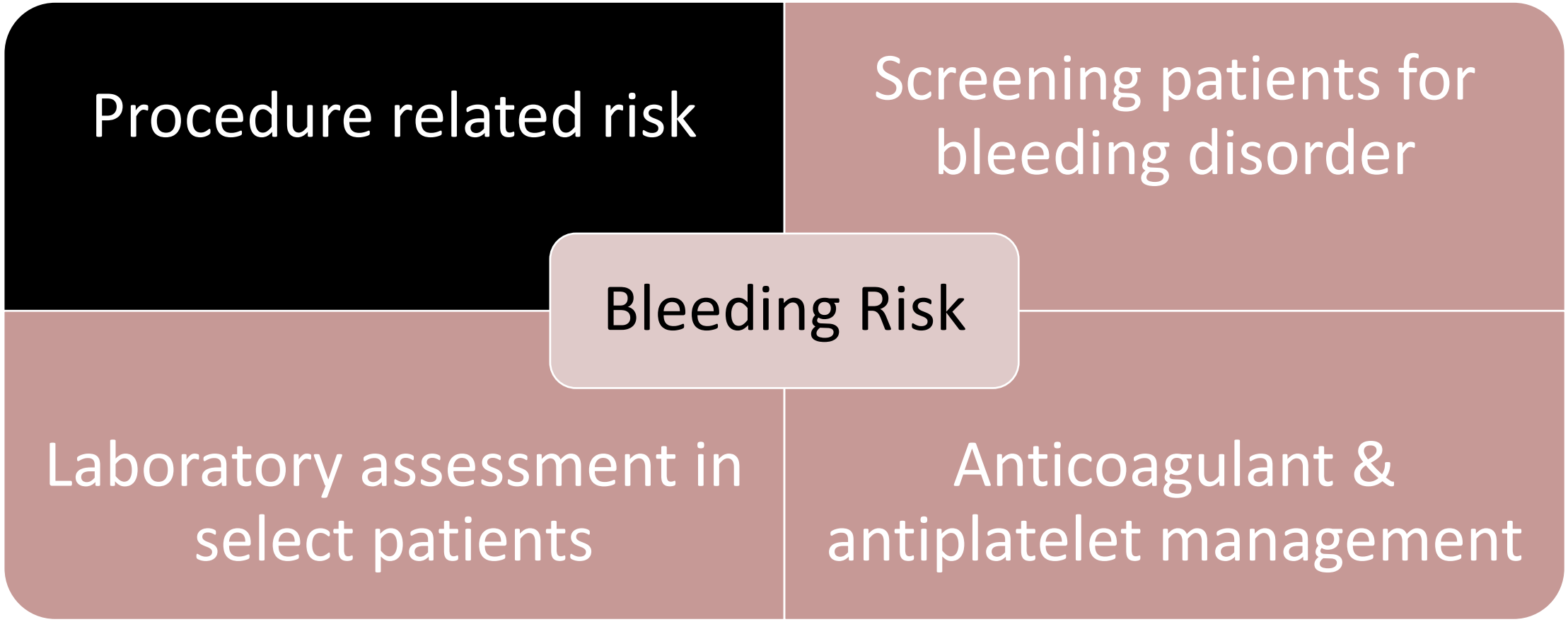
Anticoagulant & antiplatelet management

3

Choose wisely!

BAT
HAS BLED
History

Assessing peri-procedural bleeding risk



Procedure related risk

Bleeding risk	Low (<1%)	Moderate to Severe
Vascular procedures	Central line removal Dialysis access IVC filter placement PICC placement Transjugular liver biopsy Subcutaneous port placement Tunneled drainage catheter Venography Venous catheter	Ablation Arterial interventions (sheath >7 Fr) Catheter directed thrombolysis Chemoembolization Complex venous interventions CNS and Spine procedures incl epidural Radioembolization Tunneled venous catheter Urinary tract interventions Uterine fibroid embolization
Non-vascular procedures	Arthrocentesis + joint injection Catheter exchange Dental extraction (up to 2) Endoscopy without biopsy Lumbar puncture Pacemaker insertion Paracentesis Peripheral nerve block Superficial aspiration, drainage, skin biopsy Thoracentesis Thyroid biopsy	Ablation Biliary interventions Bone marrow biopsy Complex dental procedures Deep abscess drainage Solid organ biopsy Endoscopy with biopsy Gastrostomy/gastrojejunostomy placement Lymph node biopsy Percutaneous enteric tube (new tract) Spinal procedures

Procedure related risk

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Non-vascular procedures Not discussed in the SIR guidelines	Arthrocentesis + joint injection Catheter exchange Dental extraction (up to 2) Endoscopy without biopsy Lumbar puncture Pacemaker insertion Paracentesis Peripheral nerve block Superficial aspiration, drainage, skin biopsy Thoracentesis Thyroid biopsy	Ablation Biliary interventions Bone marrow biopsy Complex dental procedures Deep abscess drainage Solid organ biopsy Endoscopy with biopsy Gastrostomy/gastrojejunostomy placement Lymph node biopsy Percutaneous enteric tube (new tract) Spinal procedures

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No routine PT/INR, CBC
INR correct to ≤2.0 – 3.0
PLT transfuse if < 20 x 10^9/L

