

GI Tables For Anticoagulation Discontinuation 2020,
Coagulation in Cirrhosis, IR Bleeding Risk Guidelines,
H. Pylori Therapy, Hemostasis Settings &
Colonoscopy Screening and Surveillance 2020

Class	Agent	Peak (hour)	Half-life (hour)	Bio-availability (%)	Dosing	Reversal agents (see below for HASHTI)	Recommendations to discontinue before procedure			
Vitamin K antagonist	Warfarin	72–96	20–60	100	Daily	1. Vitamin K (IV/PO) 1–10 mg (Takes 6 (IV) to 24 (PO) hours to reverse) 2. Prothombin Complex Concentrates (Kcentra) 25–50 units/kg IV if URGENT; reverses in 2-4 hours INR 2 to <4: 25 units/kg; not to exceed 2500 units INR 4-6: 35 units/kg; not to exceed 3500 units INR >6: 50 units/kg; not to exceed 5000 units	Discontinue 5 days before procedure			
Xa inhibitor	Rivaroxaban (Xarelto)	2.5–4	5–9 (9–13 if elderly)	80	Daily or b.i.d.	1. Supportive Treatment 2. Factor VIIa 3. Prothombin Complex Concentrates (Kcentra) 50 units/kg IV; reverses in 2-4 h	Discontinue 24 h before procedure (GFR >90), 2 days (GFR 60-90), 3 days (GFR 30-59), 4 days (GFR 15-29).			
	Apixaban (Eliquis)	3	8–13	~66	b.i.d.	1. Supportive Treatment 2. Factor VIIa 3. Prothombin Complex Concentrates (Kcentra) 50 units/kg IV; reverses in 2-4 hours	Discontinue 24 h before procedure (GFR >60), 3 days (GFR 30-59), 4 days (GFR 15-29)			
	Edoxaban (Savaysa)	1-2	8.5-9.5 17 if (GFR<30)			1. Supportive Treatment 2. Factor VIIa 3. Prothombin Complex Concentrates (Kcentra) 50 units/kg IV; reverses in 2-4 hours	Discontinue at least 24 h before procedure (GFR > 15); If GFR < 15 there is no data.			
Direct thrombin inhibitor	Dabigatran (Pradaxa)	2–3	13–27 (Depending on CrCl— See table on right)	6.5	Daily or b.i.d.	1. Supportive Blood Products/HASHTI 2. Prothombin Complex Concentrates (Kcentra) 50 units/kg IV; reverses in 2-4 hours 3. Consider rVIIa 4. Hemodialysis	Renal Clearance (mL/min)	Half Life (h)	Standard Bleeding Risk*	High Bleeding Risk*
							> 80	13 (11-22)	24 h	2 – 4 days
							50 - 80	15 (12-34)	24 h	2 – 4 days
							30 - 50	18 (13-23)	>/= 48 h	4 days
							< 30	27 (22-35)	2 – 5 day	> 5 days
	Bivalirudin (Angiomax)	0.5–3	0.5	100	Intravenous	1. Supportive Blood Products/HASHTI 2. Consider rVIIa (90 mcg/kg for up to 2 doses) 3. Hemodialysis	Discontinue before induction of anesthesia in a patient with normal renal function			
	Argatroban	1–3	39–51 min	100	Intravenous	1. Supportive Blood Products/HASHTI 2. Prothombin Complex Concentrates 3. Consider rVIIa 4. Hemodialysis	Discontinue 4–6 h before induction of anesthesia in a patient with normal hepatic function			

HASHTI
1. Hold further doses of anticoagulant
2. Consider Antidote
3. Supportive treatment: volume resuscitation, inotropes as needed
4. Local or surgical Hemostatic measures: topical agents (aminocaproic acid, tranexamic acid)
5. Transfusion (red cells, platelets, FFP as indicated)
6. Investigate for bleeding source

Class	Agent	Peak (hour)	Half-life (hour)	Bio-availability (%)	Dosing	Reversal agents (see below for HASHTI)	Recommendations to discontinue before procedure
Glycoprotein IIB/IIIA inhibitors	Abciximab (ReoPro)	2	0.5	100	Intravenous	1. HASHTI 2. Platelet Transfusion	24 h before procedure
	Eptifibatide (Integrilin)	4–6	2.5	100	Intravenous	1. HASHTI 2. Platelet Transfusion	4 h before procedure
	Tirofiban (Aggrastat)	2	2	100	Intravenous	1. HASHTI 2. Platelet Transfusion 3. Dialysis	Can be stopped at the moment of skin incision without harmful effects
Low-molecular weight heparin	Enoxaparin (Lovenox) Dalteparin (Fragmin)	3–5	2.2	87	Subcutaneous	1. HASHTI 2. Protamine sulfate (1 mg/100 units Dalteparin in previous 8 h) 3. Consider rVIIa	Last dose should be given 24 h before procedure
	Tinzaparin (Innohep)	4–5	3.9	90 for Xa 67 for IIa	Subcutaneous	1. HASHTI 2. Protamine sulfate (1 mg/100 units Tinzaparin in previous 8 h) 3. Consider rVIIa	Last dose should be given 24 h before procedure
	Fondaparinux (Arixtra)	2	17–21	100	Subcutaneous	1. HASHTI 2. Protamine sulfate 3. Consider rVIIa	Last dose should be given 36-48 h before procedure and resume 6 h after procedure

