Academic Medical Center | Patient Safety Organization
a component entity of Risk Management Foundation

Patient Safety Alert: Periprocedural Management of Anticoagulation Therapy

Issue 24 | 2015

Over the past several years, there has been a dramatic increase in patients receiving long-term anticoagulation and antiplatelet therapy. Current estimates suggest that more than 4 million Americans are taking oral chronic anticoagulants for the prevention and treatment of venous and arterial thromboembolism. Anticoagulants are commonly indicated as a stroke prevention approach in patients with atrial fibrillation, and as a preventative measure for patients with mechanical heart valves or acute coronary syndrome.[4] Anticoagulants are also routinely administered to hospitalized patients for the prevention of venous thromboembolism (VTE).

From a patient safety perspective, anticoagulants are not only considered high alert medications[1], but are among the most frequently listed medications associated with medication errors, comprising 7.2% of medication-related sentinel events reported to the Joint Commission's Sentinel Event Database.[3]

From a liability perspective, claims associated with anticoagulation therapy represent a significant percentage of medication-related claims. In the CRICO Strategies Comparative Benchmarking System (CBS) data repository there are 1,486 cases with a medication-related major allegation asserted in 2009–2013. Among these, 12% involved anticoagulants. The majority of these cases originated in the inpatient setting followed by the ED and Ambulatory clinical domains.

The AMC PSO recently convened to discuss this high-risk area and important patient safety issue, the contributing factors often associated with this medication event type, and the strategies to proactively mitigate this risk.

Risks

Fluctuating diagnostic evaluations and their impact on anticoagulation administration can add to the patient risk profile. When patients with complicated presentations and fluctuating anticoagulation levels require an invasive procedure, the risks are compounded.

This Patient Safety Alert highlights the need for guidelines to assist clinicians in the periprocedural management of patients at high risk in this area. Patients with thrombosis and hemorrhage related to anticoagulation/antithrombotic therapy have risks that are complicated by the use of multiple anticoagulants with different indications.

A Multidisciplinary Approach

Experts in anticoagulation management suggest that every patient on a blood thinner undergoing a procedure, have a plan for management of the blood thinner in the periprocedural period. This approach consists of four key elements in mitigating the risk of periprocedural hemorrhage or stroke/thrombosis in patients on anticoagulation therapy:

- Identifying if a patient is on a blood thinner.
- Shared decision-making, incorporating guideline-based care. For example, for some procedures, patients can stay on blood thinner.
- Clear communication of the treatment plan to all members of the care delivery team and the patient, as well as clear documentation of this plan in the medical record.

- Accountability for ensuring the plan is implemented, and goes well from start to finish. For GI Procedures, recommendations are attached as Exhibit A[1].

UTILIZING CASE-MANAGEMENT EXPERTISE

Engaging case management to facilitate multi-disciplinary, clinically based case review for patients with an in-house length of stay >5 days is another strategy aimed at providing active surveillance of patients at high risk for complications.

DEVELOPMENT OF AN ANTICOAGULATION TEAM

Other suggested strategies include using a Nursing/Pharmacy-led team to:

- Assist in risk assessment, monitoring and dose adjustment parameters for anticoagulants.
- In consultation with the responsible physician and care team, ensure that evidence-based guidelines and pathways are followed to optimize care for complex, high risk clinical conditions.
- Assist with identification of patients currently on blood thinners and scheduled for procedures.
- Promote use of clinical guidelines for management of antithrombotic therapy.
- Facilitate clear documentation and timely communication of critical test results.
- Leverage advanced practice clinicians to support existing staff and provide increased vigilance.

Conclusion

Paramount to the success of each of these strategies is clear documentation and communication by all providers to ensure that the patient's plan of care is articulated and understood by all members of the care delivery team.