Procedure related risk

Bleeding risk	Low (<1%)	Moderate to Severe
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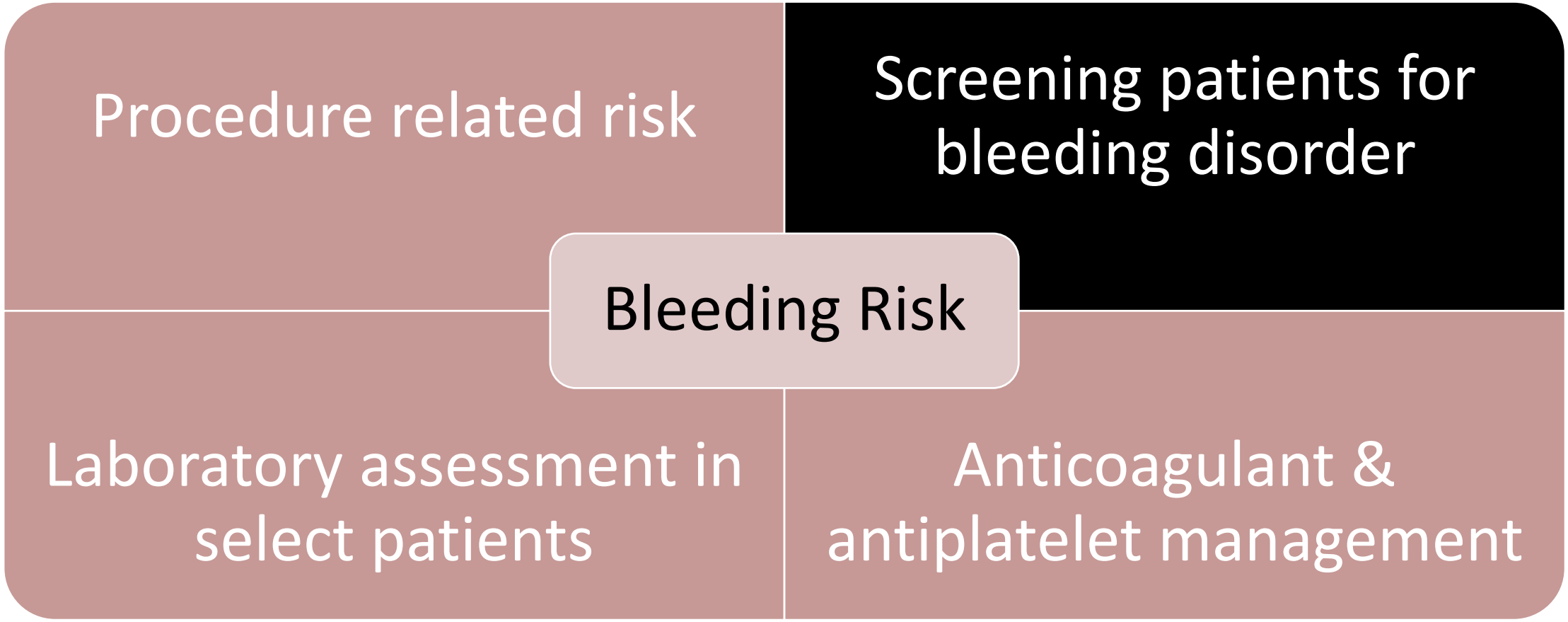
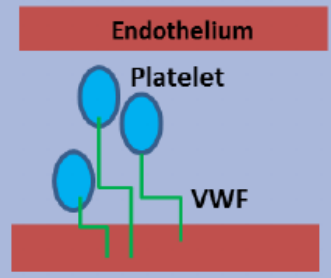
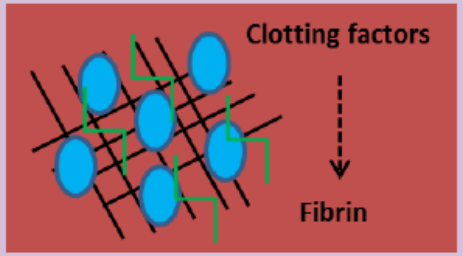
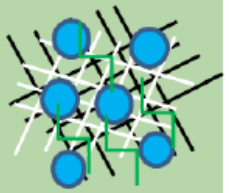
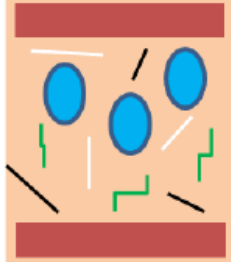
Recommended PT/INR, CBC
INR correct to ≤1.5 -1.8
PLT transfuse if < 50 x 10^9/L

Assessing peri-procedural bleeding risk



HEMOSTASIS SIMPLIFIED

St. Michael's
Inspired Care.
Inspiring Science.

HEMOSTASIS PHYSIOLOGY	Primary hemostasis = formation of platelet plug	Secondary hemostasis = formation of fibrin rich clot	Clot stabilization = formation of strong clot	Fibrinolysis = clot breakdown
				
COMMON BLEEDING DISORDERS	• Von Willebrand Disease • Platelet Function Disorders	• Hemophilia A and B • FXI Deficiency		
ROUTINE TESTS	**CBC** • Assesses platelet count but not function	**PT/INR and aPTT** • **ONLY** test secondary hemostasis • Reagents are attuned to detect a single factor deficiency **ONLY** if it is < 30% of normal function • Do **NOT** assess primary hemostasis (VWD* and platelet disorders = the most common bleeding disorders)		
BLEEDING ASSESSMENT TOOL (BAT)	☑	☑	☑	☑

The best test to assess bleeding risk is…

Bleeding Assessment Tool (BAT)

Slide courtesy M. Sholzberg

Bleeding Assessment Tools (BATs)

- BATs are the best screening test for bleeding disorders
- Can be expert or self administered
- Example: The Condensed MCMDM-1
  - Validated for vonWillebrand disease, Platelet disorders, Hemophilia carriers, Mild bleeding disorders
  - Sensitivity 85 – 100%, NPV 0.92-1.0
  - Must be administered by MD/NP/RN
  - Completed within 5 – 10 minutes

- Negative BAT (score < 4) + no family history
  - ✓ No further testing required
- Positive BAT or family history
  - ✓Refer to Hematology for additional testing

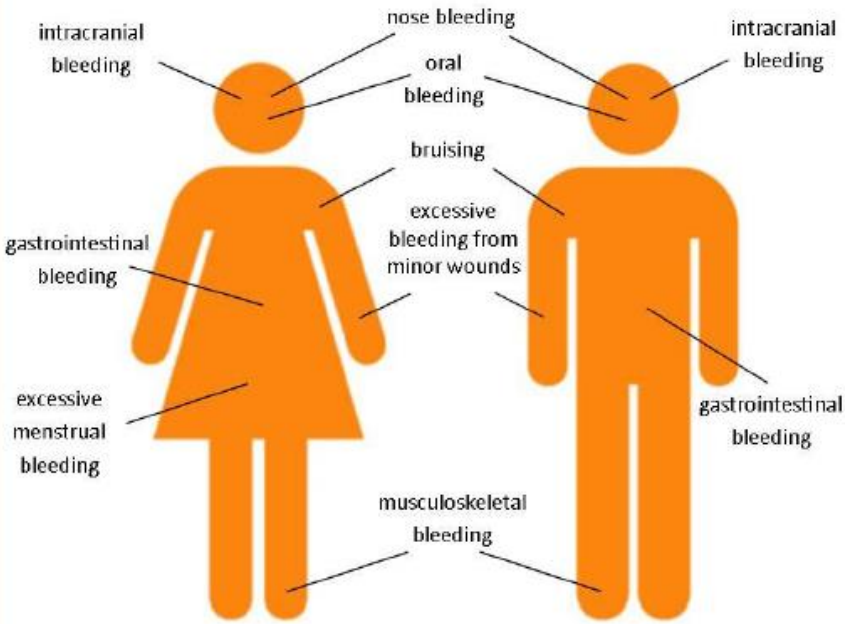
Clinical and Molecular
Hemostasis Research Group
Queen's University & Kingston General Hospital

