Inpatient Management of GI Bleeding-
Getting it Right

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Center for Advanced Endoscopy
Beth Israel Deaconess Medical Center
Harvard Medical School

Faculty disclosure:

I am a consultant for Boston Scientific and Medtronic, which manufacture devices used in evaluation and treatment of GI bleeding
Agenda

1. Initial resuscitation strategy in GI bleeding

2. Review medical management of upper GI bleeding prior to EGD:
   A. NG tubes, yay or nay?
   B. PPI dosing
   C. Brief mention re: scoring systems
   D. Even briefer mention of liver/variceal management

3. Review management of LGIB, including:
   A. Urgent colonoscopy
   B. Tagged RBC/angio
   C. Segmental colectomy

4. Small bowel bleeding- (Exactly one slide)

5. Bonus topics: Anticoagulation decisions, H.pylori eradication, PPI

Before we continue… 5 important definitions:

1. Upper GI bleeding: arising from above the Ligament of Treitz

2. Lower GI bleeding: arising from the colon

(*Midgut' bleeding or 'deep small bowel' bleeding = varying definitions)
Before we continue… 5 important definitions:

3. Overt GI bleeding  
   melena, hematochezia, hematemesis….

4. Occult GI bleeding  
   guaiac positive stool only

5. Obscure GI bleeding (aka ‘suspected small bowel bleeding’)  
   recurrent bleeding from unknown source despite negative EGD/colonoscopy/capsule

“obscure, overt bleeding…”
“obscure, occult bleeding…”
68 y.o. male with CKD presents to ED with 3 episodes of hematochezia. BP 70/30 → 80/50 after 2L NS. Hgb 8.5 HCT 26, coags normal. Sent to ICU with 1U PRBC hanging and two 20g IVs. One additional large episode of hematochezia upon arrival to ICU.

Which of the following is NOT an appropriate next step in this patient’s management?*

1. Insertion of additional 16-18g IV catheters
2. Insertion of a TLC central line
3. Insertion of a cordis/trauma line
4. NG lavage
5. Two additional units PRBC
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Volume Resuscitation & IV Flow Rate:

<table>
<thead>
<tr>
<th>Size of Angiocath</th>
<th>Flow Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>22 gauge</td>
<td>35 ml/min</td>
</tr>
<tr>
<td>20 gauge</td>
<td></td>
</tr>
<tr>
<td>18 gauge</td>
<td></td>
</tr>
<tr>
<td>16 gauge</td>
<td></td>
</tr>
<tr>
<td>14 gauge</td>
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*Source: Cornell MICU Manual*
### Volume Resuscitation & IV Flow Rate:

<table>
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<td>20</td>
<td>60</td>
</tr>
<tr>
<td>18</td>
<td>105</td>
</tr>
<tr>
<td>16</td>
<td>205</td>
</tr>
<tr>
<td>14</td>
<td>333</td>
</tr>
<tr>
<td><strong>Triple lumen central line:</strong></td>
<td><strong>68 ml/min (34ml/min + 2 x 17 ml/min)</strong></td>
</tr>
<tr>
<td><strong>Cordis/trauma line:</strong></td>
<td><strong>&gt;1000ml/min</strong></td>
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*Source: Cornell MICU Manual*
Science Section of Slide

Poiseuille's law

Doctor Section of Slide

wide catheter =
much faster infusion

long catheter =
slower infusion

Transfusion Strategies for Acute Upper Gastrointestinal Bleeding

921 patients with acute upper GIB randomized to:
  restrictive transfusion strategy (Hgb target >7)
  vs.
  liberal transfusion strategy (Hgb target >9)

- all patients underwent EGD within 6 hours
- included both cirrhotic patients and peptic ulcer patients

Cándid Villanueva, M.D., Alan Colomo, M.D., Alba Bosch, M.D., Mar Concepción, M.D., Virginia Hernández-Gea, M.D., Carles Aracil, M.D., Isabel Grauera, M.D., María Poca, M.D., Cristina Alvarez-Urturi, M.D., Jordi Gordillo, M.D., Carlos Guarner-Arjente, M.D., Miquel Santaló, M.D., Eduardo Muñiz, M.D., and Carlos Guarner, M.D.