HASHTI

- 1. Hold further doses of anticoagulant**
- 2. Consider Antidote**
- 3. Supportive treatment: volume resuscitation, inotropes as needed**
- 4. Local or surgical Hemostatic measures: topical agents (aminocaproic acid, tranexamic acid)**
- 5. Transfusion (red cells, platelets, FFP as indicated)**
- 6. Investigate for bleeding source**

Class	Agent	Peak (hour)	Half-life (hour)	Bio-availability (%)	Dosing	Reversal agents (see below for HASHTI)	Recommendations to discontinue before procedure
Thienopyridine antiplatelet agent	Clopidogrel (Plavix)	1	7–8	> 50	Daily	1. HASHTI 2. Platelet Transfusion 3. Case Reports of Methylprednisolone and desmopressin	Discontinue 5–7 days before procedure
	Ticlopidine (Ticlid)	2	12	> 80	b.i.d.	1. HASHTI 2. Platelet Transfusion	Discontinue 10-14 days before procedure
	Prasugrel (Effient)	0.5	2–15	> 79	Daily	1. HASHTI 2. Platelet Transfusion	Discontinue 5–7 days before procedure
	Ticagrelor (Brillinta)	1.5	7–8.5	> 36	Daily or BID	1. HASHTI 2. Platelet Transfusion	Discontinue 5 days before procedure
	PAR-1 inhibitor: vorapaxar (Zontivity)						Discontinue 5-13 days before procedure
	Dipyrimadole (Persantine)	1.25	7–10	50–75	q.i.d.	1. HASHTI 2. Platelet Transfusion 3. Aminophylline for Dipyrimadole overdose	Discontinue 2-3 days before procedure
	(Aggrenox (Extended release dipyrimadole+aspirin))	2	13.6	50–75	b.i.d.	1. HASHTI 2. Platelet Transfusion	Discontinue 7 days before procedure

HASHTI

- 1. Hold further doses of anticoagulant**
- 2. Consider Antidote**
- 3. Supportive treatment: volume resuscitation, inotropes as needed**
- 4. Local or surgical Hemostatic measures: topical agents (aminocaproic acid, tranexamic acid)**
- 5. Transfusion (red cells, platelets, FFP as indicated)**
- 6. Investigate for bleeding source**

JH Criteria for LVAD to have Endoscopy under Moderate Sedation in Endoscopy Suite

- Patient can be sedated with Moderate-Sedation.
- LVAD Implanted more than 30 days earlier.
- Pulse Pressure > 15 mm Hg (BPs – BPd).
- Reliable Blood Pressure, with BP-Cuff or Doppler.
- No Obstructive Sleep Apnea.
- No COPD on Home Oxygen.
- Perfusionist Available for the Endoscopy (Ext. 8384).

Coagulation in
Cirrhosis
A Precarious Re-
Balance

The State of Coagulation in Cirrhosis

O'Leary JG et al. Gastroenterology
2019 Jul;157(1):34-43

Re-balanced Systems (precarious state)

- Platelet deficit and dysfunction is counterbalanced by increased endothelial derived vWF
- Decreased liver-derived pro-coagulant factors V, VII, X are counterbalanced with low Protein C

Increased Bleeding Risk:

- Portal Pressure driven (not related to coagulation/fibrinolysis).
 - Worsen by excessive transfusion.
- Mucosal or Puncture site bleeding: due to
 - Premature clot dissolution due to "Accelerated Intravascular Coagulation and Fibrinolysis" (AICF)
 - In DIC Factor VIII is low; in AICF Factor VIII is high.
 - Thrombocytopenia due to sequestration (1/3), decreased survival, and low thrombopoietin (TPO)

Increased Thrombosis Risk:

- Due to elevated Endothelial-derived Factor VIII + low Protein C + venous stasis +/- endothelial injury.
 - Risk of Portal vein and Mesenteric vein thrombosis
 - Risk of Peripheral limb DVT

Procedure Related Bleeding Risk

Intagliata NM et al. Thromb Haemost 2018;118:1491–1506.

- Correction of Coagulation is NOT recommended before Low nor Intermediate Risk Procedures
- Individualization is often necessary

Higher risk procedures	Intermediate risk procedures	Lower risk procedures
Brain or spinal surgery	Lumbar puncture	Paracentesis
All major surgery (cardiac, intra-abdominal and orthopedic)	Percutaneous or transjugular liver biopsy	Thoracentesis
Intra-cranial pressure catheter insertion	Transjugular intrahepatic portosystemic shunt	Dental extraction
Endoscopy (large polypectomy with endoscopic mucosal or sub-mucosal resection, NOTES)	Endoscopy (e.g. percutaneous gastrostomy placement, cystgastrostomy, biliary sphincterotomy)	Endoscopy (e.g. diagnostic, variceal band ligation, uncomplicated polypectomy)
	Percutaneous biopsy of extra-hepatic organ or lesions	Cardiac catheterization
	Trans-arterial or percutaneous HCC therapies	Central line placement

Hemostasis Tests in Cirrhosis

O'Leary JG et al. Gastroenterology
2019 Jul;157(1):34-43

Intagliata NM et al. Thromb
Haemost 2018;118:1491–1506

INR (International Normalization Ratio):

- Testing NOT recommended
- Measures pro-coagulant factors I, II, V, VII and X.
- Does not measure the effect of the deficit of Protein C.
- Depends in which thromboplastin is used to run the test (different INR in different hospitals).
- Does not predict risk of bleeding.
- Attempts to correct it with FFP increases portal pressure.