1. Bowman et al. (2008) 2. Tosetto et al. (2011) 3. Azzam et al. (2012) 4. Rydz and James (2012) 5. Paroskie et al. (2015)

Bleeding Assessment Tool eg. MCMDM-I

BLEEDING SYMPTOM CATEGORIES

1. Spontaneous Bleeding



2. Bleeding with Challenges

- Surgery
- Dental Extraction
- Childbirth

Clinical Situation	-1	0	1	2	3	4
Epistaxis		No or trivial (≤ 5 per year)	> 5 per year or more than 10 minutes	Consultation only	Packing or cauterization or antifibrinolytic	Blood transfusion or replacement therapy or desmopressin
Cutaneous		No or trivial (≤ 1 cm)	> 1 cm and no trauma	Consultation only		
Bleeding from minor wounds		No or trivial (≤ 5 per year)	> 5 per year or more than 5 minutes	Consultation only	Surgical hemostasis	Blood transfusion or replacement therapy or desmopressin
Oral cavity		No	Reported, no consultation	Consultation only	Surgical hemostasis or antifibrinolytic	Blood transfusion or replacement therapy or desmopressin
Gastrointestinal bleeding		No	Associated with ulcer, portal hypertension, hemorrhoids, angiodysplasia	Spontaneous	Surgical hemostasis, blood transfusion, replacement therapy, desmopressin, antifibrinolytic	
Tooth extraction	No bleeding in at least 2 extractions	None done or no bleeding in 1 extraction	Reported, no consultation	Consultation only	Resuturing or packing	Blood transfusion or replacement therapy or desmopressin
Surgery	No bleeding in at least 2 surgeries	None done or no bleeding in 1 surgery	Reported, no consultation	Consultation only	Surgical hemostasis or antifibrinolytic	Blood transfusion or replacement therapy or desmopressin
Menorrhagia		No	Consultation only	Antifibrinolytics, oral contraceptive pill use	Dilation & curettage, iron therapy, ablation	Blood transfusion or replacement therapy or desmopressin
Postpartum hemorrhage	No bleeding in at least 2 deliveries	None done or no bleeding in 1 delivery	Consultation only	Dilation & curettage, iron therapy, antifibrinolytics	Blood transfusion or replacement therapy or desmopressin	Hysterectomy
Musde hematomas		Never	Post trauma, no therapy	Spontaneous, no therapy	Spontaneous or traumatic, requiring desmopressin or replacement therapy	Spontaneous or traumatic, requiring surgical intervention or blood transfusion
Hemarthrosis		Never	Post trauma, no therapy	Spontaneous, no therapy	Spontaneous or traumatic, requiring desmopressin or replacement therapy	Spontaneous or traumatic, requiring surgical intervention or blood transfusion
Central nervous system bleeding		Never			Subdural, any intervention	Intracerebral, any intervention

Courtesy of Dr. Michelle Sholzberg

From Bloody Easy 4 (ORBCoN)

Screening for acquired bleeding predisposition

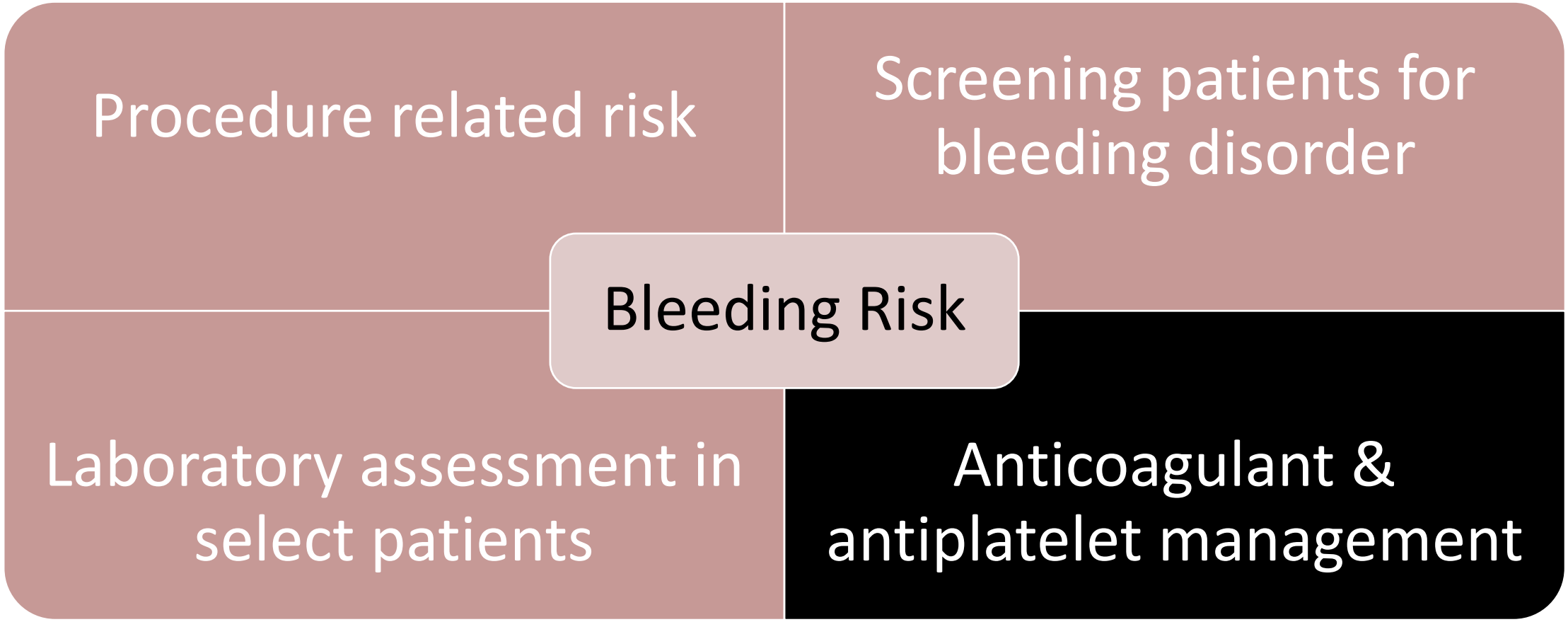
- No validated scoring system
- SIR guideline suggests use of HAS-BLED score in combination with other factors

HAS-BLED Score (Score > 3 predictive of bleeding events)	Other factors
• Hypertension • Abnormal renal function • Abnormal liver function • Prior Stroke • History of major bleeding or predisposition to bleeding • Labile INR • Age > 65 years • Concomitant use of antiplatelets or NSAIDs • History of alcohol or drug use	Medication review (prescription, OTC, herbal) Other factors: ✓ Bleeding within 3 months ✓ Bleeding with similar procedures ✓ INR above therapeutic range at the time of procedure if on Warfarin ✓ Previous bleeding with bridging therapy ✓ Mechanical heart valve ✓ Active cancer ✓ Platelet count lower than 20 x 10^9/L