CONTENT REVIEWERS:

1. Pat Folcarelli, PhD, RN: Senior Director of Patient Safety and Healthcare Quality, BIDMC
2. Carol Keohane, MS, RN: Assistant Vice President, Patient Safety, AMC PSO

REFERENCES

1. Beth Israel Deaconess Medical Center (BIDMC) Primary Care and Gastroenterology: BIDMC Anticoagulation Grid; 2015. Further information on this grid can be requested from Diane Brockmeyer, MD (dbrockme@bidmc.harvard.edu), Daniel Leffler, MD (dleffler@bidmc.harvard.edu).
2. Institute for Safe Medication Practices (ISMP). ISMP List of High-Alert Medications in Acute Care Settings. 2014; https://www.ismp.org/tools/highalertmedications.pdf. Accessed October 8, 2014.
3. The Joint Commission: Preventing errors relating to commonly used anticoagulants. Sentinel Event Alert 41, September 24, 2008; http://www.jointcommission.org/sentinel_event_alert_issue_41_preventing_errors_relating_to_commonly_used_anticoagulants/. Accessed October 8, 2014.
4. National Institutes for Health

Exhibit A

	COLONOSCOPY			EMR	EGD					ERCP		EUS or RFA		OTHER		
	COLONOSCOPY & Flex Sig (SCREENING)	**COLONOSCOPY (High Risk Screen or Surveillance) ****	**COLONOSCOPY for IBD Surveillance**	**EMR (Large Polyp) with COLONOSCOPY or EGD**	**EGD or SBE with or without biopsy**	**EGD EMERGENT Varices ligation**	**EGD ELECTIVE Varices ligation**	**EGD with Stent**	**EGD with Dilation**	**ERCP - Diagnostic**	**ERCP with Sphincterotomy**	**EUS without FNA**	**EUS with FNA -or- RFA**	**PEG**	**Paracentesis (elective therapeutic)**	**Percutaneous Liver Biopsy**
ASPIRIN = Ecotrin, Bufferin, etc.	Continue, no pt letter needed, no email needed	Continue, no pt letter needed, no email needed	Continue, no pt letter needed, no email needed	Discuss for each patient	Continue, no pt letter needed, no email needed	Continue, no pt letter needed, no email needed	Continue, no pt letter needed, no email needed	Continue, no pt letter needed, no email needed	Continue, no pt letter needed, no email needed	Continue, no pt letter needed, no email needed	Continue, no pt letter needed, no email needed	Continue, no pt letter needed, no email needed	Continue, no pt letter needed, no email needed	Discuss for each patient	Continue, no pt letter needed, no email needed	Stop 7-10 days pre biopsy & restart 48 hours after §
COUMADIN = Warfarin	Continue Goal INR 2.5 or less	Discuss for each patient	Discuss for each patient	Med must be stopped §	Continue Goal INR 2.5 or less	Continue Goal INR 2.5 or less (w emergent reversal if clinically indicated)	Discuss for each patient	Med must be stopped §	Med must be stopped §	Discuss for each patient	Med must be stopped §	Continue Goal INR 2.5 or less	Med must be stopped §	Med must be stopped §	Discuss for each patient	Stop 5 days pre biopsy & restart 48 hours after §
CLOPIDOGREL = Plavix and other anti-platelets‡	Continue	Discuss for each patient *	Discuss for each patient *	Med must be stopped § *	Continue	Continue	Discuss for each patient *	Med must be stopped § *	Med must be stopped § *	Discuss for each patient *	Med must be stopped § *	Continue	Med must be stopped § *	Med must be stopped § *	Discuss for each patient *	Stop 7-10 days pre biopsy & restart 48 hours after § *
DABIGATRAN = Pradaxa, **APIXABAN** = Eliquis, **RIVAROXABAN** = Xarelto, **EDOXABAN** = Lixiana	Continue	Discuss for each patient	Discuss for each patient	Med must be stopped §	Continue	Continue (with emergent reversal if clinically indicated)	Discuss for each patient	Med must be stopped §	Med must be stopped §	Discuss for each patient	Med must be stopped §	Continue	Med must be stopped §	Med must be stopped §	Discuss for each patient	Stop 2-5 days pre biopsy & restart 48-72 hours after §
Enoxaparin = **LOVENOX** and blood thinner shots‡	Continue	Discuss for each patient	Discuss for each patient	Med must be stopped §	Continue	Continue (with emergent reversal if clinically indicated)	Discuss for each patient	Med must be stopped §	Med must be stopped §	Discuss for each patient	Med must be stopped §	Continue	Med must be stopped §	Med must be stopped §	Discuss for each patient	Stop 24-36 hrs pre biopsy & restart 48-72 hours after §
NSAIDS = ibuprofen, naproxen, **ALEVE, MOTRIN, ADVIL,** etc.‡	Continue, no pt letter needed, no email needed	Continue, no pt letter needed, no email needed	Continue, no pt letter needed, no email needed	Med must be stopped §	Continue, no pt letter needed, no email needed	Continue, no pt letter needed, no email needed	Continue, no pt letter needed, no email needed	Continue, no pt letter needed, no email needed	Continue, no pt letter needed, no email needed	Continue, no pt letter needed, no email needed	Continue, no pt letter needed, no email needed	Continue, no pt letter needed, no email needed	Continue, no pt letter needed, no email needed	Continue, no pt letter needed, no email needed	Continue, no pt letter needed, no email needed	Stop 5 days pre biopsy & restart 48 hours after §

