Table of Contents

Important Information Before You Begin ................................................................. 5
Rationale .................................................................................................................. 6
Goals of Management ............................................................................................. 7
Nursing Assessment and Documentation ............................................................... 7
Physician Assessment and Documentation ........................................................... 9
Initial Decision Making ......................................................................................... 10
Order Set Components ......................................................................................... 11
  Order Set Components - General Care ............................................................... 11
  Order Set Components - Patient Care Orders ..................................................... 12
  Order Set Components - Respiratory Care ......................................................... 12
  Order Set Components - Intravenous Orders ..................................................... 13
  Order Set Components - Lab Investigations ..................................................... 13
  Order Set Components - Diagnostic Investigations ......................................... 14
  Order Set Components - Medications ............................................................... 14
  Order Set Components - Procedures, Policies & Guidelines ............................ 17
Disposition Planning ........................................................................................... 18
Rural Considerations ............................................................................................ 19
Patient Experience and Expectations ................................................................. 19
Preparation for Analytics ..................................................................................... 20
References ............................................................................................................ 21
Appendix A – PICO-D Questions (Key Clinical Questions) .................................. 22
  PICO 1: In patients presenting with acute non variceal upper GI bleeding, does the administration of proton pump inhibitors (PPIs) prior to endoscopy improve patient outcomes? 22
  PICO 2: In patients presenting to the Emergency Department with acute non-variceal upper GI bleeding, what is the clinical utility of administering proton pump inhibitors (PPIs)? 24
  PICO 3: In patients presenting to the Emergency Department with acute Upper GI Bleeding warranting PPI therapy, is a continuous infusion superior to an intermittent dosing regimen? ... 25
PICO 4: In patients presenting with evidence of acute upper GI bleeding, is the GBS more sensitive and/or specific than AIM65 for identifying high and low risk patients in the emergency department? ................................................................. 26

PICO 5: In patients presenting with acute GI bleeding, what is the sensitivity and specificity of vital sign parameters (HR, BP, postural vital signs) for determining the presence of significant blood loss? .............................................................................................................................. 27

PICO 6: In patients hemodynamically unstable presenting to the ED with evidence of acute upper GI bleeding, what is the optimal fluid resuscitation regimen? ................................................................. 28

PICO 7: In patients presenting with acute Upper GI Bleeding suspected to be due to a variceal source, does the administration of somatostatin/octreotide improve patient outcomes? .................. 30

PICO 8: In patients presenting with suspected acute variceal GI bleeding, what is the role of balloon tamponade in patient resuscitation/life salvage? ................................................................................................. 31

PICO 9: In hemodynamically unstable patients presenting with acute upper GI bleeding, what is the role of endoscopy in achieving hemodynamic stability? ................................................................. 33

PICO 10: In patients presenting with acute upper GI bleeding, does a restrictive packed red blood cell transfusion strategy improve patient outcomes? ................................................................................................................................. 34

PICO 11: In patients presenting with acute upper GI bleeding, does early gastroscopy (less than or equal to 12 hours; 24 hours) improve resource utilization (admission vs discharge, need for blood transfusions, ED length of stay) and disposition decision making? ................................................................. 36

PICO 12: In patients presenting with cirrhosis and acute upper GI bleeding, does the prophylactic administration of antibiotics improve clinical outcomes? ................................................................. 37

PICO 13: In patients presenting with evidence of recent upper GI bleeding can low risk patients be safely discharged from the emergency department as long as timely Gastroenterology/endoscopy follow up is arranged? ................................................................. 39

PICO 14: In patients presenting with new onset anemia of unknown cause, what is the sensitivity and specificity of stool occult blood testing of determining the presence of clinically important GI bleeding? ................................................................................................................................. 40

PICO 15: In patients presenting with acute upper GI bleeding, does the administration of proton pump inhibitors intravenously instead of orally improve patient outcomes? ................................................................. 41

PICO 16: In patients presenting with acute GI bleeding, does the prophylactic administration of prokinetic agents prior to performing diagnostic/therapeutic endoscopy improve patient outcomes? ................................................................................................................................. 42

PICO 17: In patients presenting with suspected GI bleeding, what is the sensitivity and specificity of nasogastric tube placement for confirming an upper GI source? ................................................................. 44
Important Information Before You Begin
The recommendations contained in this knowledge topic have been provincially adjudicated and are based on best practice and available evidence. Clinicians applying these guidelines should, in consultation with the patient, use independent medical judgment in the context of individual clinical circumstances to direct care. This knowledge topic will be reviewed periodically and updated as best practice evidence and practice change.

The information in this topic strives to adhere to Institute for Safe Medication Practices (ISMP) safety standards and align with Quality and Safety initiatives and accreditation requirements. Some examples of these initiatives or groups are: Health Quality Council Alberta (HQCA), Choosing Wisely campaign, Safer Health Now campaign etc.

Within this knowledge topic PICO-D questions or key clinical questions that have been used to guide research using the Population/Problem, Intervention, Comparison, Outcome, Design format. These questions are listed in Appendix A.

Links to PICO-D questions and Appendices are throughout the document (e.g.: [PICO 1] or [Appendix A]). Click on the link with your mouse to follow the link. Under the PICO question or Appendix heading you will find a link to return you to your initial place in the document.
Rationale

Upper Gastrointestinal Bleeding (UGIB), which is defined as bleeding from the gastrointestinal (GI) tract proximal to the ligament of Treitz, is a common presenting concern among patients in the Emergency Department (ED). From 2012 – 2014 in the 15 busiest EDs, 8953 Emergency Department (ED) visits related to acute UGIB occurred in the province of Alberta with 3885 (43.4%) arriving by EMS and 5401 (60.3%) being admitted to hospital\(^1\). According to data from 2004 – 2010,\(^1\) admitted patients suffering from UGIB secondary to peptic ulcer disease (PUD) faced an inhospital mortality rate of 8.5%. The management of UGIB places a strong demand on hospital resources, with more than 70% of patients receiving upper endoscopy, and a further 4-5% receiving surgical intervention. In many rural centres these resources are unavailable, necessitating transfer to tertiary care centres which places a further strain on the emergency medical transportation system. The 30-day readmission rate for patients discharged with a diagnosis of UGIB due to PUD is estimated to be roughly 5%.\(^2\)

The severity of clinical illness in acute UGIB may range from trivial blood loss to frank hypovolemic shock. Unfortunately, determining the site of gastrointestinal bleeding (upper vs lower) and estimating the amount of blood loss can prove challenging on the basis of clinical and laboratory evaluation alone. Nonetheless, documenting key vital signs, physical examination findings, and laboratory parameters forms the cornerstone of the initial evaluation of patients with UGIB in the ED. Initial management priorities include stabilization of respiratory and hemodynamic parameters. Adjunctive medical interventions provide defined clinical benefits and should be considered in the ED while arranging definitive management. Final patient disposition will rest upon a combination of clinical and laboratory parameters, and endoscopic findings. Definitive management – be it endoscopic, angiographic, or surgical – is often a resource with limited availability. Therefore, accurate risk stratification of each individual patient is of paramount importance when formulating a management plan. Validated clinical tools exist to assist with risk stratification for UGIB, and should be considered as part of a clinical decision making strategy in the ED.

UGIB is also an example of an emergent condition where early collaborative care is critical to enhance the appropriateness of clinical decisions and optimize patient care. This includes accurate identification of bleeding source, assessment of re-bleeding risk, and timely consultation for definitive management. The development of a common, best evidence approach to the management of ED patients with gastrointestinal bleeding with consideration of the geographic and resource limitations in rural Alberta is an important goal of this knowledge development.
Goals of Management
1. Secure airway and address respiratory instability, if present.
2. Initiate intravenous (IV) fluid/blood product administration as indicated.
3. Attempt to clinically determine the etiology and location of bleeding (upper vs lower GI tract) if possible.
4. Apply risk score (e.g. Glasgow-Blatchford Score (Appendix D – Risk Stratification)) to help risk stratify.
5. Initiate targeted medical therapy as appropriate, based on suspected source (if endoscopy results not available) and ongoing risk of bleeding (e.g. Proton Pump Inhibitors [PPI] +/- infusions). (PICO 1, 2, 3)
6. Identify and correct concomitant coagulopathy as indicated.
7. For low risk patients, consult to determine timing of patient assessment and endoscopy (collaborative decision regarding ED vs outpatient assessment).
8. Initiate antibiotic prophylaxis where indicated.
9. For high risk or unstable patients direct visualization (endoscopy) will support clinical decision making.
10. Initiate direct tamponade/mechanical hemostasis if required (e.g. gastric balloon tamponade/Linton Tube).
11. Arrange and coordinate additional consultations (e.g. interventional radiology, surgical consultation) as required.
12. Identify and address common comorbid conditions (e.g. alcohol intoxication/withdrawal, spontaneous bacterial peritonitis) as required.
13. Arrange for appropriate patient disposition (inpatient vs outpatient management).

Nursing Assessment and Documentation
This section contains specific considerations related to this topic. Standard assessment and documentation practices should still be followed.

1. Triage Assessment
   - Vital Signs, including a glucose (as indicated)
   - Canadian Emergency Department Information Systems (CEDIS) complaint: Vomiting blood, Blood in stool/melena, Syncope/Presyncope, Pallor
   - Canadian Triage and Acuity Scale (CTAS) modifiers:
     - Hemodynamic stability and level of consciousness are the first order modifiers most likely to be drivers of patient acuity
     - Active or significant hematemesis OR large volume melena or rectal bleeding are CTAS level 2 special modifiers for the first two CEDIS complaints listed above.
2. Initial Assessment/Documentation
   - Presenting History:
     - Amount, frequency and quality of bleeding (hematemesis, hematochezia, bright vs dark red vs melena)
     - Syncope/presyncope
• Abdominal pain suggestive of surgical etiology (e.g. mesenteric ischemia, perforated peptic ulcer)

• Past History:
  o Prior history of GI bleeding
  o Prior history of liver disease
  o Prior history of cardiac disease
  o Prior history of malignancy
  o Alcohol use

• Medications and Allergies:
  o Complete review of medications with focus on:
    ▪ NSAIDs, anticoagulants (if on direct oral anticoagulants [DOACs] please see Appendix E – Reversal of Direct Oral Anticoagulants), antiplatelets, corticosteroids

• Systems review:
  o Respiratory: respiratory rate; signs of respiratory distress
  o Cardiovascular: heart rate; blood pressure; postural vital signs (unless syncopal or presyncopal in sitting up), chest pain suggestive of secondary cardiac ischemia
  o Neurological: level of consciousness (Alert, Voice, Pain, Unresponsive [AVPU] or Glasgow Coma Scale [GCS])
  o Gastrointestinal: abdominal pain; tenderness; signs of peritonitis

Other: overt evidence of ongoing bleeding (melena, hematochezia or hematemesis while in ED), pallor

3. Ongoing Assessment/Documentation

• Systems review:
  o Respiratory: respiratory rate; signs of respiratory distress
  o Cardiovascular: heart rate; blood pressure; postural vital signs (unless syncopal or presyncopal in sitting up)
  o Neurological: level of consciousness (AVPU or GCS)
  o Gastrointestinal: abdominal pain; tenderness; signs of peritonitis
  o Other: overt evidence of ongoing bleeding (melena, hematochezia or hematemesis while in ED), pallor
Physician Assessment and Documentation
This section contains specific considerations related to this topic. Standard assessment and documentation practices should still be followed.