Beware - Herbal supplements can increase bleeding

Ajoene	Ginger
Birch bark	Ginkgo biloba
Cayenne	Ginseng
Chinese black tree fungus	Grapeseed extract
Cumin	Milk thistle
Echinacea	Onion extract
Evening primrose oil	St. John’s wort
Feverfew	Turmeric
Garlic	Vitamins E

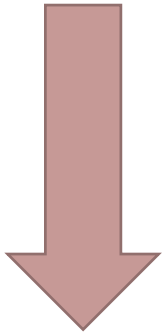
Assessing peri-procedural bleeding risk



Procedures can be performed without disrupting anticoagulation or antiplatelets

✓Procedure = LOW risk of bleeding

✓Patient = LOW risk of bleeding



Continue anticoagulant or antiplatelet

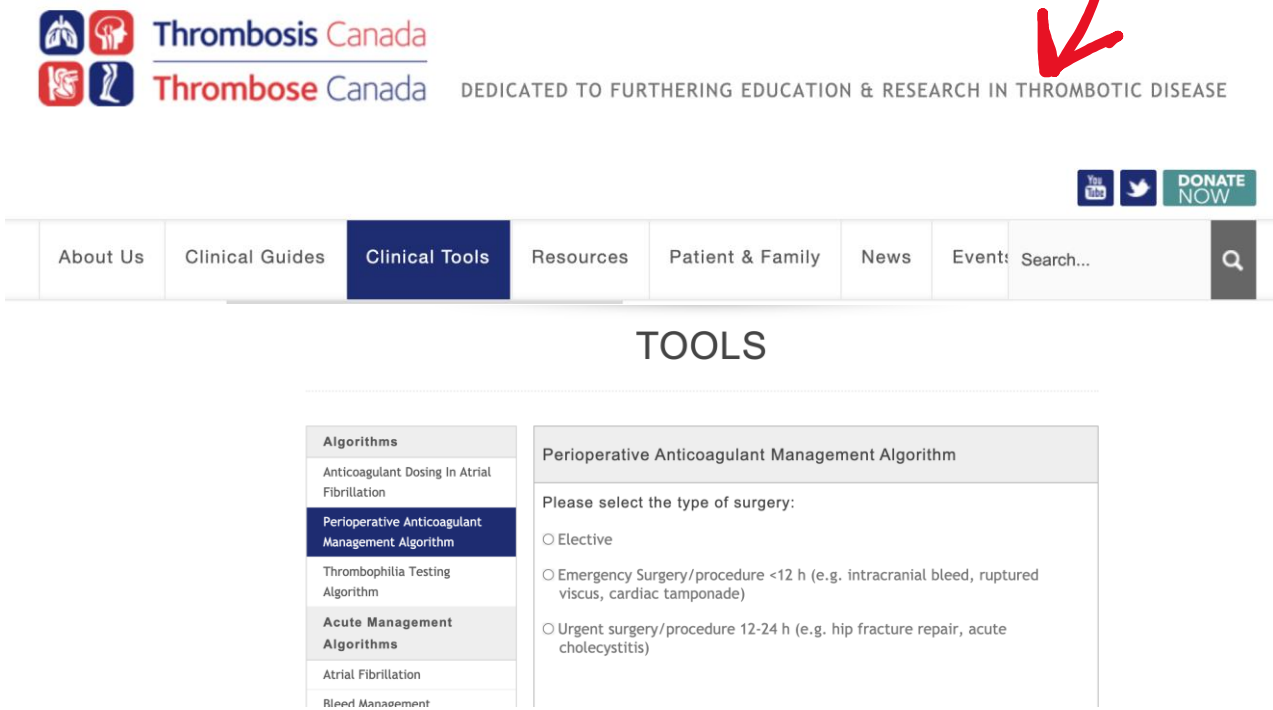
Use of reference tools is recommended

	Moderate to severe bleeding risk
Stop	Refer to **Table 6 in SIR guidelines or Thrombosis Canada Tool**
Restart	Most can be re-started 24 hrs post-procedure

Table 6. Management Recommendations for Anticoagulant and Antiplatelet Agents (32–34,36,110–128)

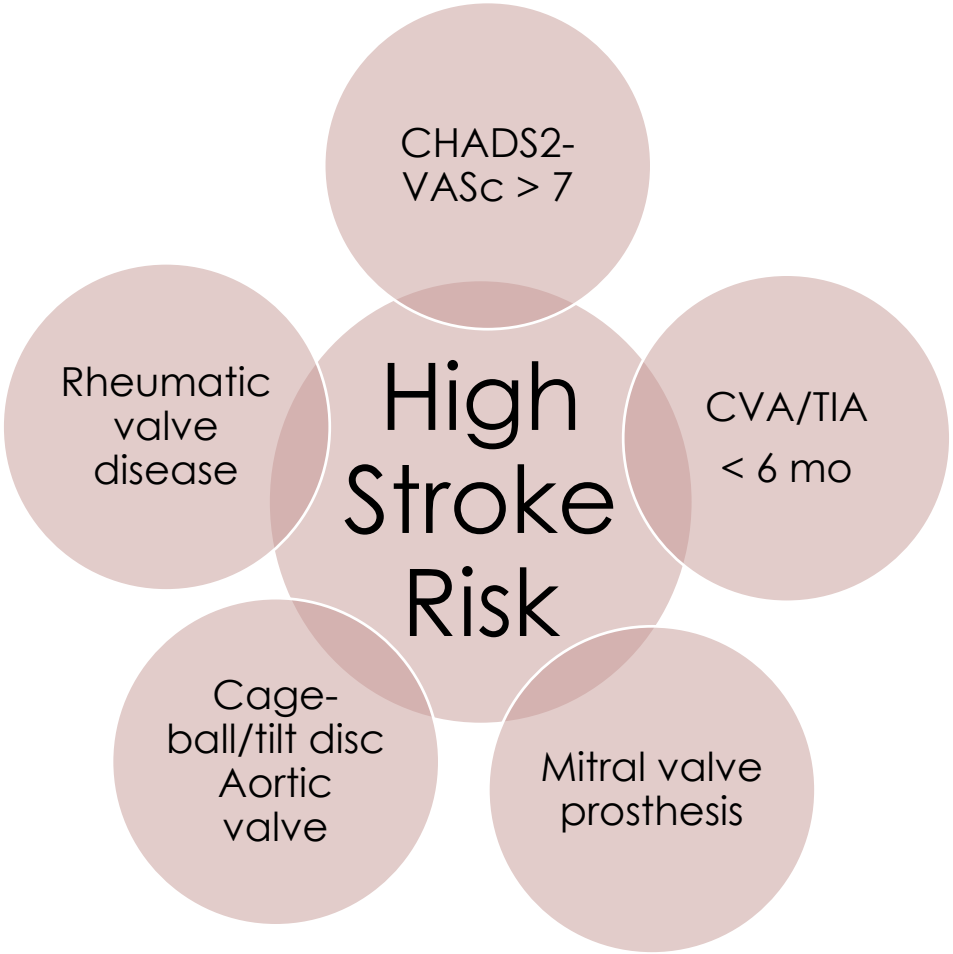
Medication	Low Risk for Bleeding	High Risk for Bleeding*
Anticoagulants		
UFH		
Withholding	Do not withhold	Withhold IV heparin for 4–6 h before procedure; check aPTT or anti-Xa level; for BID or TID dosing of SC heparin, procedure may be performed 6 h after last dose
Reinitiation	NA	6–8 h
LMWH: enoxaparin (Lovenox), dalteparin (Fragmin)		
Withholding	Do not withhold	Enoxaparin, withhold 1 dose if prophylactic dose is used; withhold 2 doses or 24 h before procedure if therapeutic dose is used; check anti-Xa level if renal function impaired; dalteparin, withhold 1 dose before procedure
Reinitiation	NA	12 h