NEJM January 2013
Summary:
- Restrictive transfusion → lower overall mortality (5% vs. 10%) and lower risk of rebleeding (10% vs. 16%)
- Mortality benefit largest for cirrhotic patients, but also present in PUD

Limitations:
- hypovolemic shock subgroup not analyzed separately
- excluded patients with “exsanguinating bleed requiring transfusion” (i.e. best strategy for rapid bleed is rapid resuscitation- don’t wait for CBC!)

The practical summary:
1. Ignore these thresholds in a ‘rapid exsanguinating bleed’ – these patients were excluded from the study. **Blood out → blood in.**
2. For the ‘more stable’ bleeder (in whom you actually have time to monitor labs!)- transfusing more conservatively may be beneficial.
### Upper GI Bleeding

#### Differential Diagnosis

**Common**
- gastric/duodenal ulcer, esophageal varices, Mallory-Weiss tear,
- gastritis/erosions, esophagitis, anastamotic ulcers

**Less common**
- Cameron lesions, Dieulafoy lesions, gastric varices, GAVE, neoplasms

**Rare**
- esophageal ulcer, aorto-enteric fistula, hemobilia, pancreatic bleeding, upper GI Crohn’s disease
Upper GI Bleeding

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Ulcer appearance and risk of re-bleeding

Approximate prevalence (%)

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<th>+ Endo tx</th>
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<tr>
<td>&quot;Clean-based&quot;</td>
<td>3%</td>
<td>10%</td>
</tr>
<tr>
<td>&quot;Pigmented spot&quot;</td>
<td>7%</td>
<td>NA</td>
</tr>
<tr>
<td>&quot;Overlying clot&quot;</td>
<td>35%</td>
<td>&lt;5%</td>
</tr>
<tr>
<td>&quot;Visible vessel&quot;</td>
<td>50%</td>
<td>15%</td>
</tr>
<tr>
<td>&quot;Active bleeding&quot;</td>
<td>90%</td>
<td>15%</td>
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Rebleeding risk (with medical tx alone vs. + endo)

Forrest et al. Lancet 1974
Kovacs et al. Curr Treatment Gastro 2007
### Ulcer appearance and risk of re-bleeding

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#### Rebleeding risk (with medical tx alone vs. + endo)

- Forrest et al. Lancet 1974
- Kovacs et al. Curr Treatment Gastro 2007

### Endoscopic therapy space

#### Endoscopic hemostasis techniques/tools

1. Injection/local vasoconstriction (temporary)
2. Clip closure of ulcer/vessel (definitive)
3. Thermal coagulation (definitive)
4. Hemospray (salvage)
Early enthusiasm for hemospray, but…

40-50% of pts re-bleed within 3-7 days after hemospray treatment

### Table 3
Overall rebleeding rate and rebleeding rate of the most frequent bleeding etiologies on day 3 and day 7.

<table>
<thead>
<tr>
<th></th>
<th>Total cohort</th>
<th>Monotherapy</th>
<th>Salvage therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical success, n (%)</td>
<td>51/52 (98.1)</td>
<td>23/23 (100)</td>
<td>28/29 (96.6)</td>
</tr>
<tr>
<td>Overall rebleeding on Day 3, n (%)</td>
<td>22/51 (43.1)</td>
<td>9/23 (39.1)</td>
<td>13/29 (44.8)</td>
</tr>
<tr>
<td>Overall rebleeding on Day 7, n (%)</td>
<td>25/51 (49)</td>
<td>10/23 (43.5)</td>
<td>15/29 (51.7)</td>
</tr>
</tbody>
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### Esophageal Varices

<table>
<thead>
<tr>
<th>Grade II varices</th>
<th>Grade III varices</th>
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<tbody>
<tr>
<td><img src="image1" alt="Grade II varices" /></td>
<td><img src="image2" alt="Grade III varices" /></td>
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</table>