**High Risk Colonoscopy = history of large or mult polyps - OR - 1st degree relative with colon ca at age<60 -OR- personal history of colon cancer

* For PLAVIX etc., Procedure MD must have explicit clearance from CARDIOLOGIST in order to stop this med -OR- DEFER procedure - OR - do procedure on med

‡ See Med List On back of this sheet for full list of med names

§ MD: Please use BIDMC Guidelines re: when to stop and restart blood thinners for procedures. These Guidelines are on the back of this page, and are available on the BIDMC Portal in PPGD Section under "Manual of Anticoagulant and Antiplatelet Therapy"

Diane M. Brockmeyer MD
Medical Director
Anticoagulation Management Service
dbrockme@bidmc.harvard.edu

GREEN = OK to stay on med. SCHEDULER Informs patient at time of scheduling. GI COORDINATOR 1. Sends providers an FYI email (GI, PCP, Anticoag Team). 2. Sends patient a letter w plan to stay on med, which also serves to document in Medical Record.

YELLOW = *Might* need to stop med. SCHEDULER Informs patient that clinical team will decide and that patient will hear back from GI Team. GI COORDINATOR 1. Sends providers email (GI, PCP, Anticoag Team, Specialists). 2. Ensures clinical team makes a decision and 3. Calls patient, then sends patient a letter w plan, which also serves to document in Medical Record.

RED = Med will probably need to stop. SCHEDULER Informs patient that clinical team will decide & that patient will hear back from GI Team. GI COORDINATOR 1. Sends providers email (GI, PCP, Anticoag Team, Specialists). 2. Ensures clinical team makes a decision & 3. Calls patient, then sends patient a letter w plan, which also serves to document in Medical Record.

This Guideline was authored by the GI/Anticoagulation Working Group: Diane Brockmeyer MD, Daniel Leffler, MD, Jennifer Mackey, Pharm D, Jacqueline Wolf, MD, Avi Ketwaroo, MD MSc. Approved by Faculty and Fellows of the Division of Gastroenterology, 4/2/14 Beth Israel Deaconess Medical Center.

References: 1. ASGE Guidelines, Gastrointest Endosc. 2009 Dec;70(6):1060-70. 2. N Engl J Med. 2013 May 30;368(22):2113-24. 3. ACCP Guidelines, Chest. 2012 Feb;141(2 Suppl):e326S-50S. 4. BIDMC Guidelines, available on BIDMC Portal.

