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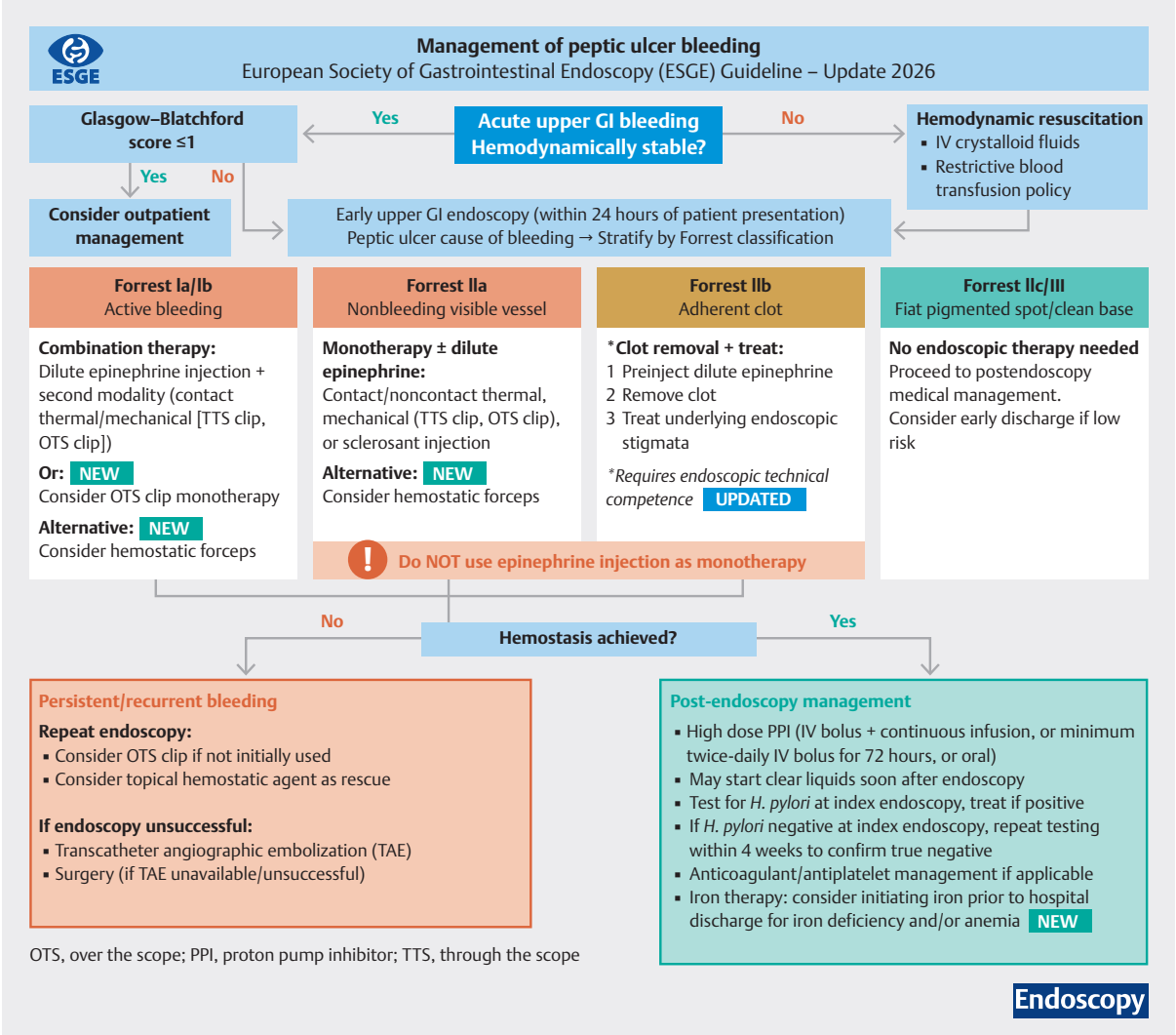
Endoscopic diagnosis and management of peptic ulcer bleeding: European Society of Gastrointestinal Endoscopy (ESGE) Guideline – Update 2026

GRAPHICAL ABSTRACT



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ABSTRACT

This guideline is an update of the 2021 ESGE Guideline on *Endoscopic diagnosis and management of nonvariceal upper gastrointestinal hemorrhage*. The following are the new and/or revised recommendations.

Pre-endoscopy management

1 ESGE does not recommend the routine use of video capsule endoscopy or telemetric blood-sensing capsules in the management of patients with suspected upper gastrointestinal hemorrhage (UGIH).

2 ESGE suggests, if intravenous erythromycin is unavailable, pre-endoscopy administration of intravenous metoclopramide in selected patients with clinically severe or ongoing active UGIH.