**Image sources:** gastrointestinalatlas.com, Boregowda et al WJGPT 2019

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### Esophageal Varices

<table>
<thead>
<tr>
<th>Bleeding varix</th>
<th>Endoscopic banding/ligation of varices</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image3" alt="Bleeding varix" /></td>
<td><img src="image4" alt="Endoscopic banding/ligation" /></td>
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**Image sources:** gastrointestinalatlas.com, Boregowda et al WJGPT 2019
Upper GI Bleeding

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esophageal ulcer, aorto-enteric fistula, hemobilia, pancreatic bleeding, upper GI Crohn’s disease
62 y.o. male presents to the ED with 6 episodes of black tarry stool. Blood pressure is 90/60 and HR is 115. Hgb 7.3, coags normal. Sent to ICU with 2U PRBC hanging and 22g and 20g IV.

NG lavage reveals fresh red blood. A large bore central line is placed. Patient has an episode of 300cc hematemesis.

Which of the following is NOT an appropriate next step.*

1. Urgent upper endoscopy
2. Intubation for airway protection prior to EGD
3. IV pantoprazole 40mg bolus
4. 250mg IV erythromycin
5. 1g IV ceftriaxone
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Which of the following is NOT an appropriate next step.

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2. Intubation for airway protection prior to EGD
3. IV pantoprazole 40mg bolus
4. 250mg IV erythromycin
5. **4g IV ceftriaxone**

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**Upper GI Bleeding Management**

**Initial approach**
Treat as PUD unless strong evidence otherwise*

1) Resuscitation, triage.
2) IV or oral PPI
3) ? NG tube
4) ‘Early’ upper endoscopy
5) Scoring systems
6) Last ditch options: angio embolization > surgery

* Cirrhosis clues: low platelets, abnormal INR etc
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**Physiologic Goals of Medical Therapy of Bleeding Ulcer**

- pH>4  Prevents pepsin activation and reduces proteolytic degradation of clots  
  (Good!)

- pH>6 Clot stabilization via improved platelet aggregation  
  (Even Better!)
EFFECT OF INTRAVENOUS OMEPRAZOLE ON RECURRENT BLEEDING AFTER ENDOSCOPIC TREATMENT OF BLEEDING PEPTIC ULCERS


RCT: IV omeprazole (80mg x 1 + 8mg/hr gtt) vs placebo AFTER endoscopy
240 patients with endoscopic evidence of active or recent ulcer bleeding

NEJM August 2000
A new era of **bolus** IV PPI dosing?
2014 Meta-analysis demonstrates equivalence between PPI bolus and infusion strategies

<table>
<thead>
<tr>
<th>Source</th>
<th>Intermittent Bolus, No.</th>
<th>Continuous Infusion, No.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Events</td>
<td>Total</td>
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<tr>
<td>Andriulli et al, 2008</td>
<td>19</td>
<td>239</td>
</tr>
<tr>
<td>Chen et al, 2012</td>
<td>6</td>
<td>101</td>
</tr>
<tr>
<td>Choi et al, 2009</td>
<td>3</td>
<td>21</td>
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<td>Jang et al, 2006</td>
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<td>Javid et al, 2009</td>
<td>4</td>
<td>53</td>
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<td>Kim et al, 2012</td>
<td>2</td>
<td>54</td>
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<tr>
<td>Sung et al, 2012</td>
<td>3</td>
<td>105</td>
</tr>
<tr>
<td>Uc bilek et al, 2013</td>
<td>3</td>
<td>37</td>
</tr>
<tr>
<td>Yamada et al, 2012</td>
<td>4</td>
<td>13</td>
</tr>
<tr>
<td>Yüksel et al, 2008</td>
<td>3</td>
<td>49</td>
</tr>
<tr>
<td>Total (95% CI)</td>
<td>47</td>
<td>691</td>
</tr>
</tbody>
</table>

Sachar et al. JAMA Internal Medicine 2014

What about oral PPI in UGIB?
118 patients who underwent endoscopic treatment of bleeding ulcer → randomized to: IV esomeprazole (80 mg bolus + 72 hr drip)  OR oral esomeprazole (40mg bid)

Findings: Rates of recurrent bleeding at 72h, 7 days, & 30 days were comparable between oral and IV PPI. No differences in any other major outcome (transfusions, mortality etc)

**A reasonable approach for PPI in Upper GI bleeding:**

**For patients with ongoing melena/hematemesis** who need urgent endoscopy → IV PPI 40mg BID. Continue IV if patient remains unstable and needs to be NPO after endoscopy. Otherwise, reasonable to switch to 40mg PO BID.