continued

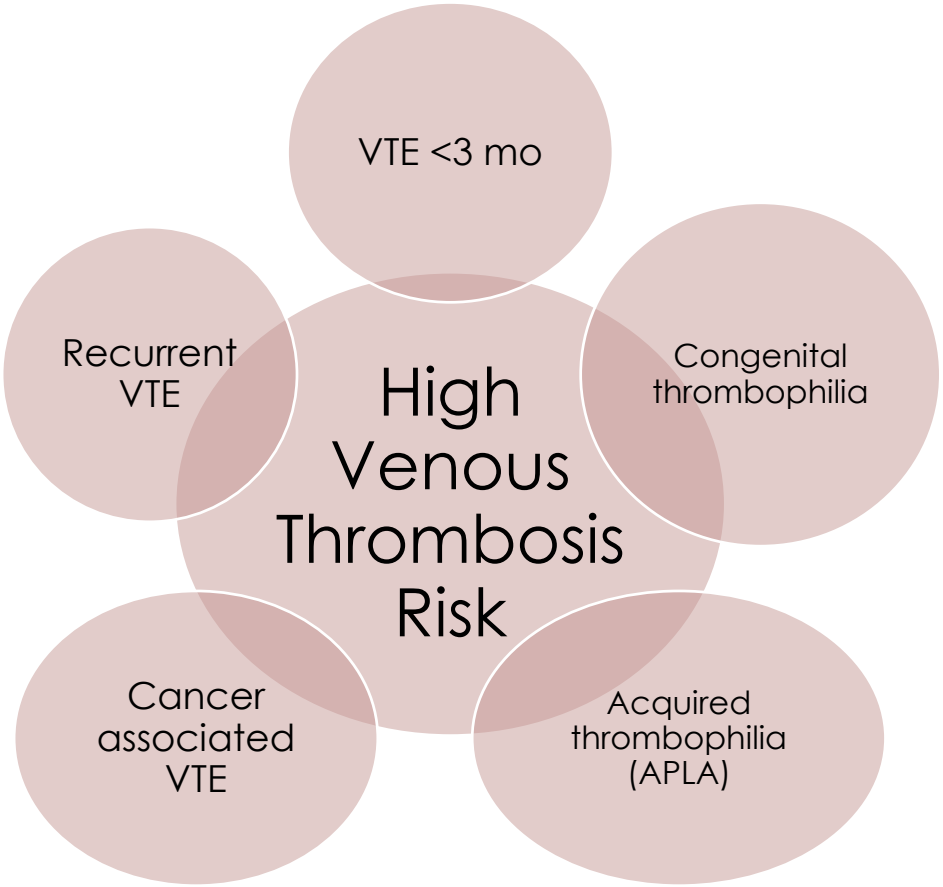


https://thrombosiscanada.ca/tools/?calc=perioperativeAnticoagulantAlgorithm

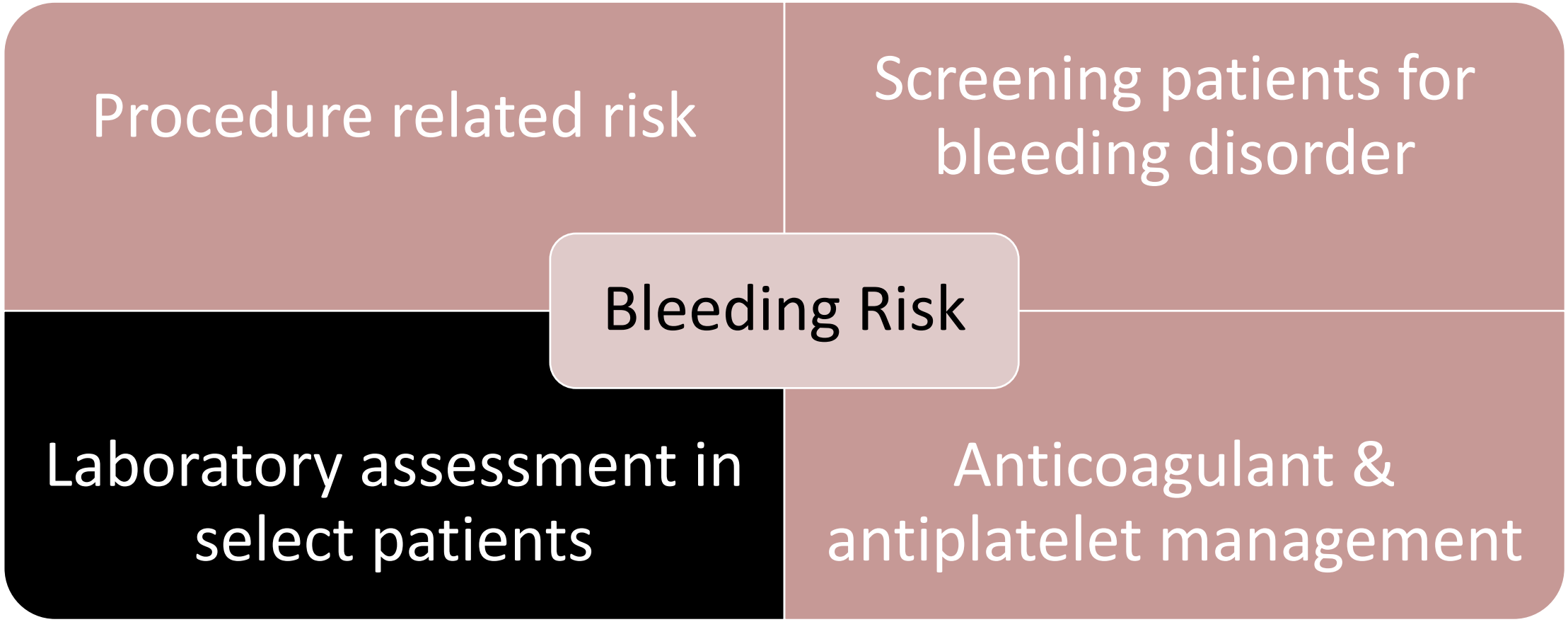
Identifying patients at high risk of clotting