Platelet Count:

- Testing recommended before “High Risk” procedures
- Traditionally 50,000 to **56,000** needed to promote thrombin generation
- Increased circulating activated platelets and elevated endothelial-derived vWF increases their effectiveness.

Fibrinogen Level:

- Testing recommended before “High Risk” procedures
- Better at predicting bleeding risk than INR.
- Most (98%) is generated in the liver.
- Its half life (normal 4 days) is shorten in cirrhosis.
- Level needed is > 120 mg/dL

Viscoelastic Test in Cirrhosis

Thromboelastography (TEG) Guided Transfusion for “Coagulopathy in Cirrhosis”. De Pietri L et al. Hepatology. 2016 Feb;63(2):566-73

- Decreased utilization of blood products without increase in bleeding complications
- If “r time” greater than 40 minutes : FFP at a dose of 10 mL/kg of “ideal body weight”.
 - “r time” is the time until the clot reaches 2 mm diameter and represents first fibrin formation.
- If “MA” shorter than 30 mm : Platelet transfusion in the amount of 1 apheresis unit (i.e., the equivalent of six or more units of platelets from whole blood, $3-6 \times 10^{11}$ platelets).
 - MA is the Maximal Amplitude of clot diameter; represents the total effect of platelets + fibrinogen + coagulation factors.
- *Use of TEG is controversial.*

Rotational Thromboelastometry (ROTEM): No studies in cirrhosis.

Sonorheometry: No studies in cirrhosis.

Complications of Blood Product Transfusion

Rahimi RS et al, HEPATOLOGY, Vol. 63, No. 2, 2016; 368-370

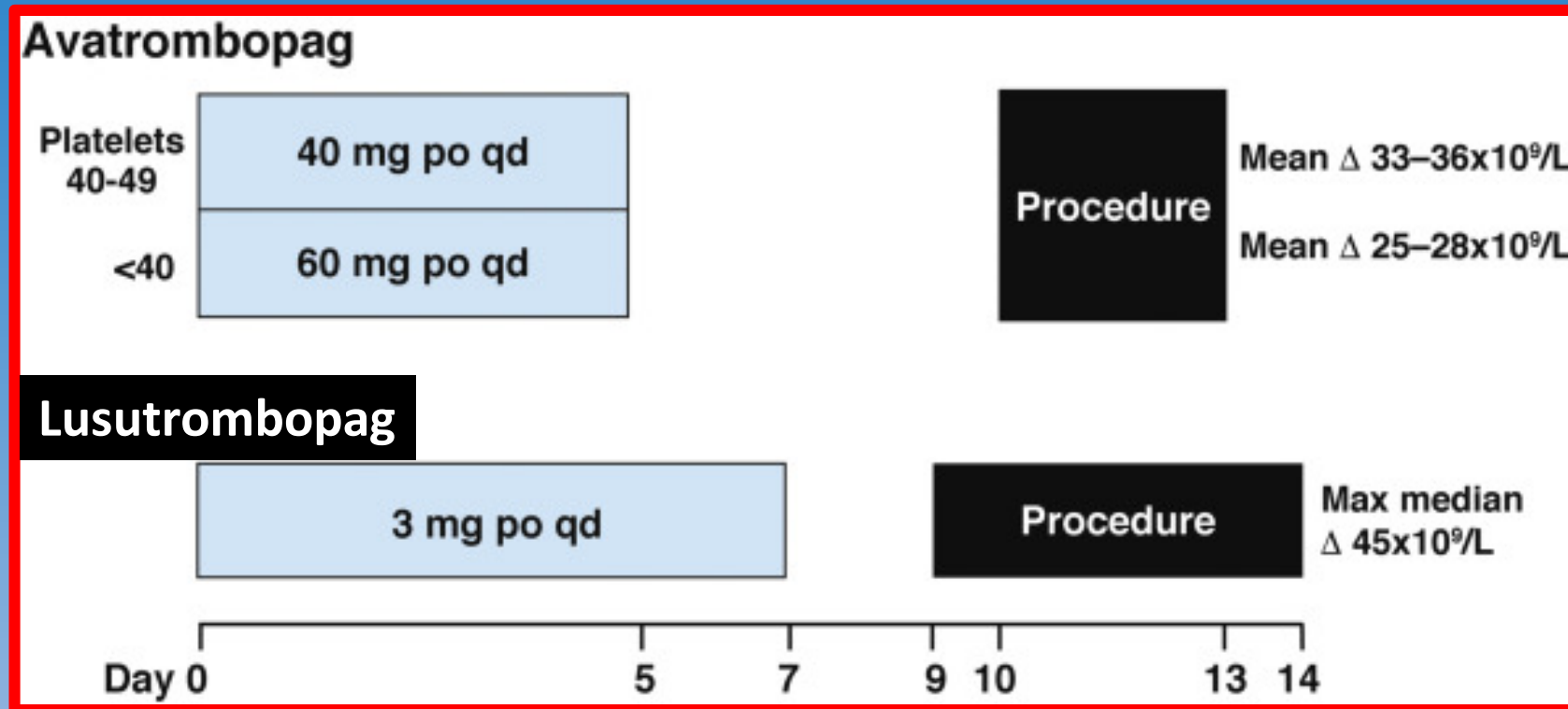
Timing	Complication
Short Term	Cost per Unit: Platelets = \$ 500; FFP = \$ 1600-2400 Transfusion reactions Cross-match errors Prolonged ventilator time Exacerbation of portal hypertension Transfusion-related acute lung injury (TRALI) Increased mortality Infection transmission Potential hypercoagulable complications, eg, portal vein thrombosis
Intermediate Term	Increased intensive care unit stay Increased hospital length of stay Systemic inflammatory response syndrome (SIRS) Transfusion-related acute lung injury (TRALI) Increased mortality
Long Term	HLA antibody formation Disease transmission Increased mortality