**For more stable patient** undergoing endoscopy ‘tomorrow’ → oral PPI 40mg PO BID
Upper GI Bleeding Management

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3) ? NG tube
4) 'Early' upper endoscopy
5) Scoring systems
6) Last ditch options: angio embolization > surgery

Upper GI Bleeding- NG tubes

“Pro” arguments:
1. Suctioning blood from the stomach may improve endoscopic visualization or reduce aspiration
2. Large amount of red blood is highly specific for large UGIB requiring early EGD

“Con” arguments:
1. Endoscopy is diagnostic/therapeutic procedure of choice, period.
2. Sensitivity/specificity of NG lavage for UGIB is inadequate to guide management (Sens 79%, Spec 55%)… +/- bile??

(specificity is low in the setting of coffee grounds or scant red blood)
Upper GI Bleeding- ‘Did you see bile?’

- Most depressing line in an NG tube article:

  Cuellar et al, Arch of Int Med Jul 1990

- Most depressing line in an NG tube article: “There was no association between the [bedside] assessment of ‘bile in the nasogastric tube’ and the actual presence of bile acids”

  Cuellar et al, Arch of Int Med Jul 1990
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Timing of upper endoscopy for upper GI bleed
(aka: should I push for GI team to scope at 2am?)
RCT of 516 patients presenting with evidence of acute upper GI bleed (how sick?: Blatchford score ≥ 12, but excluded ‘hypotensive shock’)

Mix of conditions: 60% PUD, 10% varices. etc

All patients received high dose PPI and appropriate resuscitation

Randomized to: ‘urgent’ endoscopy (within 6 hours of GI consultation)  
‘early’ endoscopy (6-24 hours of GI consultation)

Key outcomes: 30 day mortality, 30 day re-bleeding

Key finding: No benefit for mortality or rebleeding in pts who had EGD ‘urgently’ (within 6 hrs) vs. ‘early’ (6-24 hours).  
→ Stabilize + PPI first… then ‘early’ EGD
Prokinetic prior to endoscopy in UGIB

- Prior to EGD, give consider prokinetic agent to clear stomach
e.g. azithromycin 500mg X1

- Reasonable data to suggest better gastric clearance, reduced need for
  2\textsuperscript{nd} look endoscopy
- No difference in:
  - # of transfusions
  - Need for surgery
  - Length of hospital stay


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UGIB scores can predict need for endo intervention +/- mortality

- Rockall Score
- AIMS 65 Score
- Blatchford Score → ..and others

Blatchford score of 0 = No need for "intervention*"

*PRBC, endoscopic treatment, or surgery

Figure 1: Need for intervention or death by score for all four centres in phase one

Lancet 2009
Plan B... if you suspect variceal bleed*

*Consider varices if known/suspected cirrhosis based on exam, imaging, or lab findings (low platelets, low albumin, high INR)

Upper GI Bleeding

Plan B... if you suspect variceal bleed

1) Resuscitation, triage.
2) IV Octreotide (50mcg + 50mcg/hr gtt)
3) NG tube (ok to use in most cases)
4) Antibiotic treatment
5) Endoscopy for banding/injection
6) Recurrent/massive bleeding → TIPS

*Suspect varices if known/suspected cirrhosis based on exam/imaging/lab findings (low plts, low albumin, coagulopathy..)
Upper GI Bleeding

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*Suspect varices if known/suspected cirrhosis based on exam/imaging/lab findings (low plts, low albumin, coagulopathy..)