Do not stop anticoagulation without expert consultation



Assessing peri-procedural bleeding risk

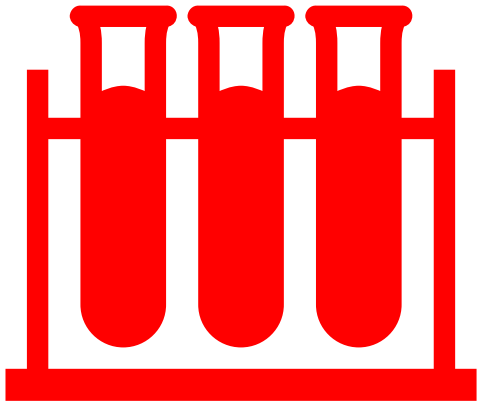


Laboratory "coag" testing does not…

1. Rule-out bleeding disorder
2. Inform us about bleeding risk

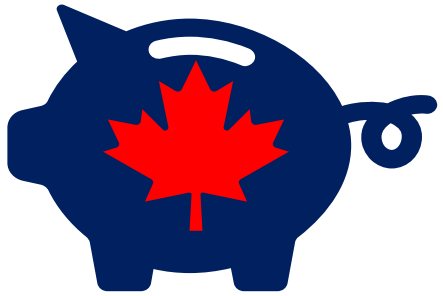
- INR validated for warfarin monitoring
- PTT can detect FVIII <30% & UFH monitoring

- INR ↑ most commonly from liver disease i.e. hypercoagulable state
- PTT ↑ most common reasons ↓FXII, Lupus anticoagulant, i.e. non-bleeding states



Send further laboratory in patients with:

- Moderate to high risk procedure
- Family history of bleeding
- Personal history of bleeding tendency
  - BAT
  - HAS-BLED >3 or other factors
- Medication monitoring (VKA, UFH, LMWH)



Laboratory testing targets

Parameter	Individuals WITHOUT chronic liver disease		Individuals WITH liver disease	
	Low Risk	**High Risk**	**Low Risk**	**High Risk**
INR	Not routinely recommended If on Warfarin, ensure within therapeutic range	< 1.8	N/A	<2.5
PTT (s)	Not recommended	Not recommended	Not recommended	Not recommended
Platelet count ($x10^9$/L)	If checked, transfuse if <20	Transfuse if <50, <70 for neuraxial anesthesia	>20 >30 for liver biopsy	>30
Fibrinogen (g/L)	Not recommended	Not recommended	>1	>1

Assessing peri-procedural bleeding risk

Classify as Low (<1%) vs. moderate & high

1

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Use Thrombosis Canada Tool Or SIR Guideline

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Bleeding Risk

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Laboratory assessment in select patients

Anticoagulant & antiplatelet management

3

Choose wisely!

BAT
HAS BLED
History

Cases overview

1. 47 y.o. M with liver disease undergoing a transjugular liver biopsy
2. 26 y.o. F G2P1 GA 37 wks with immune thrombocytopenia history requires neuraxial anesthesia for labor and delivery
3. 73 y.o. M on chemotherapy awaiting dental procedure
4. 54 y.o. F has a brother with hemophilia, awaiting colon polyp removal

Case 1: Special case of Liver disease

Parameter	Individuals WITH liver disease	
	Low Risk	High Risk
INR	--	<2.5
PTT (s)	--	--
Platelet count ($x10^9$/L)	>20 >30 for liver biopsy	>30
Fibrinogen (g/L)	>1	>1

Consideration	Information	Assessment
Profile	47y.o. M Cirrhosis, cryptogenic External CBC shows PLT 40, INR 2.1	
1. Procedure	Transjugular liver biopsy in 48 hours	Low risk
2. Anticoagulant/ Antiplatelet	Not on any A/C, A/P, OTCs	Low risk
3. Co-morbidities and bleeding risk	GI bleeding with portal hypertension 1 year a go No personal history of VTE, stroke No family history of bleeding HAS-BLED score is 1 (HTN)	Low risk
4. Laboratory testing	Given liver disease and history of low platelets, CBC is sent PLT 28 x 10^9/L	Transfuse 1u platelets

Case 1: Liver disease

- Cirrhotic patients have rebalanced hemostasis
- Abnormal "screening coagulation tests" do not correlate with bleeding
- Attempt to correct with plasma can be harmful
- Splenomegaly and portal hypertension contribute to low platelets and low increments after transfusion
- Higher risk of TACO, TRALI, worsening portal hypertension

Caldwell SH et al. Hepatology 2006;44:1039
AASLD. Hepatology 2013;57:1651
Tripodi A. Hepatology 2005;41:527

Case 2: Neuraxial anesthesia

Consideration	Information	Assessment
Profile	26 y.o. F G2P1 GA 37 wk history of Immune thrombocytopenia in spontaneous labor	
1. Procedure	Epidural anesthesia	Moderate to high risk
2. Anticoagulant/ Antiplatelet	On LMWH prophylactic dose	Determine timing of LMWH interruption
3. Co-morbidities and bleeding risk	Had post-partum DVT 2 years a go No history of stroke or bleeding No family history of bleeding Normal kidney and liver function	Higher risk of recurrent blood clot (5 – 10% risk of clot)
4. Laboratory testing	CBC shows PLT 73	

Case 2: Issue 1 - Neuraxial anesthesia and platelet count

- SIR 2019 guidelines suggest PLT ≥ 50 x 10^9/L
- European/British guidelines suggest PLT ≥ 70 x 10^9/L
- Risk of epidural hematoma (from small retrospective studies)
  - N=1525, bleeding in 11% if PLT <50 x 10^9/L, 3% if PLT 50 to 70 x 10^9/L, 0.2% if PLT ≥ 70 x 10^9/L
  - Another study showed 0 bleeds amongst 308 patients with PLT <100 x 10^9/L
- Spinal anesthesia is considered higher risk than epidural
  - Likely due to larger bore needle

[1]Anesthesiology. 2017;126(6):1053
[2]Int J Obstet Anesth. 2018;35:4.