1. History of Present Illness
   - Amount, frequency and quality of bleeding (hematemesis, hematochezia, bright vs dark red vs melena)
   - Abdominal pain suggestive of surgical etiology (e.g. mesenteric ischemia, perforated peptic ulcer)
   - Syncope

2. Past History
   - Prior GI bleeding (including etiology and sites of bleeding, if known)
   - Liver disease +/- known portal hypertension
   - Cardiac disease (important for clinical risk stratification)
   - Helicobacter pylori infection
   - Medical complexity
   - Anticoagulation
   - History of previous abdominal aortic aneurysm repair (aortoenteric fistula risk)
   - Alcohol use history

3. Medications & Allergies
   - Complete review of medications with focus on:
     - NSAIDs, anticoagulants (if on direct oral anticoagulants [DOACs] please see Appendix E – Reversal of Direct Oral Anticoagulants), antiplatelets, corticosteroids

4. Review of Systems
   - Symptoms to suggest active bleeding (recent melena, hematochezia, hematemesis)
   - Symptoms suggestive of liver dysfunction (jaundice, bruising, peripheral edema)
   - End organ compromise (decreased level of consciousness, urine output, chest pain consistent with myocardial ischemia)

5. Physical Examination
   - Findings suggestive of end organ hypoperfusion (e.g. altered mental status, tachypnea, tachycardia, hypotension, postural vital sign changes, pallor, diaphoresis)
   - Evidence of active ongoing GI bleeding, hemodynamic instability (e.g. hematemesis, melena, hematochezia)
   - Findings to suggest surgical cause of bleeding (e.g. peritonitis, distension, lack of bowel sounds, pulsatile abdominal mass)
   - Stigmata of chronic liver disease
   - Complications related to GI bleeding (e.g. findings of hepatic encephalopathy, aspiration pneumonitis/pneumonia)
   - Findings of alcohol intoxication/withdrawal

6. Scoring Tools / Risk Scores
   - Document clinical components of GBS +/- AIM65 scores (PICO 4) (Appendix D – Risk Stratification)
Initial Decision Making

1. Is the patient **unstable** with their suspected upper GI bleed (hemodynamic compromise, +/- altered level of consciousness)? *(PICO 5)*
   - If yes
     - Begin fluid resuscitation, crossmatch with the expectation of transfusion, *(PICO 6)*, consider need for initiation of Massive Transfusion Protocol**, and determine the need for safe intubation based on level of consciousness and ability to protect airway, plus
       - If suspected peptic ulcer bleed, initiate proton pump inhibitor (PPI) *(PICO 1, 2, 3)*
       - If suspected esophageal varices bleed, initiate octreotide *(PICO 7)* and consider need for a gastric balloon tamponade (Linton Tube) *(PICO 8)*
       - Consult Gastroenterology emergently to support definitive care +/- Intensive Care Unit (ICU), +/- Interventional Radiology, +/- Anesthesia *(PICO 9)*

   *(** Provincial Massive Transfusion Protocol currently in development; until this is available, refer to local Massive Transfusion guidelines when available)*

2. Is the patient **hemodynamically stable** with their suspected upper GI bleed?
   - If yes
     - Consideration 1: If you suspect they are still actively bleeding
       - Initiate IV fluids targeted to maintain end-organ perfusion
       - Type and screen OR crossmatch based on anticipated need for transfusion *(PICO 10)*
       - Clinically risk stratify the patient as high or low risk *(PICO 4)* *(Appendix D – Risk Stratification)*
       - Following initial investigations consult Gastroenterology regarding endoscopy, ongoing management and disposition *(PICO 11)*
       - Determine indications for antibiotics prior to endoscopy *(PICO 12)*
     - Consideration 2: If you believe that the patient is no longer actively bleeding
       - Initiate investigations
       - Clinically risk stratify the patient *(PICO 4)* *(Appendix D – Risk Stratification)*
       - Based on an established and safe protocol arrange for in hospital or outpatient evaluation by gastroenterology for endoscopy *(PICO 13)*
         - See below, **Indications for Endoscopy** and **Disposition Planning**
         - General Speaking,
           - GBS = 0: no endoscopy needed
Provincial Clinical Knowledge Topic
Upper Gastrointestinal Bleed, Adult
Emergency Department

- GBS 1 – 3: low risk for complications, consider inpatient vs outpatient endoscopy based on factors outlined in sections below
- GBS 4+: higher risk for complications, generally need more urgent endoscopy (emergency department vs inpatient)

3. Indications for endoscopy
   - Emergent
     - Hemodynamic instability (recurrent/persistent despite volume resuscitation, coagulopathy reversal, and medical therapy)
     - Evidence of ongoing massive bleeding
   - Urgent (PICO 11)
     - Transiently abnormal vital signs, normalized with resuscitation/medical therapy
     - Evidence of ongoing non-massive bleeding
     - Suspected variceal bleeding based on history/risk factors
     - Active concomitant medical conditions likely to influence clinical outcomes and/or require inpatient care
     - Glasgow Blatchford Score 4 or greater (Appendix D – Risk Stratification)
   - Non-Urgent (potential outpatient - consider consultation with attending Gastroenterologist regarding timing of follow-up +/- need for early endoscopy) (PICO 13)
     - Normal vital signs
     - No evidence of active bleeding
     - No active concomitant medical conditions likely to require admission and/or impact outcome of acute GI bleeding
     - Glasgow Blatchford Score 3 or less (Appendix D – Risk Stratification)
     - Unexplained acute microscopic anemia with no identifiable cause (in a stable patient) (PICO 14)

Order Set Components
Orders or their components have been added in bold text if recommended as default (e.g. Bedrest). All other orders and components would be selected based on the presentation needs of the patient. Orders that have more than one option for treatment have been entered in square brackets (e.g. Warfarin 5 [2, 2.5, 3, 4, 6, 7.5, 10] mg PO x 1).

Order Set Components - General Care
- Goals of Care Designation:
  - Important for this group of patients as many are elderly and other may have terminal diseases such as cirrhosis or GI malignancy. Use of the appropriate Goal of Care designations will help ensure investigations and management are consistent with the patients’ preferences.
• Precautions and Safety:
  - Personal Protective Equipment: standard barrier precautions, with consideration for facemask / goggles vs face shield if patient actively vomiting blood
  - Security Precautions: Consider possibility of alcohol intoxication and/or withdrawal with concomitant confusion and/or violent behavior

• Activity:
  - Bedrest
  - Bedrest - With Bathroom Privileges
  - Activity as Tolerated

• Diet / Nutrition:
  - NPO
  - NPO – May Have Sips, May Take Meds
  - NPO – May Have Ice Chips
  - Clear Fluids
  - Regular
  - Other

Order Set Components - Patient Care Orders

• Vital Signs: These orders need to be re-evaluated when the patient stabilizes or by two hours, whichever occurs first. Vital signs to include: Respiration (RR), Pulse (P), Blood Pressure (BP), Temperature (T), and Oxygen Saturation Monitoring (O2 Sats) with options to include:
  - as per local standards
  - manual or automatic
  - q___hrly
  - q___min

• Neurological Vital Signs: These orders need to be re-evaluated when the patient stabilizes or by two hours, whichever occurs first. Neurological Vital Signs to include Glasgow Coma Scale (GCS), and pupillary size and reaction to light with reassessments:
  - as per local standards
  - q___hrly
  - q___min
  - Note: The physician should be notified if a patient’s GCS decreases by 2 points.

Order Set Components - Respiratory Care

• O2 Therapy - Titrate to Saturation, Maintain: SpO2 Level % Greater Than or Equal to:______%
• O2 Therapy: at _____ LPM (litres per minute) by ______(specify device) to maintain SpO2 greater than or equal to ______%
Oxygen Saturation options reserved for patients with specific concerns such as Chronic Obstructive Pulmonary Disease (COPD). If Oxygen Saturation is already adequate, no supplemental oxygen is required.

Notify: The physician should be notified if Oxygen flow required to be increased by greater than 2 LPM to maintain the same level of oxygenation or if there is a progressive increase in the work of breathing.

Order Set Components - Intravenous Orders

- Intravenous Cannula – Insert
- Saline Lock
- IV Bolus:
  - **0.9% NaCl infusion – Bolus**, Volume: _______mL, Over:______ minutes
  - lactated ringers infusion – Bolus, Volume: _____mL, Over:_____minutes
- IV Maintenance:
  - **0.9% NaCl infusion**, IV Rate:______mL/hour
  - lactated ringers infusion, IV Rate:_____mL/hour

Order Set Components - Lab Investigations

Laboratory orders appear in **bold** text if recommended as usual default orders. Laboratory orders are **underlined** when needed to assess severity or establish a baseline. All other lab orders (e.g. investigations for possible comorbidities) are to be selected based on the presentation needs of the patient and are in regular font.

- Hematology
  - **Complete Blood Count (CBC)**
  - **PT INR**
- Transfusion Medicine
  - **Type and Screen**
  - Crossmatch ___ Unit(s) on standby / to infuse
- Chemistry
  - **Electrolytes (Na, K, Cl, CO2)**
  - **Glucose Random LEVEL**
  - **Creatinine LEVEL**
  - **Urea**
  - **ALT**
  - **AST**
  - **GGT**
  - **Alkaline Phosphatase (ALP)**
  - **Bilirubin Total**
  - **Ammonia LEVEL**
  - **Lipase**
- Albumin LEVEL
- Blood Gases
  - Blood Gas Venous
  - Blood Gas Arterial
- Urine Tests
  - Urinalysis
  - Pregnancy Test
    - Urine Pregnancy Beta HCG
    - Pregnancy – Point of Care Test

Comments regarding laboratory ordering and utilization for this patient group:
- The anion gap (AG) can be calculated as: Na+ - (Cl- + HCO3-) with a normal range of generally 4-12 mmol/L

Order Set Components - Diagnostic Investigations
- Standard x-rays
  - GR Chest, 2 Projections (Chest X-ray PA and Lateral)
  - GR Chest, 1 Projection portable (Chest X-ray Portable)
- Advanced Imaging
  - SP Embolization (thoracic / abdominal)
    - Source identification in brisk/hemodynamically significant UGIB (potentially therapeutic as well)
  - SP TIPS insertion
    - Hemostasis in variceal bleed unresponsive to endoscopic therapy
- Other
  - Electrocardiogram – 12 Lead

Order Set Components - Medications
Proton Pump Inhibitors *(PICO 1, 2, 3), (PICO 15)*
- pantoprazole:
  - Oral loading dose: 80 mg PO x 1
  - OR
  - IV loading dose: 80 mg IV x 1
  
AND/OR
  - IV intermittent dosing: 80 mg [40 mg] IV q12h
  - OR
  - IV infusion: 8 mg / hour IV (Pre-endoscopic IV PPI infusions should likely be restricted to patients at greater risk of requiring endoscopic
intervention, especially if endoscopy will be delayed; consider consultation with the attending gastroenterologist prior to initiation.)