Correction of Coagulation Parameters in Cirrhosis Before High Bleeding Risk Procedures

- In high risk procedures, correction of **Platelet count < 50,000** is reasonable
 - Low platelets are due to sequestration and low TPO.
 - Platelet dysfunction is offset by increased endothelial derived vWF.
 - One-unit single donor platelets increases plat count by 5-10,000
 - In elective procedures can be corrected with oral Avatrombopag 40-60 mg/day x 5 days, or Lusutrombopag 3 mg a day x 7 days
- In high risk procedures, correction of **Fibrinogen < 120 mg/dL** is reasonable.
 - One unit of cryoprecipitate (10-20 mL each) per 10 kg of weight, increase fibrinogen by 50 mg/dL
- In bleeding after procedure consider **Antifibrinolytic agents**:
 - Suspect in delayed or diffuse mucosal or puncture site bleeding
 - Aminocaproic acid 3 grams oral QID, or Intravenous 5 grams in 250 mL NS over 1 hour + 1 gm in 50 mL NS per hour until bleeding stops
 - Tranexamic acid 1 gm IV every 6 hours, until bleeding stops.

- O'Leary JG et al.
Coagulation in
Cirrhosis.
Gastroenterology 2019

Oral Agent to Treat Thrombocytopenia



65 to 69% of patients reach Platelet count \geq 50,000

TPO-Agonists Use in Cirrhosis

	Avatrombopag	Lusutrombopab
Platelets < 40,000	60 mg PO x 5 days (day 1 = first dose)	3 mg PO x 7 days (day 1 = first dose)
Platelets 40,000 - 49,000	40 mg PO x 5 days (day 1 = first dose)	3 mg PO x 7 days (day 1 = first dose)
Platelets \geq 50,000	Not Recommended	Not Recommended
Procedure Day	Day 10 - 13	Day 9 - 15

SIR Periprocedural Thrombotic and Bleeding Risk Management Guidelines

Patel, IJ et al. J Vasc Interv Radiol 2019; 30:1168–1184

ALL PATIENTS – High Bleeding Risk Procedures

- **Screening Coagulation Laboratory Test High bleeding risk**
 - PT/INR:
 - routinely recommended
 - Platelet count/hemoglobin:
 - routinely recommended
- **Thresholds in General**
 - INR: correct to within range of 1.5–1.8
 - Platelets: transfuse if < 50,000
- **Threshold in Liver Disease**
 - INR: Correct if > 2.5
 - Platelets: Transfuse if < 30,000
 - Fibrinogen: Cryoprecipitate if < 100 mg/dL
- Ablations: solid organs, bone, soft tissue, lung
- Arterial interventions: > 7-F sheath, aortic, pelvic, mesenteric, CNS†,‡
- Biliary interventions (including cholecystostomy tube placement)
- Catheter directed thrombolysis (DVT, PE, portal vein)**
- Deep abscess drainage (eg, lung parenchyma, abdominal, pelvic, retroperitoneal)
- Deep nonorgan biopsies (eg, spine, soft tissue in intraabdominal, retroperitoneal, pelvic compartments)
- Gastrostomy/gastrojejunostomy placement
- IVC filter removal complex**
- Portal vein interventions
- Solid organ biopsies
- Spine procedures with risk of spinal or epidural hematoma (eg, kyphoplasty, vertebroplasty, epidural injections, facet blocks cervical spine)§
- Transjugular intrahepatic portosystemic shunt††
- Urinary tract interventions (including nephrostomy tube placement, ureteral dilation, stone removal)
- Venous interventions: intrathoracic and CNS interventions

ALL PATIENTS – Low Bleeding Risk Procedures

- **Screening Coagulation Laboratory Test Low bleeding risk**
- PT/INR:
 - not routinely recommended
- Platelet count/hemoglobin:
 - not routinely recommended
- **Thresholds General**
 - INR: correct to within range of 2.0–3.0
 - Platelets: transfuse if < 20,000
- **Threshold in Liver Disease:**
 - INR: N/A
 - Platelets: Transfuse if < 20,000
 - Fibrinogen: Cryoprecipitate if < 100 mg/dL
- Catheter exchanges (gastrostomy, biliary, nephrostomy, abscess, including gastrostomy/ gastrojejunostomy conversions)
- Diagnostic arteriography and arterial interventions: peripheral, sheath < 6 F, embolotherapy‡
- Diagnostic venography and select venous interventions: pelvis and extremities
- Dialysis access interventions
- Facet joint injections and medial branch nerve blocks (thoracic and lumbar spine)§
- IVC filter placement and removal k
- Lumbar puncture¶
- Non-tunneled chest tube placement for pleural effusion
- Non-tunneled venous access and removal (including PICC placement)
- Paracentesis
- Peripheral nerve blocks, joint, and musculoskeletal injections§
- Sacroiliac joint injection and sacral lateral branch blocks§
- Superficial abscess drainage or biopsy (palpable lesion, lymph node, soft tissue, breast,
- thyroid, superficial bone, eg, extremities and bone marrow aspiration)
- Thoracentesis
- Transjugular liver biopsy (plat > 30,000)

Suggested Laboratory Thresholds for Performance of a Procedure in Patients with Chronic Liver Disease

Procedure Risk	INR	Platelets *	Fibrinogen (mg/dL) **
Low	N/A	> 20,000	> 100
High	< 2.5	> 30,000	> 100

* One unit of apheresis or 4-6 pooled (from whole blood donors) increases the platelet count by 25–50 x 10⁹/L in normal-sized patient without splenomegaly

** Administer 1 dose cryoprecipitate (bodyweight < 80 kg) or 2 doses (body weight > 80 kg)

Patient scheduled for IR procedure on anticoagulation

Can this procedure be done on anticoagulation?