2017 AASLD Guidelines

- Patients with cirrhosis presenting with any type of GI bleed, are at high risk for SBP and other bacterial infections
- Multiple RCTs show definitive benefit for antibiotics re: reduced risk of infection, rebleeding, death
- Best option: 1g IV ceftriaxone q24hrs

Garcia-Tsao et al. Hepatology 2017
Lower GI Bleeding

Lower GI Bleeding: Evidence Deficit

- UGIB and LGIB have fairly similar incidence and similar mortality rate... but.... LGIB has no ‘gold standard’ approach and evidence base for clinical management is relatively thin.
Lower GI Bleeding

1. Differential diagnosis

2. Diagnostic/therapeutic options
   - Colonoscopy
   - CT angiography
   - Tagged RBC scan
   - Invasive/mesenteric angiography
   - Surgery

Differential Diagnosis

Common
   colonic diverticula, angioectasia

Less common
   post-polypectomy bleeding, colon cancer/polyp, hemorrhoids, Meckel’s, colitis (inflammatory, ischemic, radiation)

Rare
   Dieulafoy’s lesion, rectal varices
Lower GI Bleeding

Differential Diagnosis

Common
- colonic diverticula, angioectasia

Less common
- post-polypectomy bleeding, colon cancer/polyp, hemorrhoids, Meckel's, colitis (inflammatory, ischemic, radiation)

Rare
- Dieulafoy's lesion, rectal varices

Diverticulosis

| Sigmoid colon with multiple large tics | Diverticular bleed with inadequate prep |
Lower GI Bleeding

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Common
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Less common
  post-polypectomy bleeding, colon cancer/polyp, hemorrhoids,
  Meckel’s, colitis (inflammatory, ischemic, radiation)

Rare
  Dieulafoy's lesion, rectal varices

‘Angioectasia’
  (sometimes incorrectly referred to as ‘angiodysplasia’ or ‘AVM’)

[Images of angioectasia on the gastrointestinal tract]
72 y.o. female presents to ED with 2 episodes of hematochezia. BP 100/50. Hgb slightly below baseline, coags normal. Patient has one more episode of hematochezia on medical floor at 9pm. Colonoscopy is planned next day.

What is the likelihood that she will leave the hospital without a definitive ‘source’ identified for her likely lower GI bleed?*

1. 80%
2. 50%
3. 35%
4. 20%
5. 5%
**Lower GI bleeding Pro Tip:** 30-40% of patients admitted with LGIB will be discharged without a definitive source. This is because many LGIBs (including diverticular) stop spontaneously, before the diagnostic studies occur.

*The wise physician prepares the patient before...*

“Please understand that it is expected for lower GI bleeding that we may not find the source despite careful investigation.”

*The foolish physician has only this to say afterwards...*

“How confusing that we could not find your bleeding source!”

---

**Lower GI Bleeding**

Treat as diverticular unless strong evidence otherwise*

1) Resuscitation, triage.
2) Consider NG tube lavage *(r/o UGI source)*
3) Careful rectal exam to evaluate for obvious fissure/ hemorrhoids
4) Localization and treatment

* i.e. Post-polypectomy bleed, known large hemorrhoids, possible UGI source
Lower GI Bleeding

Treat as diverticular unless strong evidence otherwise*

1) Resuscitation, triage.
2) Consider NG tube lavage (r/o UGI source)
3) Careful rectal exam to evaluate for obvious fissure/hemorrhoids
4) Localization and treatment

* i.e. Post-polypectomy bleed, known large hemorrhoids, possible UGI source

Lower GI Bleeding - localization/treatment

~ 6 options

- Rectal exam/anoscopy diagnostic
- Tagged RBC scan diagnostic
- CT angiography diagnostic
- Angiography diagnostic/therapeutic
- Urgent colonoscopy diagnostic/therapeutic
- Surgery last ditch option
Lower GI Bleeding- localization/treatment

~ 6 options

Rectal exam/anoscopy diagnostic
Tagged RBC scan diagnostic
CT angiography diagnostic
Angiography diagnostic/therapeutic

Urgent colonoscopy diagnostic/therapeutic
Surgery last ditch option

Highest diagnostic/therapeutic yield in most cases

Technetium-99m-tagged RBC scan.
- Localization imperfect.
- Detects bleed at 0.1-0.5cc/min
- 'Immediate blush' (<2 min) predicts positive angio.
**CT angiography**
- Increasing use as best radiologic test for localization of GIB
- Detects bleeding 0.3-0.5cc/min