BIDMC PROTOCOL FOR GI PROCEDURES & BLOOD THINNERS

Beth Israel Deaconess Medical Center
A teaching hospital of Harvard Medical School

IDENTIFY if patient is on blood thinner → **SHARED CLINICAL DECISION MAKING** with guideline-based care → **COMMUNICATION** of plan (to patient, providers, and in the medical record) → **ENSURE PLAN GOES WELL** from start to finish

LIST OF MED NAMES

	BRAND NAME	GENERIC NAME	HOW IT IS TAKEN
ASPIRIN = Ecotrin, Bufferin, etc.	Ecotrin, Bufferin, etc.	**Aspirin** = AS-pir-in	Pill
	BRAND NAME	GENERIC NAME	HOW IT IS TAKEN
COUMADIN = Warfarin	**Coumadin**	**Warfarin** = WAR-far-in	Pill
	BRAND NAME	GENERIC NAME	HOW IT IS TAKEN
Clopidogrel = **PLAVIX** and other anti-platelet meds	**Plavix**	Clopidogrel = kloe-PID-oh-grel	Pill
	Effient	Prasugrel = PRA-soo-grel	Pill
	Brilinta	Ticagrelor = tye-KA-grel-or	Pill
	Ticlid	Ticlopidine = tye-KLOE-pi-deen	Pill
	Pletal	Cilostazol = sye-LOE-sta-zol	Pill
	Persantine	Dipyridamole = dye-pir-ID-a-mole	Pill
	Aggrenox	Dipyridamole/aspirin	Pill
	BRAND NAME	GENERIC NAME	HOW IT IS TAKEN
Dabigatrin **= PRADAXA** Apixaban **= ELIQUIS** Rivaroxaban **= XARELTO** Edoxaban **= LIXIANA**	**Pradaxa**	Dabigatran = da-buh-GAT-ran	Pill
	Eliquis	Apixaban = a-PIX-a-ban	Pill
	Xarelto	Rivaroxaban = riv-a-ROX-a-ban	Pill
	Lixiana	Edoxaban = ee-docks-uh-ban	Pill
	Zontivity	Vorapaxar	Pill
	BRAND NAME	GENERIC NAME	HOW IT IS TAKEN
Enoxaparin = **LOVENOX** and other blood thinner shots	**Lovenox**	Enoxaparin = ee-nox-a-PAR-in	Shot
	Fragmin	Dalteparin = dal-te-PAR-in	Shot
	Heparin	Heparin = HEP-a-rin	Shot
	Arixtra	Fondaparinux = fon-da-PAR-in-ux	Shot
	BRAND NAME	GENERIC NAME	HOW IT IS TAKEN
NSAIDS = ibuprofen, naproxen, **ALEVE, MOTRIN, ADVIL,** etc.	**Advil, Motrin**	**Ibuprofen** = eye-bue-PROE-fen	Pill
	Aleve, Naprosyn	**Naproxen** = na-PROX-en	Pill
	Voltaren	Diclofenac = dye-KLOE-fen-ak	Pill
	Orudis	Ketoprofen = kee-toe-PROE-fen	Pill
	Toradol	Ketorolac = kee-toe-ROLE-ak	Pill
	Lodeine	Etodolac = e-TOE-doe-lak	Pill
	Clinoril	Sulindac = SUL-in-dak	Pill
	Celebrex	Celecoxib = sel-e-KOX-ib	Pill
	Indocin	Indomethacin = in-doe-METH-a-sin	Pill
	Feldene	Piroxicam = pir-OX-i-kam	Pill
	Mobic	Meloxicam = mel-OX-i-kam	Pill
	Tolectin	Tolmetin = TOLE-met-in	Pill
	Daypro	Oxaprozin = ox-a-PROE-zin	Pill
	Ansaid	Flurbiprofen = flur-bi-PROE-fen	Pill

Version 7
8/14/15

§ Table below contains the BIDMC Guidelines re: when to stop and restart blood thinners for procedures. These Guidelines are available on the BIDMC Portal under PPGD Section under "Manual of Anticoagulant and Antiplatelet Therapy"

