Chapter 38
Approach to Upper Gastrointestinal Bleeding (UGIB) in the ICU

38.1 Introduction and Epidemiology

Upper gastrointestinal bleeding (UGIB) is a potentially life-threatening condition that originates from the esophagus, stomach, or duodenum. It can manifest as hematemesis (vomiting blood), melena (black tarry stools), or, in cases of massive bleeding, hematochezia (fresh blood per rectum). Prompt diagnosis and intervention are essential, as UGIB is associated with significant morbidity and mortality, especially in ICU settings. The overall mortality rate for UGIB ranges from 2% to 10%, and outcomes are often worse in patients with comorbid conditions like chronic kidney disease and cardiovascular disease.

In recent years, the epidemiology of UGIB has shifted. While peptic ulcer disease remains a major cause, its incidence has decreased due to widespread *Helicobacter pylori* eradication and the increased use of acid-suppressing medications. Conversely, other causes, including vascular lesions and malignancy, have become more prevalent. This evolving landscape emphasizes the need for careful diagnostic evaluation to identify the underlying etiology and tailor management appropriately [1] [Ref: Algorithm 38.1].

38.2 Initial Assessment and Resuscitation

38.2.1 Airway, Breathing, and Circulation (ABCs)

The initial step in UGIB management involves assessing and stabilizing the patient's airway, breathing, and circulation. In patients with severe hematemesis or altered mental status, intubation may be necessary to protect the airway, especially if the

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gag reflex is compromised. Hemodynamic stability is equally critical, with target goals to maintain mean arterial pressure (MAP) > 65 mm Hg. Secure two large-bore intravenous lines for rapid fluid and blood product administration if necessary.

38.2.2 Fluid Resuscitation and Transfusion Strategy

For patients presenting with severe bleeding, judicious fluid resuscitation is critical to prevent hemodilution and fluid overload. In hemodynamically stable patients, restrictive transfusion strategies are recommended, with a hemoglobin threshold of 7 g/dL. However, patients with ongoing hemorrhage and signs of hypoperfusion may require a higher threshold to stabilize their condition. Blood product selection and administration should be guided by coagulation parameters, platelet count, and the extent of blood loss**.**

38.2.3 Timing of Endoscopy

Endoscopy should be performed within 24 hours for most patients with UGIB to identify the bleeding source and facilitate endoscopic therapy. For hemodynamically unstable patients, endoscopy is prioritized as soon as the patient is stabilized, as early intervention in these cases has been shown to reduce mortality and improve outcomes.

38.3 Risk Stratification Tools

Risk assessment tools are crucial in managing patients with upper gastrointestinal bleeding (UGIB). These tools help clinicians identify patients at higher risk for complications, determine the need for urgent interventions, and establish whether a patient can be safely managed as an outpatient or requires inpatient care. Below are descriptions of the most widely used risk stratification tools in UGIB: the Glasgow-Blatchford Score (GBS), the Rockall Score, and the Forrest Classification [2].

38.3.1 Glasgow-Blatchford Score (GBS)

The Glasgow-Blatchford Score (GBS) is a pre-endoscopic scoring system used primarily upon a patient's initial presentation to assess the need for medical intervention, such as blood transfusions or endoscopic therapy. GBS evaluates clinical and

laboratory parameters without requiring endoscopic findings, making it especially useful in emergency departments to triage patients before endoscopy.

Components of the GBS
The GBS score is calculated based on several variables:

1. Hemoglobin Level: Lower hemoglobin levels contribute to a higher score, as anemia often indicates more significant blood loss.
2. Blood Urea Nitrogen (BUN): Elevated BUN levels suggest upper GI bleeding since blood proteins are broken down in the gastrointestinal tract and absorbed, raising BUN.
3. Systolic Blood Pressure: Lower systolic blood pressure scores higher, indicating possible hypovolemic shock or hemodynamic instability.
4. Pulse Rate: A higher pulse rate reflects compensatory tachycardia due to blood loss.
5. Presence of Melena: Melena (black tarry stools) suggests ongoing or recent upper GI bleeding.
6. History of Syncope: Syncope indicates significant blood loss, leading to hypoperfusion and potential fainting episodes.
7. History of Liver Disease or Heart Failure: Comorbidities such as liver disease or heart failure place patients at increased risk of severe bleeding.