YES-

Planned procedure has low risk of bleeding
AND
Patient has low risk of bleeding

Continue current anticoagulant

No-

Planned procedure has high risk of bleeding
OR
Patient has high risk of bleeding

Is the procedure emergent?

YES

Consider reversal

NO

Does patient have high thrombotic risk?

NO
Stop AC

YES
Consider admit (UFH) vs. outpatient (LMWH) bridge

PROCEDURE

Patient with cardiac* stent who is receiving DAPT and is scheduled for IR procedure

Can this procedure be done on DAPT?

YES-

Planned procedure has low risk of bleeding

Continue current DAPT

No-

Planned procedure has high risk of bleeding

Stent placed
< 1 year

YES

Consult cardiology, or
vascular or internal
medicine for management
recommendations

NO

1. Continue ASA
2. May hold second antiplatelet agent for 5 days before procedure
3. Consider consult to cardiology, vascular or internal medicine for management recommendations

PROCEDURE

Post-Procedure Assessment of Bleeding Risk

Low Risk for Continued Bleeding

Assess indication for AC

AFib

VTE

Mechanical Heart Valve

CHRONIC

ACUTE

Assess Acuity

Apixaban or Rivaroxaban or LMWH

Choose Treatment

VKA or Dabigatran or Exodaban

Start AC **WITHOUT** Bridge for most patients

Start AC **WITH** Bridge for most patients

Persistent Risk for Continued Bleeding

Assess thrombosis risk

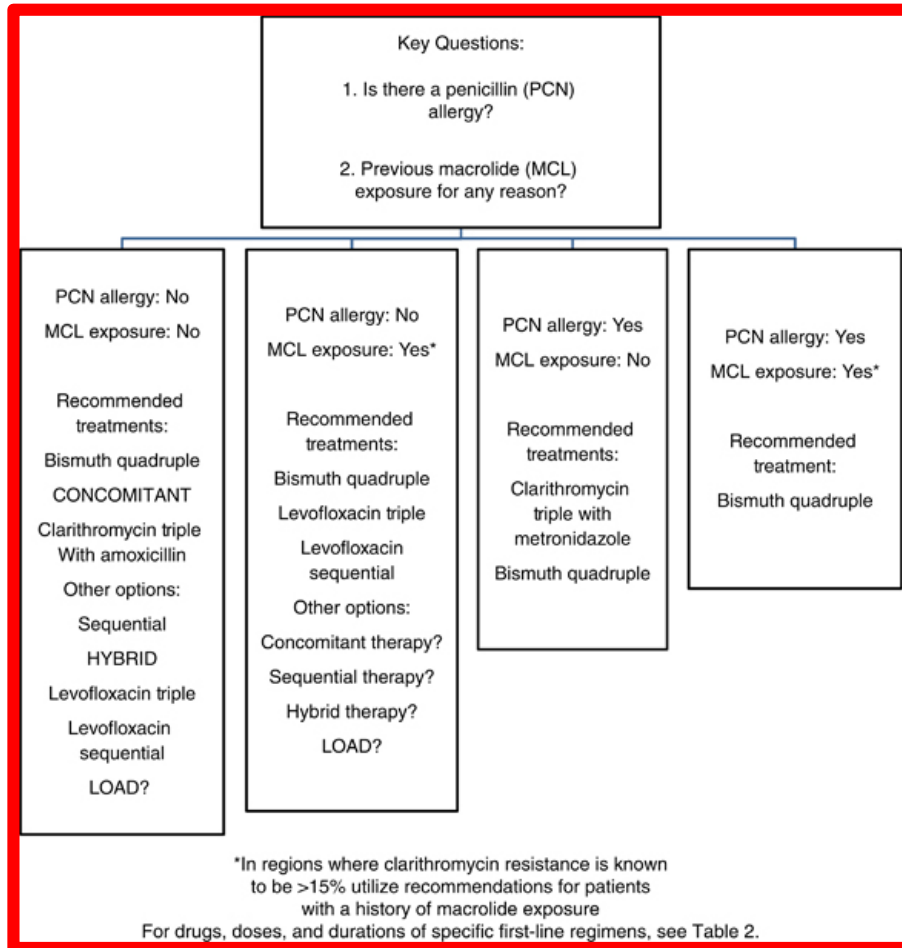
LOW

HOLD AC

HIGH

Consider low dose anticoagulation or UFH

H. Pylori Antibiotic Regimens Based in Allergy and Exposure



Antibiotic	Resistance rate (%)
Metronidazole	20
Clarithromycin	16
Levofloxacin	31
Tetracycline	<2
Amoxicillin	<2
Rifabutin	<2

Most patients with a history of penicillin allergy do not have true penicillin hypersensitivity.
After failure of first-line therapy, such patients should be considered for referral for allergy testing since the vast majority can ultimately be safely given amoxicillin-containing salvage regimens

Patients with past exposure to Metronidazole should use the 500 mg dose (partial resistance).