Octreotide (PICO 7) (recommend to initiate octreotide as soon as variceal bleeding suspected)
- octreotide
  - Loading dose: 50 micrograms IV x 1
  - AND/OR
  - IV infusion: 50 micrograms / hour IV

Analgesia
Based on the Numeric Rating Scale for Pain (where 0 is no pain and 10 is worst possible pain) consider the following medications for pain control:

Morphine
- To achieve a pain score of LESS than 4/10 in accord with patient request give:
  - Morphine 2.5 to 5 mg IV every 10 minutes IV (contact physician or nurse practitioner if pain not controlled after administration of 15 mg total)
  - OR
  - Morphine 2.5 to 5 mg SUBCUTANEOUSLY every 1 hour x 1-2 times (contact physician or nurse practitioner if pain not controlled after administration of 2 doses)

- And then to maintain a pain score of LESS than 4/10 in accord with patient request give:
  - Morphine 2.5 to 5 mg IV every 30 minutes PRN
  - OR
  - Morphine 2.5 to 5 mg SUBCUTANEOUSLY every 2 hours PRN

OR
HYDROMorphone
- To achieve a pain score of LESS than 4/10 in accord with patient request give:
  - HYDROMorphone 0.5 to 1 mg IV every 10 minutes IV (contact physician or nurse practitioner if pain not controlled after administration of 3 mg total)
  - OR
  - HYDROMorphone 0.5 to 1 mg SUBCUTANEOUSLY every 1 hour x 1-2 times (contact physician or nurse practitioner if pain not controlled after administration of 2 doses)
And then to maintain a pain score of LESS than 4/10 in accord with patient request give:
  o HYDROMorphone 0.5 to 1 mg IV every 30 minutes IV PRN
  OR
  o HYDROMorphone 0.5 to 1 mg SUBCUTANEOUSLY every 2 hours PRN

**Fentanyl**

- Fentanyl 25 to 50 micrograms IV every 5 minutes IV PRN to achieve a pain score of LESS than 4/10 in accord with patient request (contact physician or nurse practitioner if pain not controlled after administration of 200 micrograms total)

- RN notes for all opiates: monitor BP / RR; hold if systolic blood pressure (SBP) less than 90mmHg or RR less than 10 / minute

- NSAIDs to be excluded

**Antiemetics**

- ondansetron/ ondansetron DISINTEGRATING tab
  o 4 mg IV / PO x 1 dose
  +/-
  o 4 mg IV / PO to be repeated 30 minutes after first dose PRN
  AND/OR
  o 4 to 8 mg IV / PO every 8 hours PRN

  OR

- metoclopramide
  o 10 mg IV x 1 dose
  AND/OR
  o 10 mg IV every 8 hours PRN

  OR

- dimenHYDRINATE
  o 25 to 50 mg IV / PO x 1 dose
  AND/OR
  o 25 to 50 mg IV / PO every 4 hours [every 6 hours] PRN
  o (age related warnings for dimenHYDRINATE apply)

**Vasoactive agents**

- norepinephrine infusion
  o 0.05 to 1 micrograms / kg / minute IV
Provincial Clinical Knowledge Topic
Upper Gastrointestinal Bleed, Adult
Emergency Department

1. Titrate to SBP / MAP of ___________

- doPAMine infusion
  - 5 to 15 micrograms / kg / minute IV
  - Titrate to SBP / MAP of ___________

Blood Products (PICO 5, 6), (PICO 10)
- Information and monographs about the following blood components and products can be found here: http://www.albertahealthservices.ca/3319.asp
  - Red blood cells
    - For stable patients with UGIB, suggest targeting a hemoglobin threshold of 70 g/L when initiating PRBC transfusion (PICO 10)
  - Fresh frozen plasma
  - Platelets
  - Cryoprecipitate
  - Prothrombin complex
  - Factor VIIa (Niastase)
  - Factor VIII inhibitor bypass activity (FEIBA)

Antibiotic prophylaxis (PICO 12) (suggest that for patients with variceal bleeding, antibiotics decrease mortality, rebleeding and sepsis incidence)
- cefTRIAXone
  - 1 g IV every 24 hours
  - OR
  - ciprofloxacin
    - 400 mg IV every 12 hours
    - OR
    - 500 mg PO every 12 hours

Other Medications
- erythromycin (prokinetic) (PICO 16)
  - 3 mg/kg IV infused over 30 minutes
  - To be given 30 – 60 minutes pre-endoscopy; should be coordinated with gastroscopist to ensure appropriate timing
- COLYTE powder (polyethylene glycol-electrolyte solution) for oral solution 4,000 mL prep
  - If emergent/urgent colonoscopy being considered
- lactulose 15 to 30 mL PO TID PRN
  - If hepatic encephalopathy complicating acute UGIB
  - Titrate to 1 to 2 soft bowel movements per day

Order Set Components - Procedures, Policies & Guidelines
1. Physician
Provincial Clinical Knowledge Topic
Upper Gastrointestinal Bleed, Adult
Emergency Department

- Intubation under rapid sequence induction (RSI)
  - Induction agents: propofol, midazolam, fentanyl, ketamine,
  - Paralytic agents: succinylcholine, rocuronium
  - Caution is warranted in hypovolemic patients; chosen induction agent should be as hemodynamically neutral as possible; consider having preloaded vasopressor agents available
- Gastric balloon tamponade: (Linton Tube)/other balloon tamponade device insertion (PICO 8)
  - To be performed only after successful placement of endotracheal tube (above)
  - GR Chest, 1 Projection portable (portable chest x-ray) to be ordered to confirm placement prior to balloon insertion
- Procedural sedation, provincial policy and procedure can be found at http://insite.albertahealthservices.ca/9227.asp. Procedural sedation education materials can be found here: http://insite.albertahealthservices.ca/10621.asp

2. Nursing
- Intake and Output: Measure and record Output (+/- Input), Frequency: every ____ hour(s)
- Oro / Nasogastric Drainage Tube insertion: Connect To Straight drainage, Low suction – intermittent, Low suction – continuous (PICO 17)
- Foley Catheter - Insert; In and Out Catheter Insert

Disposition Planning
1. Considerations for admission
   - Hemodynamic compromise
   - Ongoing GI bleeding despite appropriate therapy
   - Lesions found on endoscopy at high risk for ongoing /recurrent bleeding
   - Suspected /confirmed surgical etiology for bleeding
   - Active comorbid conditions or complications requiring admission or hospital
2. Considerations for discharge
   - Hemodynamically stable
   - No evidence of ongoing blood loss
   - Low-risk lesions found on endoscopy
   - No active comorbidities or complications requiring hospital admission
   - Low risk, hemodynamically stable patient with planned outpatient GI follow up; for those requiring endoscopy that should be within 24-72 hours
3. Patient education / discharge instructions (Appendix C)
   - Appendix C is a copy of the Healthwise® patient education being trialed by Health Link and being considered for access to Alberta EDs for our patients.

Completion Date: September 2015
Version 1.0
Rural Considerations
1. Timely access to definitive diagnostic endoscopy on an urgent basis particularly off-hours.
2. Safe patient transfer for emergent GI consultation/management +/- ICU admission
3. Availability and comfort level with inserting gastric balloon tamponade (Linton Tube)
4. Availability of blood products

Patient Experience and Expectations
Based on a meeting with 8 patient advisors in Calgary January 25, 2015, we received the following feedback and general recommendations regarding approaches to communication, care and patient expectations in the emergency department (ED):

1. They hoped we would be able to improve care consistency among ED providers.
   
   Patient quote: “Every time I presented to the emergency department with the same condition (atrial fibrillation), each doctor provided a different treatment approach.”

2. They were supporters of care pathways, checklists, protocols, etc. wherever appropriate.

   Patient quote: “I am a strong supporter of care pathways as whenever I/my family member receive treatment using a pathway the care seems clearer and more consistent”

3. While none of the patients liked long waits, they could accept them better if there was clearer communication and reassessments as required.

   Patient quote: “Nobody likes to wait and I understand that sicker patients take priority, however, there needs to be improved communication and reassessments for those patients who are waiting”

4. They pointed out the importance of having a patient advocate accompany a sick person, but also allowing the advocate to be with the patient at decision critical points (e.g. initial assessment, treatment decision making, receiving bad news, etc.) was considered paramount.

   Patient quote: “When I accompany my family member to the ED I am often not permitted to join them when they are moved into a treatment space. I am often told this is ‘policy’.”

5. They believe that improving follow up, especially for patients being discharged from the ED and being referred to a specialist is important. This was recognized as a key safety risk for patients; having to rely on faxed referrals and a call back from the consultant’s office can lead to dangerous delays or failed connections to the detriment of the patient’s health and well-being.

   Patient quote: “The current health care system is poorly coordinated with lots of gaps and delays, especially with referrals from one physician to another.”
Preparation for Analytics

1. Key Outcomes
   - Clinical
     - Timely & therapeutically effective endoscopic intervention for patients with active UGIB
     - Appropriate use of blood transfusions
     - Unstable patients managed collaboratively with airway protection, adequate resuscitation, safe sedation and aggressive endoscopic therapy
   - Process
     - Stable low risk patients successfully discharged from the ED with consistent timely GI outpatient follow up
     - Stable high risk acute or actively bleeding patients able to be endoscoped and recovered outside of the emergency department
   - Patient Experience
     - Clear explanation of their condition and all procedures.
     - Ready access to endoscopy according to need

2. Data Elements for Capture
   - Patient demographics
   - CEDIS presenting complaint and CTAS score
   - ED time markers (triage to physician, physician to consult and then to admission or physician to discharge) and outcome markers (identified as clinical decision unit patient (CDU), consulted for admission, admitted to ICU or ward, died)
   - ED diagnoses for GI bleed using ISD-10
   - Site and Zone identifiers
   - Date and time of use of GI Bleed order set
   - Glasgow-Blatchford scores
   - Time to endoscopy

3. Proposed Reports
   - Admission rates for GI bleeding
   - ED length of stay (median, mean and 90th percentile) for GI Bleed patients
   - Time (median, mean and 90th percentile) to endoscopy from ED presentation, ED consultation and hospital admission
   - Endoscopy rate of less than or equal to 12 hours for high risk/hemodynamically unstable patients
   - Endoscopy rate less than or equal to 24 hours for low risk patients
   - Breakdown of UGI Bleed patients by non variceal vs variceal vs other
   - ED blood transfusion frequency by ‘lowest ED hemoglobin’ (less than 70, 70-79, 80-89, greater than or equal to 90)
References

1. Data provided by Data Integration and Management Resources (DIMR) March 2015.
Appendix A – PICO-D Questions (Key Clinical Questions)

For information regarding PICO-D Methodology and GRADE Terminology please see Appendix B.