Scoring and Interpretation
- A GBS score of 0 indicates very low risk, where patients are unlikely to require urgent intervention. These low-risk patients may be managed as outpatients.
- Scores above 1 suggest a need for more intensive evaluation, and scores of 2 or higher indicate a higher risk of requiring interventions like transfusion or endoscopy.
- High GBS scores (>3) often warrant admission and rapid endoscopic assessment, as they correlate with increased risk for adverse outcomes and the need for more aggressive management.

GBS is particularly helpful in distinguishing patients who may be safely discharged from those who require immediate intervention.

38.3.2 Rockall Score

The Rockall Score is used both pre- and post-endoscopy to evaluate a patient's risk of mortality and rebleeding. It is designed to be applied initially based on clinical presentation (pre-endoscopy) and then recalculated after endoscopic findings are obtained (post-endoscopy). The Rockall Score is effective for stratifying patients based on their long-term outcomes, especially their risk of death.

Components of the Rockall Score

1. Age: Older age is a strong independent predictor of mortality in UGIB.
2. Shock: Determined based on blood pressure and heart rate, the presence of shock (systolic BP <100 mmHg) indicates severe bleeding and a higher risk of poor outcomes.
3. Comorbidities: Comorbid conditions, such as renal failure, liver failure, heart disease, or malignancy, increase the risk of mortality and are heavily weighted.
4. Endoscopic Diagnosis: This includes findings like ulcers, Mallory-Weiss tears, or tumors. Higher-risk lesions (e.g., actively bleeding ulcers) score higher.
5. Stigmata of Recent Hemorrhage: Endoscopic signs of active or recent bleeding, such as spurting vessels, visible vessels, or adherent clots, indicate an increased risk of rebleeding and mortality.

Scoring and Interpretation

- Pre-endoscopy Rockall Score: This initial score, which excludes endoscopic findings, helps assess mortality risk based on age, shock status, and comorbidities.
- Post-endoscopy Rockall Score: After endoscopic evaluation, findings are incorporated to refine the risk assessment. Scores range from 0 to 11, with higher scores indicating greater mortality risk.
- A score of 0–2 suggests low risk, where patients generally have low mortality risk and may require less intensive monitoring.
- A score above 5 correlates with a high risk of mortality, indicating the need for aggressive monitoring and intervention.
- A score above 7 is associated with an 80% risk of rebleeding, emphasizing the need for close follow-up and possibly repeated intervention.

The Rockall Score is particularly valuable post-endoscopy, where it incorporates endoscopic findings, allowing clinicians to stratify patients by their risk for rebleeding and death and tailor post-endoscopic management accordingly.

38.3.3 Forrest Classification

The Forrest Classification is an endoscopic classification system specifically designed to stratify the risk of rebleeding in patients with peptic ulcer disease, based on the visual appearance of the ulcer during endoscopy. It categorizes ulcers into high- and low-risk groups and helps guide the urgency and type of intervention required.

Forrest Classification Categories

1. Forrest Ia (Active Spurting Hemorrhage): Represents active arterial bleeding with visible spurting. This is an emergency situation with the highest risk of rebleeding, requiring immediate hemostatic intervention.

2. Forrest Ib (Active Oozing Hemorrhage): Continuous oozing of blood indicates ongoing, albeit slower, bleeding. Urgent endoscopic intervention is still necessary, though the immediate risk may be slightly lower than with spurting.
3. Forrest IIa (Non-bleeding Visible Vessel): A visible vessel in the ulcer bed suggests recent hemorrhage and a high risk of rebleeding. Endoscopic therapy is indicated to prevent further bleeding.
4. Forrest IIb (Adherent Clot): The presence of an adherent clot over the ulcer base indicates prior bleeding with a moderate risk of rebleeding. Vigorous irrigation may be attempted to dislodge the clot, followed by endoscopic treatment if high-risk features are revealed.
5. Forrest IIc (Flat Pigmented Spot): Flat, pigmented lesions indicate that bleeding has ceased and that the risk of rebleeding is low. Generally, no endoscopic intervention is needed, though acid suppression therapy may be initiated.
6. Forrest III (Clean Ulcer Base): An ulcer with a clean base has the lowest risk of rebleeding, and these patients may be managed conservatively with supportive care.