Regimen	Drugs (doses)	Dosing frequency	Duration (days)	FDA approval
Clarithromycin triple	<i>PPI (standard or double dose)</i>	<i>BID</i>	<i>14</i>	<i>Yes^a</i>
	<i>Clarithromycin (500 mg)</i>			
	<i>Amoxicillin (1 gm) or Metronidazole (500 mg TID)</i>			
Bismuth quadruple	PPI (standard dose)	BID	10–14 (14 if salvage therapy)	No ^b
	Bismuth subcitrate (120–300 mg) or subsalicylate (300 mg)	QID		
	Tetracycline (500 mg)	QID		
	Metronidazole (250–500 mg)	QID (250)		
		TID to QID (500)		
Concomitant	<i>PPI (standard dose)</i>	<i>BID</i>	<i>10–14 (same as salvage therapy)</i>	<i>No</i>
	<i>Clarithromycin (500 mg)</i>			
	<i>Amoxicillin (1 gm)</i>			
	<i>Nitroimidazole (500 mg)^ε</i>			
Sequential	PPI (standard dose)+Amoxicillin (1 gm)	BID	5–7	No
	PPI, Clarithromycin (500 mg)+Nitroimidazole (500 mg) ^ε	BID	5–7	
Hybrid	<i>PPI (standard dose)+Amox (1 gm)</i>	<i>BID</i>	<i>7</i>	<i>No</i>
	<i>PPI, Amoxicillin, Clarithromycin (500 mg), Nitroimidazole (500 mg)^ε</i>	<i>BID</i>	<i>7</i>	
Levofloxacin triple	PPI (standard dose)	BID	10–14 (14 if salvage therapy)	No
	Levofloxacin (500 mg)	QD		
	Amoxicillin (1 gm)	BID		
Levofloxacin sequential	<i>PPI (standard or double dose)+Amox (1 gm)</i>	<i>BID</i>	<i>5–7</i>	<i>No</i>
	<i>PPI, Amox, Levofloxacin (500 mg QD), Nitroimidazole (500 mg)^ε</i>	<i>BID</i>	<i>5–7</i>	
LOAD	Levofloxacin (250 mg)	QD	7–10	No
	PPI (double dose)	QD		
	Nitazoxanide (500 mg)	BID		
	Doxycycline (100 mg)	QD		

AIMS 65 Score

ER Prediction of Mortality, LOS, & Cost

Saltzman JR et al. Gastrointest Endosc 2011;74:1215-24

FACTOR	1 point for each	Alternative Description
Albumin	< 3 g/dL	
INR	> 1.5	
Mental status	Glasgow score < 14	disorientation, lethargy, stupor, or coma
Systolic Pressure	</= 90 mm Hg	
Age	> 65	

All factors are the ones present at time of arrival to ER

Mortality/LOS: 2 pts = 3%/5.5 d; 3 pts = 8-10%/6.5 d; 4 pts = 15%/7.5 d; 5 pts = 24%/9 d

13.5% of patients have score \geq 3, with mortality of 10% or higher

Heater Probe in Upper Endoscopy

(Inject “pillow” before Small Bowel burn)

Lesion	Probe	Pressure	Energy	Pulses/ Site
PUD/ Dieulafoy	10 Fr	Very Firm	30 J	4
M-W Tear	7-10 Fr	Moderate	20 J	3
Angiodys plasia	7-10 Fr	Light	15 J	2

BICAP (Gold Probe) in Upper Endoscopy

(Inject “pillow” before Small Bowel burn)

Lesion	Probe	Pressure	Energy	Time/ Site
PUD/ Dieulafoy	10 Fr	Very Firm	20 W	10-14 sec
M-W Tear	7-10 Fr	Moderate	20 W	4 sec
Angiodys plasia	7-10 Fr	Light	15 W	2 sec

Re-Bleeding Risk Factors for Severe Acute LGIB

Strate LL; Am J Gastroenterol 2005;100:1821-1827

Risk Factors	Coefficient	Odds Ratio	95% CI
Heart rate \geq 100/min	1.2	3.7	1.8–7.6
<i>Systolic blood pressure \leq 115 mmHg</i>	0.6	3.5	1.5–7.7
Syncope	1.5	2.8	1.1–7.5
<i>Non-tender abdominal examination</i>	0.9	2.4	1.2–4.9
Rectal bleeding within 1st 4 h of evaluation	1.0	2.3	1.3–4.2
<i>Aspirin use (\geq 81 mg in last 7 days)</i>	0.5	2.1	1.1–3.8
>2 comorbid illnesses	0.6	1.9	1.1–3.4

0 RF = 6% re-bleeding rate; LOS 1.7-2.8 d
1-3 RF = 43% re-bleeding; LOS 2.5-3.1 d
> 3 RF = 79% re-bleeding; LOS 3.0-3.5 d

Heater Probe in Colonoscopy

(Inject “Pillow” before burn; tattoo after)

Lesion	Probe	Pressure	Energy	Pulses/ Site
Ulcer	10 Fr	Moderate	15 J	2
Stalk	10 Fr	Moderate	15-20 J	2
Diverticuli	10 Fr	Moderate	15 J	2
Cancer	10 Fr	Moderate	20 J	2
Angiodys plasia	7-10 Fr	Light	10 J	1