Case 2: Issue 2 - anticoagulant management

- Agreement between SIR Guidelines, Thrombosis Canada and European Society of Anesthesia[1] guidelines
- Prophylactic LMWH
  - Epidural placement ≥ 12 hours after standard prophylactic LMWH doses
  - May be resumed ≥12 hours post-delivery or epidural removal.
  - If traumatic epidural, consider delay ≥ 24 hours for resumption

[1]*Eur J Anaesthesiol 2010; 27:999.*

Case 2: Neuraxial anesthesia in ITP patient conclusion

Consideration	Information	Assessment
Profile	26 y.o. F G2P1 GA 37 wk history of Immune thrombocytopenia previously on steroids	
1. Procedure	Epidural anesthesia	Moderate to high risk
2. Anticoagulant/ Antiplatelet	On LMWH prophylactic dose	**Place epidural 12 hours after last dose** **Resume after 12 hours + adequate hemostasis**
3. Co-morbidities and bleeding risk	Had post-partum DVT 2 years a go No history of stroke or bleeding No family history of bleeding Normal kidney and liver function	Higher risk of recurrent blood clot (5 – 10% risk of clot)
4. Laboratory testing	CBC shows PLT 73	**No need to transfuse platelets** **Monitor CBC**

Case 3: Dental procedures in cancer patient

Consideration	Information	Assessment
Profile	73 y.o. M with myeloma starting high dose bisphosphonates	
1. Procedure	2 dental extractions	Low risk
2. Anticoagulant/ Antiplatelet	None	
3. Co-morbidities and bleeding risk	No previous bleeding or thrombosis No family history of bleeding Normal kidney and liver function With chemo, has had cytopenias	Potential for low PLT
4. Laboratory testing	CBC shows PLT 32 x 10^9/L	

Case 3: Dental procedures and anticogulation

- Not discussed in SIR guideline 2019
- Thrombosis Canada does provide guidance regarding anticoagulation management[1,2]
  - Anticoagulation can be likely continued for low risk procedures
- Minor dental procedures are:
  - Dental extractions 1 or 2 teeth
  - Endodontic (root canal)
  - Subgingival scaling or other cleaning
- Use of 5mL tranexamic acid mouthwash 3 – 4 x / day before and after procedure is endorsed

[1]Heart 2018;104:1461-1467
[2]Thrombosis Canada v15May2020 Available at: https://thrombosiscanada.ca/wp-content/uploads/2020/05/NOACs-DOACs-Perioperative-Management-17May2020.pdf.

Case 3: Dental procedure and platelet count

Received: 8 January 2019 | Revised: 14 February 2019 | Accepted: 27 February 2019

DOI: 10.1111/odi.13082

WWOM PROCEEDINGS

WILEY ORAL DISEASES

World Workshop on Oral Medicine VII: Platelet count and platelet transfusion for invasive dental procedures in thrombocytopenic patients: A systematic review

Jumana Karasneh[1] | Janina Christoforou[2] | Jennifer S. Walker[3] | Maddalena Manfredi[4] | Bella Dave[5] | Pedro Diz Dios[6] | Peter B. Lockhart[7] | Lauren L. Patton[8]

- 9 cohort studies included
- No difference in mean PLT count between bleeders vs. non-bleeders (38,143/uL vs. 38,820/uL)
- No difference in bleeding with PLT transfusion vs. no transfusion
- Thresholds for PLT transfusion varied from $<30x10^9/L$ to $50x10^9/L$

Case 3: Dental procedures in cancer patient

Consideration	Information	Assessment
Profile	73 y.o. M with myeloma starting high dose bisphosphonates	
1. Procedure	2 dental extractions	Low risk
2. Anticoagulant/ Antiplatelet	None	
3. Co-morbidities and bleeding risk	No previous bleeding or thrombosis No family history of bleeding Normal kidney and liver function With chemo, has had cytopenias	Potential for low PLT
4. Laboratory testing	CBC shows PLT 32 x 10^9/L	**No transfusion of platelets recommended**

Case 4: Hemophilia A carrier awaiting colon polyp removal

Consideration	Information	Assessment
Profile	54 y.o. F with Hemophilia A carrier	
1. Procedure	Colon polyp removal	Moderate to severe risk
2. Anticoagulant/ Antiplatelet	None	
3. Co-morbidities and bleeding risk	Significant bleeding history Brother has hemophilia Normal kidney and liver function	**Comprehensive BAT required**
4. Laboratory testing	CBC shows hgb 102g/L, MCV 64fL, INR/aPTT WNL	

Case 4: Hemophilia A carrier and BAT

Clinical Situation	-1	0	1	2	3	4
Epistaxis		No or trivial (≤ 5 per year)	> 5 per year or more than 10 minutes	Consultation only	Packing or cauterization or antifibrinolytic	Blood transfusion or replacement therapy or desmopressin
Cutaneous		No or trivial (≤ 1 cm)	> 1 cm and no trauma	Consultation only		
Bleeding from minor wounds		No or trivial (≤ 5 per year)	> 5 per year or more than 5 minutes	Consultation only	Surgical hemostasis	Blood transfusion or replacement therapy or desmopressin
Oral cavity		No	Reported, no consultation	Consultation only	Surgical hemostasis or antifibrinolytic	Blood transfusion or replacement therapy or desmopressin
Gastrointestinal bleeding		No	Associated with ulcer, portal hypertension, hemorrhoids, angiodysplasia	Spontaneous	Surgical hemostasis, blood transfusion, replacement therapy, desmopressin, antifibrinolytic	
Tooth extraction	No bleeding in at least 2 extractions	None done or no bleeding in 1 extraction	Reported, no consultation	Consultation only	Resuturing or packing	Blood transfusion or replacement therapy or desmopressin
Surgery	No bleeding in at least 2 surgeries	None done or no bleeding in 1 surgery	Reported, no consultation	Consultation only	Surgical hemostasis or antifibrinolytic	Blood transfusion or replacement therapy or desmopressin
Menorrhagia		No	Consultation only	Antifibrinolytics, oral contraceptive pill use	Dilation & curettage, iron therapy, ablation	Blood transfusion or replacement therapy or desmopressin
Postpartum hemorrhage	No bleeding in at least 2 deliveries	None done or no bleeding in 1 delivery	Consultation only	Dilation & curettage, iron therapy, antifibrinolytics	Blood transfusion or replacement therapy or desmopressin	Hysterectomy
Musde hematomas		Never	Post trauma, no therapy	Spontaneous, no therapy	Spontaneous or traumatic, requiring desmopressin or replacement therapy	Spontaneous or traumatic, requiring surgical intervention or blood transfusion
Hemarthrosis		Never	Post trauma, no therapy	Spontaneous, no therapy	Spontaneous or traumatic, requiring desmopressin or replacement therapy	Spontaneous or traumatic, requiring surgical intervention or blood transfusion
Central nervous system bleeding		Never			Subdural, any intervention	Intracerebral, any intervention