Table 16. Recommended Timing for Periprocedural Interruption and Initiation of Antithrombotic Therapy

ANTITHROMBOTIC MEDICATION	STOP PRIOR TO PROCEDURE	RESTART AFTER PROCEDURE	
Antiplatelet Medications†		*Low bleeding risk*	*High bleeding risk*
Aspirin (81-325 mg daily +/- dipyridamole)	7-10 days	24 h	48 h
Ticlodipine (250 mg twice daily)	10-14 days	24 h	48 h
Clopidogrel (75 mg once daily)	7-10 days*	24 h	48 h
Prasugrel (10 mg once daily)	7-10 days¥	24 h	48 h
Ticagrelor (90 mg twice daily; t ½ = 8 h)	5 days¢	24 h	48 h
Cilostazol (100 mg twice daily; t ½ = 11h)	3 days	24 h	48 h
Anticoagulant Medications‡			
Warfarin (t ½ = 36-42 h, but highly variable)	5 days§	12 h	24 h
Intravenous UFH (t ½ ~ 60 min)3	4-6 h (and PTT normal)	24 h	48-72 h
LMWH (t ½ = 3-7h)[3, 4]			
Prophylactic dosing	12 h (24 h for CrCl < 30 mL/min)	12 h	24-36 h
Therapeutic dosing			
• Once daily (give 50% of last dose)	24 h (36 h for CrCl < 30 mL/min)	24 h	48-72 h
• Twice daily	24 h (36 h for CrCl < 30 mL/min)	24 h	48-72 h
Fondaparinux (t ½ = 17)4	2-3 day (3-5 days for CrCl < 50 mL/min)	24 h	48-72 h
Dabigatran (150 mg twice daily)[5,5]			
CrCl > 50 mL/min (t ½ = 14-17 h)	3 days	24 h	48-72 h
CrCl 30-50 mL/min (t ½ = 16-18 h)	4-5 days	24 h	48-72 h
CrCl 15-30 mL/min (t ½ = 16-18 h)	4-5 days£	24 h	48-72 h
Rivaroxaban (20 mg once daily)[5,6]			
CrCl > 50 mL/min (t ½ = 8-9 h)	2-3 days	24 h	48-72 h
CrCl 30-50 mL/min (t ½ = 9 h)	3-4 days	24 h	48-72 h
CrCl 15-29.9 mL/min (t ½ = 9-10 h)	3-4 days♂	24 h	48-72 h
Apixiban (5 mg twice daily)[5,7]			
CrCl > 50 mL/min (t ½ = 7-8 h)	2-3 days	24 h	48-72 h
CrCl 30-50 mL/min (t ½ = 17-18 h)	3-4 days	24 h	48-72 h

†Assuming minimal platelet effect by 7-days and no effect by 10-days for (irreversible) agents: aspirin, ticlodipine, clopidogrel, and prasugrel; ticlodipine drug clearance is prolonged by an additional 4-days after repeated dosing.8 Ticagrelor and cilostazol half-life depends on rate of drug clearance.
*5-days is sufficient for cardiac surgery.9
¥7-days per manufacturer,10 drug effect may persist up to 10 days.
¢ 5-days per manufacturer,11 shorter interval expected based on half-life.
‡Intervals based on 4-5 drug half-lives to achieve minimal residual anticoagulant effect; shorter intervals may be appropriate for procedures with low-risk or consequence of bleeding, but there are limited data to guide recommendations.1, 5, 20-22
§> 90% of patients will achieve an INR < 1.5 after skipping 5 doses.1
£ Patients receiving dabigatran 75 mg twice daily.
♂ Patients receiving rivaroxaban 15 mg daily.

This guideline has been designed to assist the clinician in decision making. It is not intended to replace clinical judgment where individual patient characteristics may require modification of these recommendations.