BICAP (Gold Probe) in Colonoscopy

(Inject "Pillow" before burn; tattoo after)

Lesion	Probe	Pressure	Energy	Time/ Site
Ulcer	10 Fr	Moderate	20 W	2 sec
Stalk	10 Fr	Moderate	20 W	2 sec
Diverticuli	10 Fr	Moderate	20 W	2 sec
Cancer	10 Fr	Moderate	20 W	2 sec
Angiodysplasia	7-10 Fr	Light	15 W	1 sec

Effect of Family History on Onset & Frequency of Screening Colonoscopy

Category	Start age (the lesser)	Interval
One 2 nd degree, or any number 3 rd degree with CRC	50	10 years
1 st degree with CRC \geq age 60	40	10 years
1 st degree with adenoma \geq age 60	40	10 years
Two 2 nd degree with CRC	40	10 years
1 st degree with adenoma or CRC < age 60	40, or [10 y before “index”]	5 years
\geq two 1 st degree with CRC	40, or [10 y before “index”]	5 years

Effect of IBD on Onset & Frequency of Screening Colonoscopy

Category	Start time	Interval
Pancolitis	> 8 years of disease	2 years; q 1 y after 20 y of IBD
Left sided colitis	> 15 years of disease	2 years; q 1 y after 20 y of IBD
Colitis associated with Primary Sclerosing Cholangitis	At time of diagnosis	1 year
IBD colitis with 1st degree relative with CRC (consider also for: histologic inflammation, foreshortened colon, stricture, or multiple inflammatory pseudopolyps)	Pancolitis x 8 y Left sided colitis x 15 y	1 year

Effect of Inherited Disorders on Onset & Frequency of Screening Colonoscopy

Category	Start age (the lesser)	Interval
Serrated Polyposis Syndrome	First degree relative: 10 y younger than index case	1 y (to remove all polyps > 5 mm)
Peutz-Jeghers Syndrome	With symptoms or late teens (whichever is first)	2-3 years
Juvenile Polyposis Syndrome	With symptoms or late teens (whichever is first)	2-3 years
HNPCC (gene carrier or risk) (Muir-Torre & Turcot w glioblastoma)	20, or [10 y before “index”] whichever is first	2 years; q 1 y after 40
MYH associated Adenomatous Polyposis (MAP) [> 15 adenomas]	25	2-3 year
FAP/Gardner/Turcot with medulloblastoma/Attenuated APC	10	Yearly colonoscopy

First Follow-Up in Average-Risk Adults With Normal Colonoscopy or Adenomas

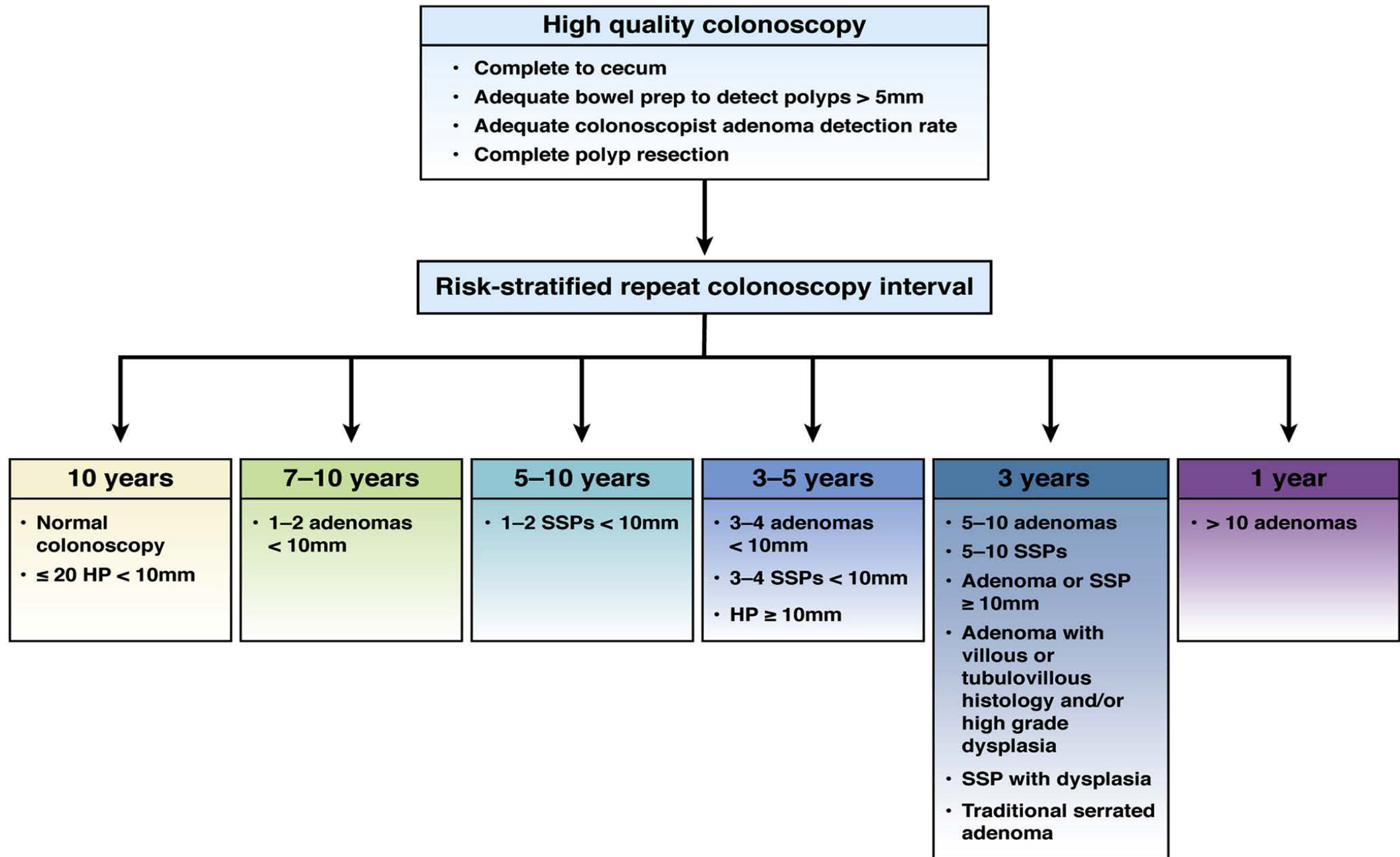
Baseline (First) colonoscopy finding	Recommended interval for surveillance colonoscopy (years)	Strength of recommendation	Quality of evidence
Normal	10	Strong	High
1–2 tubular adenomas <10 mm	7-10	Strong	Moderate
3–4 tubular adenomas <10 mm	3-5	Weak	Very Low
5–10 tubular adenomas <10 mm	3	Strong	Moderate
Adenoma 10 mm	3	Strong	High
Adenoma with tubulovillous or villous histology	3	Strong	Moderate
Adenoma with high-grade dysplasia	3	Strong	Moderate
>10 adenomas on single examination*	1	Weak	Very Low
Piecemeal resection of adenoma 20 mm	6 months	Strong	Moderate