Scoring and Interpretation

- High-Risk Lesions (Forrest Ia, Ib, IIa): These are actively bleeding or recently bleeding lesions with a high likelihood of rebleeding and require urgent endoscopic therapy.
- Moderate-Risk Lesions (Forrest IIb): These are generally managed with endoscopic intervention after clot removal to determine the lesion's status.
- Low-Risk Lesions (Forrest IIc, III): These patients typically do not require endoscopic therapy and can often be managed with conservative treatment, such as acid suppression.

Forrest classification is instrumental in determining the type and urgency of endoscopic intervention, helping guide therapy and predict rebleeding risk.

38.3.4 Comparison of GBS, Rockall, and Forrest Classification

Each of these tools serves a unique function in the assessment of UGIB:

- GBS: Primarily used pre-endoscopy to assess the need for urgent intervention and identify patients suitable for outpatient management.
- Rockall Score: Used both pre- and post-endoscopy to evaluate mortality risk, with higher scores indicating a need for closer monitoring and possible interventions.
- Forrest Classification: Applied during endoscopy to assess the visual appearance of ulcers and stratify them based on rebleeding risk, guiding the urgency and approach of therapeutic interventions.

The combined use of GBS, Rockall, and Forrest Classification allows a comprehensive risk assessment in UGIB patients, from initial triage through post-endoscopic management. Each tool supports clinical decision-making, enabling targeted and effective patient care based on specific risk profiles and treatment needs.

38.4 Pre-endoscopic Management

38.4.1 Proton Pump Inhibitors (PPIs)

The use of PPIs before endoscopy in patients with UGIB remains a point of debate. Although routine pre-endoscopic PPI administration has not shown a significant reduction in mortality or urgent intervention need, it may have potential benefits. PPIs work by inhibiting gastric acid secretion, which in turn helps stabilize blood clots formed at the site of bleeding lesions. Lower gastric acidity reduces clot dissolution, enhancing clot stability and minimizing the risk of rebleeding in high-risk lesions, such as peptic ulcers [3].

After endoscopy, high-dose PPI therapy is strongly recommended, especially in patients with confirmed high-risk lesions (e.g., visible vessels or adherent clots). Commonly, this is administered as an 80 mg intravenous bolus followed by a continuous infusion of 8 mg/hour over 72 hours or via intermittent high dosing (40 mg IV twice daily). Studies have shown that this approach decreases rebleeding rates and promotes better outcomes, particularly within the critical first 3 days post-intervention. For patients with confirmed peptic ulcer bleeding, PPI therapy is continued orally after discharge to support ongoing clot stability and ulcer healing, typically at a twice-daily dose for the initial 2 weeks, then reduced to once daily as maintenance therapy.

38.4.2 Erythromycin as a Prokinetic Agent

Erythromycin, administered intravenously at a dose of 250 mg, acts as a prokinetic agent to promote gastric emptying. It is ideally given 30–90 min before endoscopy to improve gastric visualization, particularly when there is significant blood or clots in the stomach that may obscure endoscopic views. By stimulating gastric motility, erythromycin clears blood and gastric contents, allowing for a clearer assessment of the source and extent of bleeding. Enhanced visualization facilitates effective and targeted endoscopic therapy, which is critical in managing UGIB cases with considerable hemorrhage.

Erythromycin's prokinetic effect has also been associated with reduced procedure time and improved diagnostic yield. While erythromycin administration is

generally safe, it should be used cautiously in patients with known QT prolongation or those on medications that can interact with erythromycin.