**PICO 1:** *In patients presenting with acute non variceal upper GI bleeding, does the administration of proton pump inhibitors (PPIs) prior to endoscopy improve patient outcomes?*

**Population, Patient or Problem:** Adult patients presenting to the ED with acute Upper GI Bleeds

**Intervention, Prognostic Factor, Exposure:** PPIs prior to endoscopy

**Comparison:** PPIs post endoscopy based on visual findings

**Outcome:** Hemodynamic stabilization, mortality, morbidity, rebleeding

**Design:** RCTs/meta-analysis for RCTs

**Search Strategy:** Cochrane library, Medline, and PubMed for systematic reviews and clinical trials. Guidelines were checked.

**Clinical Recommendation:** We suggest that pre-endoscopic proton pump inhibitor (PPI) administration should not be a routine treatment in all patients with non-variceal UGIB as it has not been shown to improve patient outcomes (i.e. - mortality, rebleeding and surgery) in this population. However, pre-endoscopic PPI administration does reduce the need for endoscopic therapy and may therefore be useful in patients judged to be at higher risk of requiring this intervention. This may especially be true in those patients with higher Glasgow-Blatchford scores, active clinically significant bleeding, and/or in whom endoscopy may be delayed or withheld due to local resource availability and/or individual patient factors. Ideally, the decision of whether to treat prior to endoscopy should be made in concert with the local / regional gastroenterology consultant.

The most recent Cochrane Database meta-analysis of pre-endoscopic PPI therapy\(^1\) included 6 randomized, controlled trials, all of which were performed on inpatients admitted with upper GI bleeding. Pre-endoscopic PPI use did not reduce mortality (OR 1.12; 95% CI 0.72 to 1.73), rebleeding (OR 0.81; 95%CI 0.61 to 1.09), or the need for surgery (OR 0.96 95% CI 0.68 to 1.35). However, the proportion of patients with high-risk stigmata of recent hemorrhage observed at...
endoscopy was reduced (OR 0.67; 95% CI 0.54 to 0.84). This was associated with a lower risk of needing endoscopic therapy (OR 0.68; 95% CI 0.50 to 0.93). Given the percentage of low-risk patients included in these studies (more than half of enrolled patients lacked high-risk stigmata of recent hemorrhage) it is unclear whether the lack of clinically important outcomes shown by this meta-analysis would be generalizable to a higher-risk population.

Recent guidelines from the American College of Gastroenterology and the International consensus on the management of NVUGIB suggest that PPIs may be considered prior to endoscopy to decrease the proportion of patients with high-risk stigmata of recent hemorrhage, thus reducing the need for endoscopic therapy. However, they also point out that PPIs prior to endoscopy do not appear to improve clinical outcomes (mortality, rebleeding, or the need for surgery). The SIGN 2008 and NICE 2012 guidelines do not recommend the use of PPIs prior to endoscopy in patients with upper GI bleeding, based on the results of the Cochrane meta-analysis.

Quality of Evidence: Moderate, GRADE B. We are moderately confident in the effect estimate. The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.

Strength of Recommendation: Weak, GRADE 2.

References:
PICO 2: In patients presenting to the Emergency Department with acute non-variceal upper GI bleeding, what is the clinical utility of administering proton pump inhibitors (PPIs)?

Population, Patient or Problem: Adult patients presenting with acute upper GI bleeding

Intervention, Prognostic Factor, Exposure: Proton pump inhibitors

Comparison: Placebo

Outcome: Mortality, rebleeding, surgical intervention, blood transfusions

Design: RCTs and meta-analyses of RCTs

Search Strategy: Cochrane library, Medline, and PubMed for systematic reviews and clinical trials. Guidelines were checked.

Clinical Recommendation: We recommend PPIs be administered after endoscopy confirms peptic ulcer disease to be the source of the bleeding. PPIs do not reduce mortality but are associated with a decreased risk of rebleeding and the need for surgery.

A meta-analysis of 12 trials demonstrated no mortality benefit associated with PPI administration in confirmed ulcer-related upper GI bleeding. However, rebleeding rates (0.46, 0.33 - 0.64; NNT 12) and the need for surgical intervention (0.59, 0.46 to 0.76; NNT 20) were both significantly reduced. Various guidelines (Laine and Barkun) recommend the use of proton pump inhibitors in upper GI bleeding secondary to peptic ulcer disease.

Quality of Evidence: High, GRADE A. We are very confident that the true effect lies close to that of the estimate of the effect. A systematic review including 12 RCTs was available.

Strength of Recommendation: Strong, GRADE 1.

References:
PICO 3: In patients presenting to the Emergency Department with acute Upper GI Bleeding warranting PPI therapy, is a continuous infusion superior to an intermittent dosing regimen?

Population, Patient or Problem: Adult patients presenting with acute upper GI bleeding
Intervention, Prognostic Factor, Exposure: IV bolus dosing followed by continuous intravenous infusion
Comparison: Intermittent dosing (oral or IV)
Outcome: Mortality, rebleeding, surgical intervention, blood transfusions
Design: RCTs and meta-analyses of RCTs

Search Strategy: Cochrane library, Medline, and PubMed for systematic reviews and clinical trials. Guidelines were checked.

Clinical Recommendation: We suggest that when PPIs are administered to patients with upper GI bleeding due to confirmed peptic ulcer disease, an intermittent dosing regimen be used. Bolus dosing followed by continuous IV infusion is not superior to intermittent dosing and is associated with higher costs.

Current guidelines\(^1\)\(^2\) recommend the use of IV bolus dosing followed by continuous IV infusion when administering PPIs in the setting of acute upper GI bleeding associated with peptic ulcer disease. However, a more recent meta-analysis which included 13 RCTs demonstrated that an intermittent dosing regimen was non-inferior to an IV bolus dose followed by continuous IV infusion.\(^3\) This finding was consistent across trials using both IV and PO intermittent dosing regimens. All trials included in the meta-analysis enrolled UGIB with confirmed PUD and moderate to high risk stigmata of recent hemorrhage (i.e. – patients with low-risk stigmata were excluded).

Quality of Evidence: High, GRADE A. We are very confident that the true effect lies close to that of the estimate of the effect. A systematic review including 13 RCTs was available.

Strength of Recommendation: Weak, GRADE 2.

References:


**PICO 4:** In patients presenting with evidence of acute upper GI bleeding, is the GBS more sensitive and/or specific than AIM65 for identifying high and low risk patients in the emergency department?

**Population, Patient or Problem:** Adults presenting to the ED with acute upper GI bleed  
**Intervention, Prognostic Factor, Exposure:** GBS  
**Comparison:** AIM65  
**Outcome:** Sensitivity, specificity, and accuracy of identifying low, moderate and high risk upper GI bleed patients, emergent, urgent, and non-urgent endoscopy rates and findings, morbidity and mortality  
**Design:** Cohort studies/meta-analysis  

**Search Strategy:** Cochrane library, Medline, and PubMed for systematic reviews and clinical trials. Guidelines were checked.

**Clinical Recommendation:** We suggest that the GBS score appears to have higher sensitivity and specificity for identifying high and low risk patients. There is conflicting data as to whether AIMS65 score is superior in predicting inpatient mortality; however, GBS appears to be superior in predicting the need for blood transfusions and high-risk clinical outcomes.

No recommendations in guidelines could be identified. One retrospective cohort was identified comparing AIMS65 score to GBS in adults with upper GI bleed. The AIMS65 and GBS scores were similar in terms of accuracy of predicting re-bleeding, ICU admission, hospital length of stay and time to endoscopy. The AIMS65 score was better able to predict inpatient mortality over GBS, while the GBS was superior in predicting the need for and number of blood transfusions. A recent prospective observational study compared the GBS vs. AIMS65 score in patients with upper GI bleeding in the ED. Overall, the study found that the GBS score had superior specificity and sensitivity to identify high risk patients compared to the AIMS65 score (defined as a composite...
outcome of blood transfusion, surgical / endoscopic intervention, ICU admission, or in-hospital death).

**Quality of Evidence:** Low, GRADE C. Our confidence in the effect estimate is limited: The true effect may be substantially different from the estimate of the effect. Only 2 non-randomized studies available.

**Strength of Recommendation:** Weak, GRADE 2

**References:**

**PICO 5:** *In patients presenting with acute GI bleeding, what is the sensitivity and specificity of vital sign parameters (HR, BP, postural vital signs) for determining the presence of significant blood loss?*

**Population, Patient or Problem:** Adult patients presenting to the ED with acute UGIB

**Intervention, Prognostic Factor, Exposure:** Objective markers for hemodynamic instability

**Comparison:** Clinical impression

**Outcome:** Sensitivity, specificity, prediction of poor outcomes & need for intervention

**Design:** Logistic regression/cohort studies

**Search Strategy:** Cochrane library, Medline, and PubMed for systematic reviews and clinical trials. Guidelines were checked.

**Clinical Recommendation:** We suggest that vital signs may be used to prognosticate adverse events in patients presenting to the ED with upper GI bleeding. A pulse rate of greater than or equal to 100/min was found to be indicative of the need for urgent evaluation for upper GI bleed. In addition, the Blatchford score - which is a validated score used to assess the risk of poor outcomes in patients with upper GI bleeding in the ED - includes pulse rate and systolic blood pressure.
One non-systematic review of the literature identified pulse rate of greater than 100/min as indicative for the need for urgent evaluation of an upper GI bleed.¹ One cohort study developed the Blatchford score to identify patients with upper GI bleed who are at risk for adverse outcomes.² The score includes several factors including blood urea levels, haemoglobin levels for men and women, systolic blood pressure, pulse (greater than or equal to 100 per min), presentation with melena or syncope, hepatic disease, and cardiac failure. The lower the patients systolic blood pressure (100-109 mm Hg, 90-99 mm Hg, or less than 90 mm Hg) the higher the score the patient received. The Blatchford score has been validated to assess the risk of poor outcomes in patients in the ED with upper GI bleeding.³,⁴,⁵,⁶

**Quality of Evidence:** Low, GRADE C. Our confidence in the effect estimate is limited: The true effect may be substantially different from the estimate of the effect. Only non-randomized studies were available.