Case 4: Hemophilia A carrier MCMDM-1 score 8

Clinical Situation	-1	0	1	2	3	4
Epistaxis		No or trivial (≤ 5 per year)	> 5 per year or more than 10 minutes	Consultation only	Packing or cauterization or antifibrinolytic	Blood transfusion or replacement therapy or desmopressin
Cutaneous		No or trivial (≤ 1 cm)	> 1 cm and no trauma	Consultation only		
Bleeding from minor wounds		No or trivial (≤ 5 per year)	> 5 per year or more than 5 minutes	Consultation only	Surgical hemostasis	Blood transfusion or replacement therapy or desmopressin
Oral cavity		No	Reported, no consultation	Consultation only	Surgical hemostasis or antifibrinolytic	Blood transfusion or replacement therapy or desmopressin
Gastrointestinal bleeding		No	Associated with ulcer, portal hypertension, hemorrhoids, angiodysplasia	Spontaneous	Surgical hemostasis, blood transfusion, replacement therapy, desmopressin, antifibrinolytic	
Tooth extraction	No bleeding in at least 2 extractions	None done or no bleeding in 1 extraction	Reported, no consultation	Consultation only	Resuturing or packing	Blood transfusion or replacement therapy or desmopressin
Surgery	No bleeding in at least 2 surgeries	None done or no bleeding in 1 surgery	Reported, no consultation	Consultation only	Surgical hemostasis or antifibrinolytic	Blood transfusion or replacement therapy or desmopressin
Menorrhagia		No	Consultation only	Antifibrinolytics, oral contraceptive pill use	Dilation & curettage, iron therapy, ablation	Blood transfusion or replacement therapy or desmopressin
Postpartum hemorrhage	No bleeding in at least 2 deliveries	None done or no bleeding in 1 delivery	Consultation only	Dilation & curettage, iron therapy, antifibrinolytics	Blood transfusion or replacement therapy or desmopressin	Hysterectomy
Musde hematomas		Never	Post trauma, no therapy	Spontaneous, no therapy	Spontaneous or traumatic, requiring desmopressin or replacement therapy	Spontaneous or traumatic, requiring surgical intervention or blood transfusion
Hemarthrosis		Never	Post trauma, no therapy	Spontaneous, no therapy	Spontaneous or traumatic, requiring desmopressin or replacement therapy	Spontaneous or traumatic, requiring surgical intervention or blood transfusion
Central nervous system bleeding		Never			Subdural, any intervention	Intracerebral, any intervention

Case 4: Hemophilia A carrier awaiting colon polyp removal

Consideration	Information	Assessment
Profile	54 y.o. F with Hemophilia A carrier	
1. Procedure	Colon polyp removal	Moderate to severe risk
2. Anticoagulant/ Antiplatelet	None	
3. Co-morbidities and bleeding risk	Significant bleeding history Brother has hemophilia Normal kidney and liver function	**MCMDM-1 score 8** 
4. Laboratory testing	CBC shows hgb 102g/L, MCV 64fL, INR/aPTT WNL, Ferritin 2ug/L	

Proceed to Hematology consult!

Key Resources

Canadian Association for **Interventional Radiology**

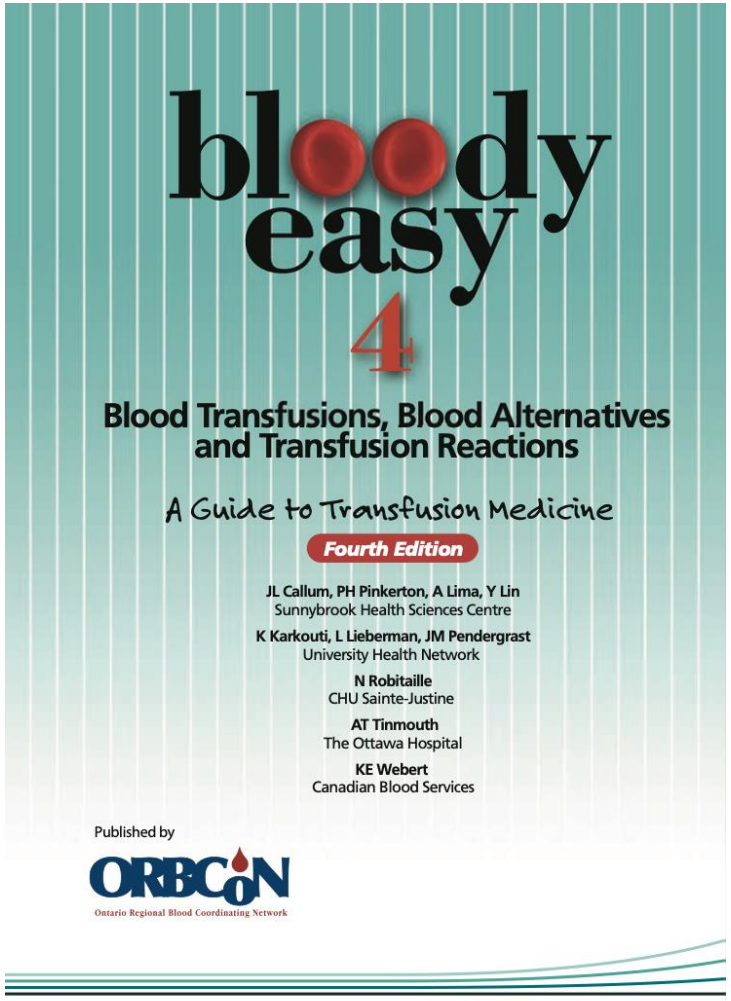
Association canadienne pour **la radiologie d'intervention**

Choosing Wisely Canada™

Society of Interventional Radiology | *The vision to heal®*

Thrombosis Canada

Thrombose Canada



Ontario

Queen's University

Clinical and Molecular Hemostasis Research Group

Queen's University & Kingston General Hospital

MCMDM-1 BAT

Thank you

Additional questions can be sent to:

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Helpful references

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Courtesy of Dr. Jim Douketis and Dr. Menaka Pai

When are you "good to go" for surgery?

Hemostatic Parameter		
INR	<1.5	≥1.5
aPTT	40-45 sec	>45 sec
platelet count	>50 × 10^9/L	<50 × 10^9/L
DOAC level: suggested	<50 ng/mL <30 ng/mL	>50 ng/mL (?)