38.4.3 Anticoagulation Management

For patients on anticoagulant therapy, UGIB management requires balancing the risk of ongoing bleeding with the potential for thromboembolic complications if anticoagulation is withheld. The approach to anticoagulation reversal varies based on the specific agent used:

1. Warfarin: For patients on warfarin, vitamin K administration and prothrombin complex concentrates (PCC) or fresh frozen plasma (FFP) are the primary reversal strategies. PCC is preferred in emergent settings due to its rapid reversal effect and lower volume load compared to FFP. Vitamin K provides a more sustained effect and is typically given alongside PCC for durable reversal.
2. Direct Oral Anticoagulants (DOACs): For patients taking DOACs such as apixaban, rivaroxaban, or dabigatran, options include specific reversal agents where available (e.g., idarucizumab for dabigatran) or nonspecific reversal agents like activated charcoal if the DOAC was taken within the past few hours. Hemodialysis can also be effective in dabigatran cases due to its renal excretion.

Reintroduction of anticoagulants post-hemostasis must be carefully timed and considered based on the patient's bleeding risk and thrombotic profile. In high thrombotic risk patients, early reintroduction may be beneficial, typically after 48–72 hours if hemostasis is confirmed and bleeding has ceased.

38.5 Endoscopic Therapy and Post-endoscopic Management

38.5.1 Endoscopic Hemostasis Techniques

Endoscopy serves both diagnostic and therapeutic roles in UGIB. High-risk lesions—such as those with spurting, oozing, or visible vessels—require immediate intervention. Dual therapy, involving a combination of injection and mechanical or thermal methods, is preferred for high-risk lesions. Commonly used combinations include adrenaline injection followed by mechanical clipping or thermal coagulation.

1. Injection Therapy: Epinephrine injection is often used as the initial hemostatic technique due to its vasoconstrictive properties, which temporarily slows bleeding. However, injection alone is usually insufficient, and it should be combined with another modality.

2. Thermal Coagulation: Methods such as bipolar electrocoagulation or heater probe coagulation provide targeted thermal energy to the bleeding site, facilitating tissue coagulation and hemostasis.
3. Hemostatic Powder: Newer agents like hemostatic powder sprays are effective in refractory cases, forming a physical barrier that promotes clot formation. They are also beneficial in cases where traditional methods are challenging, such as diffuse oozing bleeds.
4. Over-the-Scope Clips (OTSC): These are especially useful in recurrent or challenging bleeds, as they can close larger lesions compared to traditional clips [4].

38.5.2 Managing Recurrent Bleeding

In instances of rebleeding, a repeat endoscopy is typically the first line of management. If hemostasis is not achievable with endoscopic measures, non-endoscopic interventions should be considered:

1. Transcatheter Arterial Embolization (TAE): This radiological technique involves embolizing the bleeding vessel, which is especially useful in cases where endoscopic therapy has failed or for patients unfit for surgery.
2. Transjugular Intrahepatic Portosystemic Shunt (TIPS): TIPS is a viable option in variceal bleeding cases where endoscopic and pharmacologic interventions are ineffective. By reducing portal venous pressure, TIPS minimizes the risk of further variceal hemorrhage, offering a long-term solution for patients with advanced liver disease and portal hypertension.

38.6 Post-discharge and Long-Term Management

38.6.1 Prophylactic Antibiotics

In patients with variceal bleeding, prophylactic antibiotics such as ceftriaxone are strongly recommended. Antibiotic prophylaxis reduces the incidence of spontaneous bacterial peritonitis (SBP) and other infections, which are common complications in patients with cirrhosis and UGIB. Prophylactic antibiotic therapy should ideally be initiated upon presentation and continued for up to 7 days, as this duration has been shown to reduce infection rates and improve survival outcomes in this high-risk group.

38.6.2 Helicobacter pylori *Eradication*

For patients with peptic ulcer disease as the underlying cause of UGIB, testing and treating for *Helicobacter pylori* infection is essential. Eradication of H. pylori significantly lowers the recurrence of peptic ulcers and associated bleeding. Typical treatment regimens include a combination of PPIs with antibiotics such as amoxicillin and clarithromycin for 7–14 days. Confirmatory testing post-treatment ensures eradication, which is essential for long-term ulcer management and prevention of rebleeding.

Long-term management also includes PPI maintenance therapy to support ongoing healing and prevent rebleeding, particularly in high-risk patients. Lifestyle adjustments, such as avoiding NSAIDs, reducing alcohol intake, and quitting smoking, further support ulcer healing and reduce the risk of recurrent UGIB.