**Strength of Recommendation:** Weak GRADE 2

**References:**

**PICO 6:** *In patients hemodynamically unstable presenting to the ED with evidence of acute upper GI bleeding, what is the optimal fluid resuscitation regimen?*
Population, Patient or Problem: Hemodynamically unstable adults presenting to the ED with acute Upper GI Bleeds

Intervention, Prognostic Factor, Exposure: Crystalloids

Comparison: Crystalloids plus blood products

Outcome: Hemodynamic stabilization, mortality, morbidity

Design: Randomized Controlled Trials (RCTs)/meta-analysis for RCTs

Search Strategy: Cochrane library, Medline, and PubMed for systematic reviews and clinical trials. Guidelines were checked.

Clinical Recommendation: There is insufficient evidence and lack of consensus to make a recommendation regarding the optimal fluid resuscitation regimen. There are guidelines that make recommendations towards replenishing fluids in patients presenting with upper GI bleed but no evidence is provided.

The SIGN guidelines¹ state that no quality studies have been completed comparing crystalloid and colloid fluid restoration in patients with GI bleeding. One review was found which recommended that patients with active bleeding should receive at least 500 ml of saline, or another crystalloid solution during the first 30 minutes after presentation to maintain blood pressure, while several units of packed erythrocytes are typed and crossed. Fluid infusion should be increased if blood pressure falls or does not increase.¹ The ACG 2012 practice guidelines recommend that one of the initial steps for treating patients presenting with upper GI bleeds includes hemodynamic assessment and fluid resuscitation, including IV fluids and transfusion of blood cells.

Quality of Evidence: Very Low, GRADE D. We have very little confidence in the effect estimate: The true effect is likely to be substantially different from the estimate of effect

Strength of Recommendation: Insufficient evidence

References:
PICO 7: In patients presenting with acute Upper GI Bleeding suspected to be due to a variceal source, does the administration of somatostatin/octreotide improve patient outcomes?

Population, Patient or Problem: Adult patients presenting to the ED with acute Upper GI Bleeds suspected due to variceal bleeding

Intervention, Prognostic Factor, Exposure: Octreotide plus fluid resuscitation pre endoscopy

Comparison: Fluid resuscitation only pre endoscopy

Outcome: Hemodynamic stabilization, mortality, morbidity, bleeding control

Design: RCTs/meta-analysis for RCTs

Search Strategy: Cochrane library, Medline, and PubMed for systematic reviews and clinical trials. Guidelines were checked.

Clinical Recommendation: We recommend that somatostatin or its analogues (octreotide and vapreotide, and terlipressin) should be initiated as soon as variceal hemorrhage is suspected and continued for 3–5 days after diagnosis is confirmed.

A 2002 meta-analysis\(^1\) comparing endoscopic therapy alone to endoscopic therapy plus pharmacological treatment with the various vasoactive agents demonstrated improved hemostasis with combined therapy (NNT for initial hemostasis and 5-day hemostasis of 8 and 5, respectively). However, mortality was unaffected by the addition of vasoactive agents to endoscopic therapy (RR, 0.73; 95% CI, 0.45-1.18). A Cochrane Database meta-analysis\(^2\) in 2010 suggested that endoscopic sclerotherapy alone was not superior to treatment with vasoactive medications alone, and sclerotherapy was associated with a higher risk of serious adverse events. The American College of Gastronenterology Guidelines\(^3\) on the management of variceal hemorrhage from 2007 recommend that vasoactive pharmacotherapy be used in conjunctions with endoscopic therapy.

Quality of Evidence: High, GRADE A. We are very confident that the true effect lies close to that of the estimate of the effect. A meta-analysis including 15 trials was available.

Strength of Recommendation: Strong, GRADE 1

References:


**PICO 8:** *In patients presenting with suspected acute variceal GI bleeding, what is the role of balloon tamponade in patient resuscitation/life salvage?*

**Population, Patient or Problem:** Hemodynamically unstable adults presenting to the ED with acute Upper GI Bleeds suspected due to variceal bleeding

**Intervention, Prognostic Factor, Exposure:** Linton tube plus blood and fluid resuscitation

**Comparison:** Blood and fluid resuscitation and gastroscopy

**Outcome:** Hemodynamic stabilization, ability to perform endoscopy, mortality, morbidity

**Design:** RCTs/Cohort observational studies

**Search Strategy:** Cochrane library, Medline, and PubMed for systematic reviews and clinical trials. Guidelines were checked.

**Clinical Recommendation:** We suggest that balloon tamponade should be used as a temporizing measure (maximum 24 hours) in patients with uncontrollable life-threatening bleeding for whom a more definitive therapy (e.g. TIPS or endoscopic therapy) is planned. Balloon tamponade devices, while effective in reducing active bleeding, increase the risk of severe complications; their risks and benefits must be carefully considered prior to use.

The American College of Gastroenterology guidelines report that Balloon tamponade is very effective in temporarily controlling bleeding with immediate hemorrhage control in over 80% of patients. Because the use of Linton or Sengstaken tubes is associated with potentially lethal complications such as aspiration, migration, and necrosis/perforation of the esophagus with mortality rates as high as 20%, it should be restricted to patients with uncontrollable bleeding for whom a more definitive therapy (e.g. TIPS) is planned within 24 hours. Intubation prior to tube insertion is strongly recommended.
Based on the available data, there were no significant differences between the Linton-Nachlas tube and the Sengstaken-Blakemore tube in regards to rate of bleeding control among patients. The Linton tube has been reported in case reports\(^2\) and non-randomized studies\(^3\) to cause significant complications in patients. A RCT compared Terlipressin vs. the Linton-Michel tube to control bleeding of gastroesophageal varices in cirrhotic patients.\(^4\) While the Linton-Michel tube was more effective in controlling bleeding than Terlipressin, patients were more likely experience side effects and bleeding recurrence.

**Quality of Evidence:** Very Low, GRADE D. We have very little confidence in the effect estimate: The true effect is likely to be substantially different from the estimate of effect.

**Strength of Recommendation:** Weak, GRADE 2.

**References:**

**Additional Readings and General References:**
PICO 9: In hemodynamically unstable patients presenting with acute upper GI bleeding, what is the role of endoscopy in achieving hemodynamic stability?

Population, Patient or Problem: Hemodynamically unstable adults presenting to the ED with acute Upper GI Bleeds

Intervention, Prognostic Factor, Exposure: Early endoscopy to stop of slow active bleeding during resuscitation

Comparison: Medical resuscitation prior to endoscopy

Outcome: Time to hemodynamic stabilization, blood transfusion and fluid requirements, morbidity, mortality, rebleeding rates

Design: RCTs/meta-analysis for RCTs

Search Strategy: Cochrane library, Medline, and PubMed for systematic reviews and clinical trials. Guidelines were checked.

Clinical Recommendation: We suggest that in patients with higher risk clinical features with a Blatchford score greater than or equal to 12, or signs of hemodynamic instability that endoscopy within 12 hours should be considered to potentially improve clinical outcomes. This was based on subgroup analysis in an RCT and an observational study where mortality rates were higher in those patients having endoscopy greater than 13 hours post presentation.

Early endoscopy (within 24 hours of presentation) has been recommended in the International Consensus Guidelines for patients presenting with acute upper GI bleeding.\textsuperscript{1,2} While early endoscopy is recommended for most patients, it may need to be delayed in some high-risk patients, such as those with active acute coronary syndrome, or suspected perforation.\textsuperscript{3,4} The SIGN guidelines suggest that endoscopic therapy should be given to patients with active bleeding lesions, non-bleeding visible vessels, and ulcers with an adherent blood clot.\textsuperscript{5} It recommends that patients should be considered for admission and early endoscopy if there is evidence of haemodynamic disturbance.

Quality of Evidence: Very Low, GRADE D. We have very little confidence in the effect estimate: The true effect is likely to be substantially different from the estimate of effect

Strength of Recommendation: Weak, GRADE 2

References:


PICO 10: In patients presenting with acute upper GI bleeding, does a restrictive packed red blood cell transfusion strategy improve patient outcomes?

Population, Patient or Problem: Hemodynamically stable adults presenting to the ED with acute non variceal upper GI bleed

Intervention, Prognostic Factor, Exposure:: Restricted blood transfusions for stable patients with hemoglobin less than or equal to 70

Comparison: Blood transfusions based on clinical judgment

Outcome: Hemodynamic stabilization, blood transfusion requirements, inpatient length of stay, morbidity, mortality

Design: RCTs/meta-analysis for RCTs

Search Strategy: Cochrane library, Medline, and PubMed for systematic reviews and clinical trials. Guidelines were checked.

Clinical Recommendation: We recommend that a restricted blood transfusion strategy (threshold of 70 g/L) be employed for stable patients with upper GI bleeding over a more liberal blood transfusion strategy (threshold of 90 g/L).

The international consensus on nonvariceal upper gastrointestinal bleeding recommends that blood transfusions should be administered in patients with a haemoglobin level of less than or equal to 70 g/L.1,2,3 The SIGN 2009 guidelines also suggest that a red cell transfusion should be considered.
after a loss 30% of the circulating volume. The caveat to this recommendation is that patients with co-morbidities such as coronary artery disease may require higher haemoglobin and patients with active ongoing bleeding or volume contracted at the time of haemoglobin measurement probably require transfusion before they drop below 70 g/L.

A narrative review identified that current guidelines based on non-randomized trials, resulting in the recommendation of restricted blood transfusions at 70 g/L. The narrative review and a systematic review both identified one RCT which compared restricted blood transfusions (70 g/L) vs. liberal blood transfusions (90 g/L) in adult patients with acute upper GI bleeding. The study found that restrictive blood transfusions was associated with reduced mortality, fewer occurrences of re-bleeding, reduced length of stay in hospital, and fewer adverse events. The liberal blood transfusion group was found to have significantly higher portal pressure gradient, which could explain the higher re-occurrence of bleeding. A systematic review identified another RCT comparing blood transfusions when haemoglobin fell below 70 g/L (to maintain 70-90 g/L) vs. blood transfusions when haemoglobin fell below 90 g/L (maintaining haemoglobin 90-110 g/L). No differences were noted in mortality, or length of stay between either transfusion plans.

Quality of Evidence: Moderate, GRADE B. We are moderately confident in the effect estimate: The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.

Strength of Recommendation: GRADE 1, Strong.

References:

**PICO 11:** In patients presenting with acute upper GI bleeding, does early gastroscopy (less than or equal to 12 hours; 24 hours) improve resource utilization (admission vs discharge, need for blood transfusions, ED length of stay) and disposition decision making?