*Patients with >10 adenomas or lifetime >10 cumulative adenomas may need to be considered for genetic testing based on absolute/cumulative adenoma number, patient age, and other factors such as family history of CRC

Recommendations for Post-Colonoscopy First Follow-Up in Average-Risk Adults With Serrated Polyps

Baseline (First) colonoscopy finding	Recommended interval for surveillance colonoscopy (years)	Strength of recommendation	Quality of evidence
</= 20 HPs in rectum or sigmoid colon <10 mm	10	Strong	Moderate
</= 20 HPs proximal to sigmoid colon <10 mm	10	Weak	Very Low
1–2 SSPs <10 mm	5-10	Weak	Very Low
3–4 SSPs <10 mm	3-5	Weak	Very Low
5–10 SSPs <10 mm	3	Weak	Very Low
SSP 10 mm	3	Weak	Very Low
SSP with dysplasia	3	Weak	Very Low
HP 10 mm	3-5	Weak	Very Low
TSA	3	Weak	Very Low
Piecemeal resection of SSP 20 mm	6 months	Strong	Moderate

Patients with cumulative >20 hyperplastic polyps distributed throughout the colon, with at least 5 being proximal to the rectum, as well as those with 5 serrated polyps proximal to the rectum > 5 mm, with at least two 10 mm meet criteria for serrated polyposis syndrome and may require specialized management



Recommendations for Second Surveillance Stratified by Adenoma Findings at Baseline and First Surveillance

Baseline Finding	First Interval (y)	First Surveillance Finding	Next Interval (y)
1-2 Tubular Adenoma (TA) < 10 mm	7-10	Normal	10
		1-2 TA < 10 mm	7-10
		3-4 TA < 10 mm	3-5
		Adenoma 10 mm in size; or adenoma with tubulovillous/villous histology; or adenoma with high grade dysplasia; or 5–10 adenomas <10 mm	3
3-4 Tubular Adenoma (TA) < 10 mm	3-5	Normal	10
		1-2 TA < 10 mm	7-10
		3-4 TA < 10 mm	3-5
		Adenoma 10 mm in size; or adenoma with tubulovillous/villous histology; or adenoma with high grade dysplasia; or 5–10 adenomas <10 mm	3
Adenoma 10 mm in size; or adenoma with tubulovillous/villous histology; or adenoma with high-grade dysplasia; or 5–10 adenomas <10 mm	3	Normal	5
		1-2 TA < 10 mm	5
		3-4 TA < 10 mm	3-5
		Adenoma 10 mm in size; or adenoma with tubulovillous/villous histology; or adenoma with high grade dysplasia; or 5–10 adenomas <10 mm	3

Additional Surveillance Considerations

- **Discontinuation of surveillance** should be considered in patients with serious comorbidities with less than 10 years of life expectancy.
- Surveillance guidelines are intended for asymptomatic people; new symptoms may need diagnostic work-up.
- Evolving technologies like chromoendoscopy, magnification endoscopy, narrow band imaging, and CT colonography are not established for postpolypectomy surveillance at this time.

Post-Colorectal Cancer Surveillance

	Interval from Previous Exam
Clearing Colonoscopy	Before, During, or 3 months After Resection
Post-Clearing Colonoscopy	1 year later
1st Metachronous Surveillance	3 years later
Subsequent Metachronous Surveillance	5 years later, and every 5 years thereafter

Rectal Cancer

Local Recurrence Surveillance
After Low-Anterior Resection
(In addition to Colonoscopies)

	Interval	Duration
Rectal EUS or Rigid/Flexible Proctoscopy	Every 3 months	3 years