3 ESGE suggests that pre-endoscopy high dose intravenous proton pump inhibitor (PPI) therapy be considered in patients presenting with acute UGIH; however, this should not delay early endoscopy.

4 ESGE does not recommend emergent (≤6 hours) or urgent (≤12 hours) upper GI endoscopy unless the patient remains hemodynamically unstable despite adequate resuscitation.

Endoscopic management

5 ESGE suggests that patients with peptic ulcers presenting with an adherent clot (Forrest IIb) should undergo endoscopic therapy, with clot removal and subsequent endoscopic hemostasis if indicated, provided that the endoscopist has the technical competence to safely remove the clot and manage potential conversion to a higher risk bleeding lesion.

6 ESGE could not reach a consensus for or against the routine use of a Doppler endoscopic probe in treatment decisions of high risk endoscopic stigmata of peptic ulcer bleeding.

7 ESGE suggests the use of over-the-scope (OTS) clips as monotherapy as an alternative to combination therapy as first-line therapy for peptic ulcer bleeding with high risk stigmata (FIa, FIb) owing to a lower risk of further bleeding compared with standard endoscopic hemostatic therapy.

8 ESGE recommends, for patients with an ulcer with a nonbleeding visible vessel (FIIa), contact or noncontact thermal therapy, mechanical therapy (e. g. through-the-scope or OTS clips), or injection of a sclerosing agent, each as monotherapy or in combination with epinephrine injection.

9 ESGE suggests, for patients with an ulcer with a nonbleeding visible vessel (FIIa), OTS clips may be used as alternative monotherapy.

10 ESGE suggests hemostatic forceps with soft coagulation may be used as monotherapy in the treatment of peptic ulcer bleeding with high risk stigmata (FIa, FIb, and FIIa).

11 ESGE suggests that hemostatic agents should not be used as monotherapy in the first-line treatment of patients with high risk stigmata of peptic ulcer bleeding.

12 ESGE suggests that, in patients with persistent bleeding refractory to standard hemostasis modalities, the use of a topical hemostatic agent or OTS clips should be considered.

13 ESGE recommends that, in patients with persistent bleeding refractory to all modalities of endoscopic hemostasis, including topical hemostatic agents and OTS clips, transcatheter angiographic embolization (TAE) should be considered. Surgery is indicated when TAE is not locally available or after unsuccessful TAE.

Postendoscopy management

14 ESGE suggests that prophylactic TAE be considered in selected high risk cases of peptic ulcer bleeding (e. g. patients with hemodynamic instability at presentation, posterior duodenal wall ulcer location, large ulcer size [>2 cm], or when durable endoscopic hemostasis is considered uncertain).

15 ESGE could not reach a consensus for or against the routine use of potassium-competitive acid blockers for patients who have undergone endoscopic hemostasis.

16 ESGE recommends that, for patients with clinical evidence of recurrent peptic ulcer bleeding, use of an OTS clip should be considered. Should this second attempt at endoscopic hemostasis also be unsuccessful, TAE should be considered. Surgery is indicated when TAE is either locally unavailable or after unsuccessful TAE.

17 ESGE recommends that, in patients with peptic ulcer hemorrhage who require ongoing anticoagulation therapy, anticoagulation should be resumed as soon as clinically indicated based on thromboembolic risk.

18 ESGE suggests that iron therapy be initiated prior to hospital discharge in patients with peptic ulcer bleeding and iron deficiency and/or anemia.

19 ESGE suggests that early oral nutrition, within 24 hours following endoscopic hemostasis, be initiated in patients with peptic ulcer bleeding in whom durable hemostasis has been achieved.

ABBREVIATIONS

DEP	Doppler endoscopic probe
DOAC	direct oral anticoagulant
ESGE	European Society of Gastrointestinal Endoscopy
GBS	Glasgow–Blatchford score
GI	gastrointestinal
GRADE	Grading of Recommendations Assessment, Development and Evaluation
Hb	hemoglobin
OR	odds ratio
OTS	over the scope
PICO	patient, intervention, control, outcome
PPI	proton pump inhibitor
RBC	red blood cell
RCT	randomized controlled trial
RR	risk ratio
TAE	transcatheter angiographic embolization
TTS	through the scope
UGIH	upper GI hemorrhage
VKA	vitamin K antagonist

SCOPE AND PURPOSE

This Guideline is an official statement of the European Society of Gastrointestinal Endoscopy (ESGE) and is an update of the previously published 2021 ESGE clinical guideline addressing the role of gastrointestinal (GI) endoscopy in the diagnosis and management of acute nonvariceal upper GI hemorrhage. The recommendations and evidence statements in this updated guideline pertain specifically to the pre-endoscopic, endoscopic, and post-endoscopic management of peptic ulcer hemorrhage.