**Population, Patient or Problem:** Adults presenting to the ED with acute upper GI bleed

**Intervention, Prognostic Factor, Exposure:** Endoscopy during ED stay

**Comparison:** Admission and endoscopy within 24 - 48 hours

**Outcome:** Morbidity, blood transfusions, length of stay, overall costs, mortality

**Design:** RCTs/meta-analysis for RCTs

**Search Strategy:** Cochrane library, Medline, and PubMed for systematic reviews and clinical trials. Guidelines were checked.

**Clinical Recommendation:** We suggest that early endoscopy may improve resource utilization in those patients requiring endoscopy for acute upper GI bleeding.

2 randomized, controlled trials were identified which compared endoscopy shortly after initial ED presentation to endoscopy within 24-48 hrs after admission. The first of these trials demonstrated reduced admission rates, reduced length of stay, and reduced overall costs of care in the early endoscopy group. Clinical outcomes were no different in the early endoscopy group than the control group. The second trial did not demonstrate improved resource utilization. However, in the majority of patients receiving early endoscopy the admitting physicians did not follow the endoscopists’ recommendations regarding disposition, resulting in a higher rate of admission within this group than would have been expected based on the endoscopy results alone. In both of these trials, hemodynamically unstable patients and those with multiple comorbidities were excluded.

Early endoscopy (within 24 hours of presentation) has been recommended in various guidelines for patients presenting with acute upper GI bleed due to observational studies showing decreased lengths of stay, and decreased surgical interventions. The SIGN guidelines state that early endoscopy allows for identifying patients who could be safely discharged from the ED. The NICE guidelines recommend offering endoscopy to unstable patients immediately after resuscitation and within 24 hours of admission for all other patients with UGIB.
Quality of Evidence: Moderate, GRADE B. We are moderately confident in the effect estimate: The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.

Strength of Recommendation: GRADE 2. Weak.

References:

PICO 12: In patients presenting with cirrhosis and acute upper GI bleeding, does the prophylactic administration of antibiotics improve clinical outcomes?

Return to Table of Contents
Return to Initial Decision Making
Return to Order Set Components - Medications

Population, Patient or Problem: Adults with cirrhosis presenting with upper GI bleeding

Completion Date: September 2015  Version 1.0
**Intervention, Prognostic Factor, Exposure:** Prophylactic antibiotics + standard care  
**Comparison:** Placebo + standard care  
**Outcome:** Mortality, bacterial infections, rebleeding  
**Design:** RCTs and meta-analyses of RCTs  

**Search Strategy:** Cochrane library, Medline, and PubMed for systematic reviews and clinical trials. Guidelines were checked.

**Clinical Recommendation:** We suggest that antibiotics be administered prophylactically to patients with cirrhosis presenting with acute upper GI bleeding. Prophylactic antibiotics appear to have beneficial effects on mortality, rebleeding, and the incidence of bacterial infections within this population.

Multiple trials have been published demonstrating clinical benefit associated with prophylactic antibiotics in cirrhotic patients with upper GI bleeding. In 2011 a meta-analysis was published including 12 randomized controlled trials comparing prophylactic antibiotics to placebo in this population.\(^1\) Antibiotics were associated with a reduction in mortality, rebleeding, and bacterial infections. The GRADE quality of included studies was generally low. The most effective antibiotic and the optimal duration of therapy is not well-defined in the literature to date.

Both the SIGN Guidelines (2008) and the NICE Guidelines (2012) recommend in favour of administering prophylactic antibiotics to patients with suspected variceal bleeding.\(^2\,^3\) The optimal choice of antibiotic regimen are not well-defined.

**Quality of Evidence:** Moderate, GRADE B. We are moderately confident in the effect estimate: The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.

**Strength of Recommendation:** Weak, GRADE 2

**References:**

   DOI:10.1002/14651858.CD002907.pub2.


3. National Institute for Health and Care Excellence (NICE) Acute upper gastrointestinal
Provincial Clinical Knowledge Topic
Upper Gastrointestinal Bleed, Adult
Emergency Department

bleeding management guideline, June 2012

PICO 13: **In patients presenting with evidence of recent upper GI bleeding can low risk patients be safely discharged from the emergency department as long as timely Gastroenterology/endoscopy follow up is arranged?**

Return to Table of Contents
Return to Initial Decision Making

**Population, Patient or Problem:** Adults presenting to the ED with low risk acute/recent upper GI bleed

**Intervention, Prognostic Factor, Exposure:** Gastroenterology assessment/endoscopy during ED stay

**Comparison:** Gastroenterology assessment/endoscopy as an outpatient

**Outcome:** Morbidity, ED representations with active bleed prior to GI outpatient assessment, blood transfusions, length of stay, overall costs, mortality

**Design:** RCTs/meta-analysis for RCTs

**Search Strategy:** Cochrane library, Medline, and PubMed for systematic reviews and clinical trials. Guidelines were checked.

**Clinical Recommendation:** We suggest that low risk patients with a GBS score of 0 can typically be safely discharged with outpatient management. Disposition decision-making should take into account additional patient factors (e.g. – medical comorbidities, social factors, etc.)

The SIGN 2008 guidelines recommends that patients could be considered for discharge with outpatient follow-up includes age less than 60 years, no evidence of haemodynamic disturbance, no significant comorbidity, not a current inpatient, no witnessed haematemesis or haematochezia.¹ The ACG 2011 guidelines made a conditional recommendation that discharge from the ED without inpatient endoscopy maybe considered in patients with urea nitrogen less than 6.5 mmol/L, haemoglobin greater than or equal to 130 g/L for men (120 g/L for women), systolic blood pressure greater than or equal to 110 mm Hg, pulse less than 100 beats/min, and absence of melena, syncope, cardiac failure, and liver disease.²

One study found that patients presenting to the ED with upper GI bleed with a GBS score of 0 can be safely discharged home with outpatient management.³ Less than half (40%) of patients chose to attend their scheduled outpatient endoscopy; follow-up with those patients and their family doctors revealed that none of the patients were readmitted for upper GI bleeding or died during the 6 month
follow-up. Another prospective study comparing the GBS with the AIM-65 score documented one patient with a GBS score of 0 and a history of hematologic comorbidities who required red blood cell / platelet transfusion. The authors remarked that patient factors such as medical comorbidities which may complicate the clinical course of GI bleeding should be taken into account when determining the appropriate disposition of individual patients.

No studies comparing endoscopy in the ED versus outpatient endoscopy could be identified.

**Quality of Evidence:** Low, GRADE C. Our confidence in the effect estimate is limited: The true effect may be substantially different from the estimate of the effect.

**Strength of Recommendation:** Weak, GRADE 2

**References:**

**PICO 14:** *In patients presenting with new onset anemia of unknown cause, what is the sensitivity and specificity of stool occult blood testing of determining the presence of clinically important GI bleeding?*

**Return to Table of Contents**  
**Return to Initial Decision Making**

**Population, Patient or Problem:** Adults presenting with new onset anemia suspected to be due to occult GI bleeding  
**Intervention, Prognostic Factor, Exposure:** Fecal Occult Blood Testing  
**Comparison:** Clinical decision making  
**Outcome:** Sensitivity, specificity, clinical outcome
Provincial Clinical Knowledge Topic
Upper Gastrointestinal Bleed, Adult
Emergency Department

_Design:_ Cohort studies/reference standard comparisons

**Search Strategy:** Cochrane library, Medline, and PubMed for systematic reviews and clinical trials. Guidelines were checked.

**Clinical Recommendation:** There is no evidence to support the use of fecal testing for occult GI bleeding to assist with decision making in the emergency department.

**Quality of Evidence:** Very Low, GRADE D. We have very little confidence in the effect estimate: The true effect is likely to be substantially different from the estimate of effect.

**Strength of Recommendation:** There is insufficient evidence and lack of consensus to make a recommendation regarding the sensitivity or specificity of stool occult blood testing for determining the presence of GI bleeding.

**PICO 15:** _In patients presenting with acute upper GI bleeding, does the administration of proton pump inhibitors intravenously instead of orally improve patient outcomes?_

Return to Table of Contents
Return to Order Set Components - Medications

_Population, Patient or Problem:_ Adults presenting to the ED with acute Upper GI bleed

**Intervention, Prognostic Factor, Exposure:** Intravenous proton pump inhibitors

**Comparison:** Oral proton pump inhibitors

**Outcome:** Morbidity, blood transfusions, length of stay, overall costs, mortality

**Design:** RCTs/meta-analysis for RCTs

**Search Strategy:** Cochrane library, Medline, and PubMed for systematic reviews and clinical trials. Guidelines were checked.

**Clinical Recommendation:** We recommend that IV and oral proton pump inhibitors (PPIs) be considered equally effective in reducing mortality, blood transfusions, hospital length of stay, and blood transfusions. Intravenous administration appears to have no additional benefits over oral PPIs in regards to patient outcomes. If IV PPIs are given bolus dosing alone is as effective as bolus followed by continuous PPI infusion.

In 2013, a systematic review comparing IV vs. oral PPIs in adult patients with upper GI bleed (peptic ulcer bleeding) was published. The review included 6 RCT’s. Rates of recurrent bleeding, mean volume of blood transfusion, and mortality were similar amongst patients receiving either oral or IV PPI’s. Patients receiving oral PPI’s had shortened length of hospital stay compared to patients receiving IV PPI’s. In a recently published RCT patients either received either A) IV

Completion Date: September 2015 Version 1.0
esomeprazole (80 mg) at 8 mg/h for 72 hr with oral placebo or B) IV placebo and oral esomeprazole (40 mg) every 12 hours. Rates of recurrent bleeding were similar in patients receiving either IV or oral PPIs. In addition, rates of unscheduled endoscopy, angiographic embolization, surgery, ICU admission, length of stay, and units of blood transfusion.

Another meta-analysis form 2014 included 13 RCTs which compared intermittent PPI dosing (either PO or IV) to continuous IV infusion in bleeding peptic ulcers with high risk stigmata of recent hemorrhage. Intermittent dosing was found to be non-inferior to continuous infusions, and there was no heterogeneity between trials using intermittent oral dosing and those using intermittent intravenous dosing. Their recommendation was that guidelines should be revised to recommend intermittent PPI therapy.

Quality of Evidence: High, GRADE A. We are very confident that the true effect lies close to that of the estimate of the effect. One systematic review was available which included 6 RCT’s. An additional meta-analysis was available which indirectly examined this question.

Strength of Recommendation: Strong, GRADE 1

References:

**PICO 16:** In patients presenting with acute GI bleeding, does the prophylactic administration of prokinetic agents prior to performing diagnostic/therapeutic endoscopy improve patient outcomes?