38.7 Considerations for Special Populations

38.7.1 Older Adults and Comorbidities

Older adults often have higher risks of UGIB-related complications, exacerbated by comorbidities such as cardiovascular and renal diseases. These patients may require a more conservative approach to fluid resuscitation and transfusion, alongside careful monitoring of end-organ function.

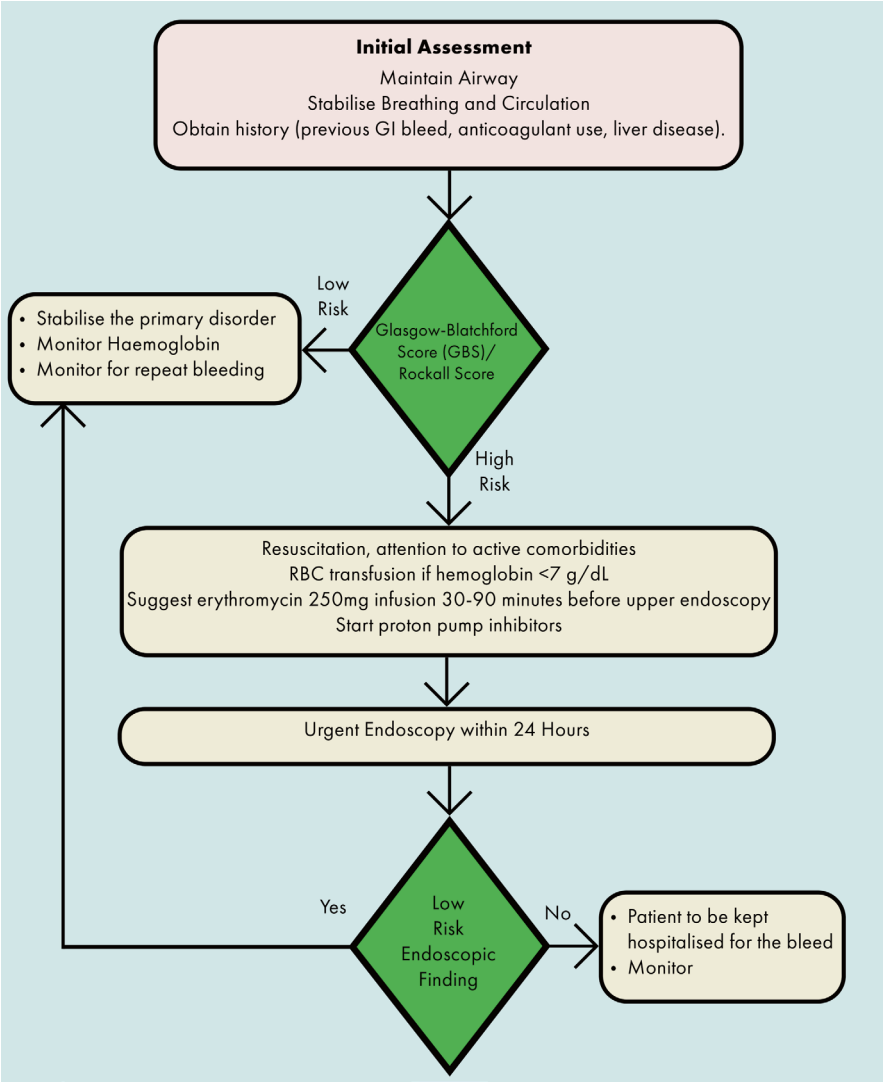
38.7.2 Patients on Antithrombotic Therapy

In patients who require ongoing antithrombotic therapy, careful consideration is required regarding when to resume these medications post-hemostasis. For patients at high thrombotic risk, early reintroduction may be beneficial, but it should be balanced against the potential for rebleeding.

38.8 Conclusion

The management of UGIB in the ICU is a multidisciplinary effort involving gastroenterologists, intensivists, radiologists, and surgeons. Prompt stabilization, risk stratification, timely endoscopy, and appropriate post-endoscopic care are essential in reducing UGIB-associated morbidity and mortality. In complex cases, such as those involving recurrent bleeding or significant comorbid conditions, a collaborative approach among specialties enables optimal care and improves outcomes.

Algorithm 38.1: Approach to upper gastrointestinal bleeding (UGIB) in the ICU



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