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**Mesenteric angiography**
- Detects bleeding >1cc/min.
- Risks include contrast load, puncture site complications etc.
**Colonoscopy**
- Can detect bleeding site at “0 cc/min”.
- Requires rapid prep and willing endoscopist
- Particularly effective for post-polypectomy bleeding, angiodysplasia
- No evidence that bowel purge ‘disrupts the clot’

**“Urgent colonoscopy purge”**

PO: PEG (golytely) 1 cup Q15 minutes
or
NG tube: 250 mL Q15 minutes

(4-6 L golytely total over 3-4 hours)

Published trials on ‘urgent colonoscopy’ recommend starting procedure within 2 hrs after stool/blood clearance and “within 8 hours of hospitalization or onset of hematochezia”

Very low quality evidence and no randomized trial comparing, modern colonoscopy approaches vs. CT angio etc for LGIB.

Meta-analysis shows no significant differences in bleeding source localization, adverse event rates, rebleeding, transfusion requirement, or mortality between approaches.

Suspected small bowel bleeding = 1 slide

- If EGD/colo negative. Must evaluate for small bowel bleeding (most common = angioectasia, most dangerous = tumor). Capsule endo is reasonable first step.
- Important to tell patients that small bowel bleeding is usually intermittent, and that capsule may be negative.
- Yield of capsule drops from >90% if done during active bleeding, to 33% if capsule several weeks after event (Pennazio et al. 2004).
- Use capsule as screening tool before deep enteroscopy (single/double balloon)
Acute GI Bleeding- 4 management pearls

1. Resuscitation requires adequate IV access (short fat peripheral IVs preferred)

2. For UGIB, re-bleeding risk is predicted by specific ulcer stigmata, and is reduced by endoscopic treatment and PPI treatment (IV or oral)

3. Evidence that ‘early’ EGD (6-24hrs) is at least as good as urgent EGD (<6 hrs)

4. Colonoscopy should be first line for LGIB in the majority of cases, otherwise CT angio for localization → interventional angio for treatment

GI bleeding bonus slides (3 key questions):

1. When is inpatient FOBT testing appropriate?

2. How long does a patient need to be on a PPI after a peptic ulcer?

3. What about patients who need to resume anticoagulation?
1) When is inpatient FOBT use appropriate?

Fecal occult blood testing in hospitalized patients

FOBT generally not useful to answer clinical questions in hospitalized patients and studies show even when checked, it rarely changes management:

- Low concern for GIB, normal CBC... but positive guaiac? → likely false positive - no need to scope
- High concern for GIB, but negative guaiac? could be false negative due to intermittent bleeding - clinical concern should drive decision to scope

Matthews et al. J. Hosp Medicine 2017 (TWDFNR series)
2) **What is the appropriate duration of PPI therapy after bleeding peptic ulcer?**

- No evidence-based answer to this question
- I typically treat for 8 weeks if there is an obvious, reversible cause (H.pylori, NSAIDs which can be avoided)
- Consider longer/lifelong treatment if there is no reversible cause, or if there is a clear need for continued NSAID use

3) **How to discuss resuming anticoagulation after GIB:**

- For majority of UGIB and LGIB patients previously on anticoagulation, anticoag should be resumed.
- Precise *timing* of resumption is individualized and has not been adequately studied.

*Online First*

**Risk of Thromboembolism, Recurrent Hemorrhage, and Death After Warfarin Therapy Interruption for Gastrointestinal Tract Bleeding**

Daniel M. Witt, PharmD, FCCP, BCCP, Thomas Delate, PhD; David A. Garcia, MD; Nathan P. Clark, PharmD; Elaine M. Hylek, MD; Walter Agno, MD; Francesca Dentali, MD; Mark A. Crowther, MD

Arch Int Med 2012
...a trend towards higher rate of GI bleeding (10% vs. 5%, p=0.09)  
...but significantly better 90 day survival (94% vs. 80%, p<0.001)

In pts resuming warfarin after GIB, there is...

“Not dying is more important than not rebleeding”