**Population, Patient or Problem:** Adults with acute upper GI bleed going for endoscopy

**Intervention, Prognostic Factor, Exposure:** Prokinetics (erythromycin) prior to endoscopy

**Comparison:** Placebo
**Outcome:** Morbidity, blood transfusions, length of stay, overall costs, mortality  
**Design:** RCTs/meta-analysis for RCTs

**Search Strategy:** Cochrane library, Medline, and PubMed for systematic reviews and clinical trials. Guidelines were checked.

**Clinical Recommendation:** It is suggested that an intravenous infusion of erythromycin (250 mg approximately 30 min before endoscopy) should be considered to improve diagnostic yield and decrease the need for repeat endoscopy, however, there is no consistent evidence to show improved clinical outcomes.

Two systematic reviews were recently published which examined the efficacy of erythromycin before endoscopy in patients with upper GI bleed.\(^1\,^2\) The reviews identified RCT’s which compared erythromycin infusion either before or after endoscopy in adult patients presenting with upper GI bleeds. Six studies were identified and the meta-analysis revealed that erythromycin given prior to endoscopy resulting in significantly improved visualization of the gastric mucosa (OR 3.43; 95% CI: 1.81 to 6.50), decreased need for a second endoscopy (OR 0.47; 95% CI:0.26 to 0.83), units of blood transfused (WMD -1.51;95 % CI:-2.45 to -0.56), and decreased length of stay in hospital (WMD -1.51; 95% CI: -2.45 to -0.56). The American College of Gastroenterology practice guidelines provide a conditional recommendation in favour of pre-endoscopic administration of erythromycin in order to improve diagnostic yield.\(^3\)

**Quality of Evidence:** Moderate, GRADE B. We are moderately confident in the effect estimate: The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different. One systematic review conducting a meta-analysis of 6 RCT’s was identified.

**Strength of Recommendation:** Weak, GRADE 2.

**References:**
PICO 17: In patients presenting with suspected GI bleeding, what is the sensitivity and specificity of nasogastric tube placement for confirming an upper GI source?

Population, Patient or Problem: Adults presenting with suspected GI bleed

Intervention, Prognostic Factor, Exposure: Nasogastric insertion to assess aspirate

Comparison: Clinical decision making

Outcome: Sensitivity, specificity, clinical outcome, length of stay, patient satisfaction

Design: Cohort studies/reference standard comparisons

Search Strategy: Cochrane library, Medline, and PubMed for systematic reviews and clinical trials. Guidelines were checked.

Clinical Recommendation: We suggest that the placement of a nasogastric tube is not adequately sensitive to assist in diagnosis, prognosis or visualization of a bleeding source.¹

The international consensus on nonvariceal upper GI bleeding, Barkun ², recommended considering nasogastric (NG) tube in selected patients as the findings may have prognostic value. The guidelines also identified a study in which fresh blood in the NG tube was one of 4 predictors for the need for very early endoscopy. Results from a Canadian UGIB registry published in 2004 noted 13% of patients with UGIB had clear or bile-stained aspirate, 15% of these had active bleeding or non-bleeding visible vessel compared with 23% with coffee ground aspirate and 45% with bloody aspirate.³ Another study reported physicians were incorrect about 50% of the time when reporting bile in the aspirate, suggesting the NG tube was in the duodenum and interpreting that to mean no active bleeding.⁴

A conference abstract for a single-blinded RCT was identified⁵, in which the study tried to examine whether NG tube was able to predict the need for endoscopy. Patients either received no NG tube, or NG tube with aspiration and lavage. The study found that NG tube was not predictive of which patients had lesions that required endoscopic therapy.

Quality of Evidence: Moderate, GRADE B. We are moderately confident in the effect estimate: The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.

Strength of Recommendation: Weak, GRADE 2

References:


*Return to Beginning of Document*
Appendix B – PICO-D Methodology and GRADE Terminology

Key components of high quality and trustworthy clinical guidance include: i) recommendations that are clearly stated and based on scientific evidence of benefits, harms and where possible, costs, and ii) a guideline rating system that is used to communicate quality and reliability of both the evidence and the strength of its recommendations. In the development of these guidelines, clinical questions were formulated based on the PICO-D format as supported by Sackett¹ and Guyatt² in their User’s Guide to the Medical Literature to define the clinical question. The GRADE terminology, where possible, is used to address the questions regarding Quality of Evidence and Strength of Recommendations. The components of PICO-D format and the GRADE methodology are described below.

PICO-D

P - Population, Patient, or Problem: This element defines the group of patients or characteristics of the patients.

I - Intervention, Prognostic Factor, Exposure: This element defines the main intervention being considered.

C - Comparison: This element defines the main alternative to compare with the intervention, such as comparison of two drugs or tests, or a medication to no medication or placebo.

O - Outcome: This defines what you are trying to accomplish, measure, improve or affect.

D - Design: The type of question (related to diagnosis, harm/etiology, prognosis, or therapy) will define which study design is best suited to provide evidence to answer the clinical question.

Definitions of Study Types²,³

1. Meta-analysis: a statistical technique that summarizes the results of several studies in a single weighted estimate, in which more weight is given to results of studies with more events and sometimes to studies of higher quality.

2. Systematic Review: attempts to collate all empirical evidence that fits pre-specified eligibility criteria to answer a specific research question using explicit, systematic methods selected with a view to minimizing bias. This provides more reliable findings from which to draw conclusions. (Antman 1992, Oxman 1993). The key characteristics of a systematic review are: i) clearly stated objectives with pre-defined eligibility criteria for studies; ii) an explicit and reproducible methodology; iii) a systematic search that attempts to identify all studies meeting the eligibility criteria; iv) an assessment of validity for the included studies, (e.g. through the assessment of risk of bias; and v) a systematic synthesis and presentation, of the characteristics and findings of the included studies.⁴

3. Randomized Controlled Trial (RCTs): a trial in which participants are randomly assigned to two or more groups: at least one (the experimental group) receiving an intervention that is being tested and another (the comparison or control group) receiving an alternative treatment or placebo. This design allows assessment of the relative effects of interventions.
4. **Controlled Clinical Trial (CCTs):** a trial in which participants are assigned to two or more different treatment groups in a non-randomized or quasi-randomized method. Examples of quasi-randomized allocation are birthdate and medical record numbers. Studies in which the randomization process is not explicitly stated as randomized are considered CCTs. CCTs are more likely to suffer from bias than RCTs.

5. **Observational Studies:**
   a. **Cohort Study**: an observational study in which a defined group of people (the cohort) is followed over time. The outcomes of people in subsets of this cohort are compared, to examine people who were exposed or not exposed (or exposed at different levels) to a particular intervention or other factor of interest. A prospective cohort study assembles participants and follows them into the future. A retrospective (or historical) cohort study identifies subjects from past records and follows them from the time of those records to the present.
   b. **Case control study**: a study design that examines a group of people who have experienced an event (usually an adverse event) and a group of people who have not experienced the same event, and looks at how exposure to suspect (usually noxious) agents differed between the two groups. This type of study design is most useful for trying to ascertain the cause of rare events, such as rare cancers.
   c. **Case Series**: analysis of series of people with the disease (there is no comparison group in case series).

**GRADE Methodology**
Whenever possible answers are identified from recent high quality guidelines or high quality systematic reviews and recommendations provided are based on GRADE definitions. Where guidelines or systematic reviews are not available to answer certain questions rapid reviews are undertaken and/or a consensus approach used to try to answer clinically relevant questions. Only where the evidence is supportive and the benefits clearly outweigh the harm is a “we recommend” strength of recommendation applied.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>High GRADE A</td>
<td>We have high confidence that the true effect lies close to that of the estimate of the effect.</td>
</tr>
<tr>
<td>Moderate GRADE B</td>
<td>We are moderately confident in the effect estimate: The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.</td>
</tr>
<tr>
<td>Low GRADE C</td>
<td>Our confidence in the effect estimate is low: The true effect may be substantially different from the estimate of the effect.</td>
</tr>
<tr>
<td>Very low GRADE D</td>
<td>We have very low confidence in the effect estimate: The true effect is likely to be substantially different from the estimate of effect.</td>
</tr>
</tbody>
</table>
Table 2. GRADE Strength of Recommendations

<table>
<thead>
<tr>
<th>GRADE</th>
<th>Recommendation wording</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strong</td>
<td>Strong recommendation, with desirable effects clearly outweighing undesirable effects/burdens (or vice versa). Word of Recommendation: We recommend in favor of / We recommend against.....</td>
</tr>
<tr>
<td>Weak</td>
<td>Weak recommendation, with desirable effects closely balanced with undesirable effects. Word of Recommendation: We suggest in favor of / We suggest against.....</td>
</tr>
<tr>
<td>Insufficient evidence or no consensus</td>
<td>Word of Recommendation: There is insufficient evidence or the confidence in the effect estimates is so low that the panel is unable to make a recommendation regarding.....</td>
</tr>
</tbody>
</table>

References:
Appendix C – Patient Education and Discharge Material

Patient education and discharge material can be found at the following links:

Gastrointestinal Bleeding:
https://myhealth.alberta.ca/health/AfterCareInformation/pages/conditions.aspx?hwid=ut2744

Esophageal Varices:
https://myhealth.alberta.ca/health/AfterCareInformation/pages/conditions.aspx?hwid=ut2735
## Appendix D – Risk Stratification

### Table 1: Glasgow Blatchford Score

<table>
<thead>
<tr>
<th>Admission Risk Marker</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood urea (mmol/L)</td>
<td></td>
</tr>
<tr>
<td>6.5 – 7.9</td>
<td>2</td>
</tr>
<tr>
<td>8.0 – 9.9</td>
<td>3</td>
</tr>
<tr>
<td>10.0 – 25.0</td>
<td>4</td>
</tr>
<tr>
<td>Greater than 25.0</td>
<td>6</td>
</tr>
<tr>
<td>Hemoglobin for men (g/L)</td>
<td></td>
</tr>
<tr>
<td>120 – 129</td>
<td>1</td>
</tr>
<tr>
<td>100 – 119</td>
<td>3</td>
</tr>
<tr>
<td>Less than 100</td>
<td>6</td>
</tr>
<tr>
<td>Hemoglobin for women (g/L)</td>
<td></td>
</tr>
<tr>
<td>100 – 119</td>
<td>1</td>
</tr>
<tr>
<td>Less than 100</td>
<td>6</td>
</tr>
<tr>
<td>Systolic blood pressure (mm Hg)</td>
<td></td>
</tr>
<tr>
<td>100 – 109</td>
<td>1</td>
</tr>
<tr>
<td>90 – 99</td>
<td>2</td>
</tr>
<tr>
<td>Less than 90</td>
<td>3</td>
</tr>
<tr>
<td>Other Markers</td>
<td></td>
</tr>
<tr>
<td>Pulse greater than or equal to 100/minute</td>
<td>1</td>
</tr>
<tr>
<td>Presentation with melena</td>
<td>1</td>
</tr>
<tr>
<td>Presentation with syncope</td>
<td>2</td>
</tr>
<tr>
<td>Hepatic Disease*</td>
<td>2</td>
</tr>
<tr>
<td>Cardiac Failure**</td>
<td>2</td>
</tr>
</tbody>
</table>

*Known history, or clinical and laboratory evidence of chronic or acute liver disease.

**Known history, or clinical and echocardiographic evidence of cardiac failure.

### GBS Score Utility

<table>
<thead>
<tr>
<th>GBS Score</th>
<th>Outcome</th>
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</thead>
<tbody>
<tr>
<td>0</td>
<td>No treatment required; can typically be managed safely without endoscopy</td>
</tr>
<tr>
<td>Less than or equal to 3</td>
<td>Required no endoscopic therapy, blood transfusions, and suffered no rebleeding</td>
</tr>
<tr>
<td>Less than or equal to 7</td>
<td>Required no surgery and mortality was zero</td>
</tr>
</tbody>
</table>
Table 2: AIM 65 Score

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albumin less than 30 g/L</td>
<td>1</td>
</tr>
<tr>
<td>Altered Mental Status</td>
<td>1</td>
</tr>
<tr>
<td>INR greater than 1.5</td>
<td>1</td>
</tr>
<tr>
<td>Systolic Blood Pressure less than or equal to 90mmHg</td>
<td>1</td>
</tr>
<tr>
<td>Age greater than 65</td>
<td>1</td>
</tr>
<tr>
<td>Maximum score</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Score</th>
<th>Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.3%</td>
</tr>
<tr>
<td>1</td>
<td>1.2%</td>
</tr>
<tr>
<td>2</td>
<td>2.8%</td>
</tr>
<tr>
<td>3</td>
<td>8.5%</td>
</tr>
<tr>
<td>4</td>
<td>15.1%</td>
</tr>
<tr>
<td>5</td>
<td>24.5%</td>
</tr>
</tbody>
</table>

References:
Appendix E – Reversal of Direct Oral Anticoagulants

Important Note: The information contained in this appendix comes from a provincial guideline and does not show the guideline in its entirety. The content below is not guaranteed to be up to date and it is recommended that the full guideline be accessed.

To access the full AHS guideline go to: https://extranet.ahsnet.ca/teams/policydocuments/1/clp-prov-direct-oral-anticoagulant-agents-guideline-hcs-115-01.pdf

A. Dabigatran

<table>
<thead>
<tr>
<th>Testing</th>
<th>Minor Bleeding</th>
<th>Moderate Bleeding</th>
<th>Major Bleeding</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CBC, INR/PTT;</td>
<td>CBC, INR/PTT;</td>
<td>CBC, INR/PTT;</td>
</tr>
<tr>
<td></td>
<td>Creatinine;</td>
<td>Creatinine;</td>
<td>Creatinine;</td>
</tr>
<tr>
<td></td>
<td>Listed therapy</td>
<td>Fibrinogen;</td>
<td>Fibrinogen;</td>
</tr>
<tr>
<td></td>
<td>Type and Screen;</td>
<td>Thrombin Time</td>
<td>Cross-match;</td>
</tr>
<tr>
<td></td>
<td>Thrombin Time</td>
<td></td>
<td>Thrombin Time</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Supportive Therapy</th>
<th>Minor Bleeding</th>
<th>Moderate Bleeding</th>
<th>Major Bleeding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local therapy</td>
<td></td>
<td>Transfusion;</td>
<td>Surgery/Intervention;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Surgery/Intervention;</td>
<td>Consider platelet transfusion if antiplatelet agents are in use</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Drug Dosing</th>
<th>Minor Bleeding</th>
<th>Moderate Bleeding</th>
<th>Major Bleeding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hold Dabigatran;</td>
<td></td>
<td>Hold Dabigatran;</td>
<td>Hold Dabigatran;</td>
</tr>
<tr>
<td>Hold antiplatelet agents</td>
<td></td>
<td>Hold antiplatelet agents</td>
<td>Hold antiplatelet agents</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reversal/Removal</th>
<th>Minor Bleeding</th>
<th>Moderate Bleeding</th>
<th>Major Bleeding</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td></td>
<td>Consider charcoal^ less than 2-4 hours post-dose;</td>
<td>Consider charcoal^ less than 2-4 hours post-dose;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Consider dialysis</td>
<td>Consider dialysis</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Procoagulant Agents</th>
<th>Minor Bleeding</th>
<th>Moderate Bleeding</th>
<th>Major Bleeding</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td></td>
<td>Tranexamic acid (10mg/kg IV or 25 mg/kg PO)^</td>
<td>Consider FEIBA 25 - 50 unit/kg for major bleeding, 50-100 unit/kg for ICH or PCC 25 - 50 unit/kg</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Tranexemetic acid (10 mg/kg IV)^</td>
</tr>
</tbody>
</table>

Note: ^Major upper GI bleeding is a relative contraindication for activated charcoal

^Upper urinary tract bleeding is a relative contraindication for Tranexamic acid, which can cause “clot colic”;

Completion Date: September 2015

Version 1.0
B. Rivaroxaban/Apixaban

Table 3. Patients on Rivaroxaban (Xarelto) or Apixaban (Eliquis) with Bleeding

<table>
<thead>
<tr>
<th>Testing</th>
<th>Minor Bleeding</th>
<th>Moderate Bleeding</th>
<th>Major Bleeding</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CBC, INR/PTT;</td>
<td>CBC, INR/PTT; Fibrinogen; T &amp; S; Anti Xa level</td>
<td>CBC, INR/PTT; Fibrinogen; T &amp; S; Anti Xa level</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Supportive Therapy</th>
<th>Minor Bleeding</th>
<th>Moderate Bleeding</th>
<th>Major Bleeding</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Local therapy</td>
<td>Local therapy/site control; Transfusion; Surgery/Intervention</td>
<td>Local Therapy; Transfusion; Surgery.Intervention; Consider platelet transfusion if recent antiplatelet agents</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Drug Dosing</th>
<th>Minor Bleeding</th>
<th>Moderate Bleeding</th>
<th>Major Bleeding</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hold Rivaroxaban/Apixaban; Hold antiplatelet agents</td>
<td>Hold Rivaroxaban/Apixaban; Hold antiplatelet agents</td>
<td>Hold Rivaroxaban/Apixaban; Hold antiplatelet agents</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reversal</th>
<th>Minor Bleeding</th>
<th>Moderate Bleeding</th>
<th>Major Bleeding</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>Consider charcoal(^a) (no evidence for effectiveness); Not dialyzable</td>
<td>Consider charcoal(^a) (no evidence for effectiveness); Not dialyzable</td>
<td>Consider charcoal(^a) (no evidence for effectiveness); Not dialyzable</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Procoagulant agents</th>
<th>Minor Bleeding</th>
<th>Moderate Bleeding</th>
<th>Major Bleeding</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>Tranexamic acid (10 mg/kg IV or 25 mg/kg PO)(^b)</td>
<td>Tranexamic acid (10 mg/kg IV)(^b)</td>
<td>Consider PCC 25-50 unit/kg or fixed dosage of PCC 2000 units or rFVIIa 40 - 90 mcg/kg; Tranexamic acid (10 mg/kg IV)(^b)</td>
</tr>
</tbody>
</table>

Note: \(^a\)Major upper GI bleeding is a relative contraindication for activated charcoal \(^b\)Upper urinary tract bleeding is a relative contraindication for Tranexamic acid, which can cause “clot colic”;

If an emergent/urgent procedure is required:

1. For patients needing emergent surgery, reversal cannot be achieved prior to proceeding nor is there time for coagulation testing.
2. Draw blood for: CBC, INR, PTT, fibrinogen, thrombin time, anti-Xa activity, type and screen, Creatinine, then proceed and transfuse as necessary along with other products as time permits.
3. Time permitting measure the level of effect of the oral anticoagulant agent and wait until the effect is minimal or below detection prior to proceeding.
4. Dabigatran’s effect will be influenced more by renal dysfunction than that of Rivaroxaban or Apixaban.
Appendix F – Clinical Working Group Membership

We would like to acknowledge the contributions of the Provincial Clinical Knowledge Working Group members as follows. Your participation and time spent is appreciated.

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Role</th>
<th>Zone</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Knowledge Lead</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael Bullard</td>
<td>Physician</td>
<td>Knowledge Lead</td>
<td>Provincial</td>
</tr>
<tr>
<td><strong>Topic Lead</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chris Hall</td>
<td>Physician</td>
<td>Topic Lead</td>
<td>Provincial</td>
</tr>
<tr>
<td><strong>Working Group Members</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harvey Woytiuk</td>
<td>Physician</td>
<td>Working Group Member</td>
<td>North Zone</td>
</tr>
<tr>
<td>Richard Martin</td>
<td>Physician</td>
<td>Working Group Member</td>
<td>North Zone</td>
</tr>
<tr>
<td>Brian Holroyd</td>
<td>Physician</td>
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<td>Edmonton Zone</td>
</tr>
<tr>
<td>Jennifer Pritchard</td>
<td>Physician</td>
<td>Working Group Member</td>
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</tr>
<tr>
<td>Sam Chow</td>
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<td>Working Group Member</td>
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<tr>
<td>Pat San Augustin</td>
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<td>Ni Lam</td>
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<tr>
<td>Allison Kirkham</td>
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<td>Katherine Smith</td>
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<td>Simon Ward</td>
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<tr>
<td>Lyle Thomas</td>
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<td>Eddy Lang</td>
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<tr>
<td>Shawn Dowling</td>
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<tr>
<td>Shelly Lynn Franklin</td>
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<tr>
<td>Jennine Desmarais</td>
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<td>Margaret Dymond</td>
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<td>Maria Janik</td>
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<tr>
<td>Bonnie Niebergall</td>
<td>Registered Nurse</td>
<td>Working Group Member</td>
<td>South Zone</td>
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<td>Monique Fernquist</td>
<td>Registered Nurse</td>
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<td><strong>Multidisciplinary</strong></td>
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<tr>
<td>Sander van Zanten</td>
<td>Physician</td>
<td>Content Expert</td>
<td>Edmonton Zone</td>
</tr>
<tr>
<td>Kerri Novak</td>
<td>Physician</td>
<td>Content Expert</td>
<td>Calgary Zone</td>
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<tr>
<td>Stafford Dean</td>
<td>DIMR Representative</td>
<td>Content Expert</td>
<td>Provincial</td>
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For questions or feedback related to this knowledge topic please contact Clinical Knowledge Topics by emailing ClinicalKnowledgeTopics@albertahealthservices.ca