Introduction

The most common causes of acute upper gastrointestinal hemorrhage (UGIH) are nonvariceal. These include gastric and duodenal peptic ulcers, Mallory–Weiss syndrome, Dieulafoy's lesion, malignancy, angioectasias, and mucosal erosive disease of the esophagus/stomach/duodenum. This ESGE clinical guideline focuses exclusively on the pre-endoscopic, endoscopic, and postendoscopic management of patients with pep-

tic ulcer hemorrhage. It is an update of the 2021 ESGE Guideline on the endoscopic diagnosis and management of nonvariceal UGIH [1]. Endoscopic management recommendations for nonulcer, nonvariceal UGIH etiologies can be found in a recently published ESGE-endorsed guideline from the Canadian Association of Gastroenterology [2].

Methods

The ESGE commissioned this updated clinical guideline (ESGE Guideline Committee chair, T.C.T.) and appointed a guideline leader (I.M.G.), who established three task forces to review the evidence and provide updated statements/recommendations (taskforce #1, pre-endoscopy statements; taskforce #2, endoscopy statements; taskforce #3 postendoscopy statements), each with its own leader (M.C., J.M., S.B.L.). These three taskforces made up the "guideline group." PICO (patient, intervention, control, outcome) questions were prepared by the guideline leader (I.M.G.), the three taskforce leaders (M.C., J.M., S.B.L.), and the ESGE Guideline Committee chair (T.C.T.) and then assigned to the three taskforces (**Appendix 1s**, see online-only Supplementary material).

Based on the PICO questions, a professional librarian performed a structured, systematic literature search of English-language articles from 1946 to August 2025 using keywords in Ovid MEDLINE, EMBASE, and the Cochrane Database of Systematic Reviews. The results of the literature search were distributed to each taskforce for review, inclusion of relevant studies, synthesis of the evidence, and development of statements. A methodologist (G.T.) assisted the taskforces in performing the evidence synthesis, assessed the certainty of evidence, developed evidence profiles, and facilitated guideline group discussions. Evidence on each PICO question was summarized in tables using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) system [3] (**Appendix 1s)**. Further details on ESGE guideline development have been previously reported [4].

During two online face-to-face meetings of the entire guideline group on 11 December 2025 and 7 January 2026 proposed guideline statements were presented and discussed. In February 2026, I.M.G. prepared the initial manuscript, containing the new and updated recommendations, along with those that were carried forward from the previous 2021 guideline (▶ **Table 1**). This was then distributed for review and revision to the entire guideline group. After agreement of all guideline group members had been obtained, the manuscript was reviewed by the chair of the ESGE Publications Working Group (M.B.) and two independent external reviewers. The manuscript was then sent for further comments to the 49 ESGE member societies and 5500+ ESGE individual members, after

▶ **Table 1** Summary of Guideline statements and recommendations.

Previous ESGE Guideline 2021		Updated ESGE Guideline 2026	
Recommendation	**Strength of recommendation/quality of evidence**	**Recommendation**	**Strength of recommendation/quality of evidence**
Pre-endoscopy management			
Initial patient evaluation and hemodynamic resuscitation			
ESGE recommends immediate assessment of hemodynamic status in patients who present with acute upper gastrointestinal hemorrhage (UGIH), with prompt intravascular volume replacement, initially using crystalloid fluids, if hemodynamic instability exists	Strong/low	No change	No change
Red blood cell (RBC) transfusion strategy			
ESGE recommends, in hemodynamically stable patients with acute UGIH and no history of cardiovascular disease, a restrictive RBC transfusion strategy, with a hemoglobin (Hb) threshold of <7 g/dL prompting RBC transfusion. A post-transfusion target Hb concentration of 7–9 g/dL is desirable	Strong / moderate	No change	No change
ESGE recommends, in hemodynamically stable patients with acute UGIH and a history of acute or chronic cardiovascular disease, a more liberal RBC transfusion strategy, with a Hb threshold of ≤8 g/dL prompting RBC transfusion. A post-transfusion target Hb concentration of ≥10 g/dL is desirable	Strong/low	No change	No change

▶ **Table 1** (Continuation)

Previous ESGE Guideline 2021		Updated ESGE Guideline 2026	
Recommendation	**Strength of recommendation/quality of evidence**	**Recommendation**	**Strength of recommendation/quality of evidence**
Patient risk stratification			
ESGE recommends, in patients with acute UGIH, the use of the Glasgow–Blatchford Score (GBS) for pre-endoscopy risk stratification. Patients with GBS ≤1 are at very low risk of rebleeding, mortality within 30 days, or needing hospital-based intervention and can be safely managed as outpatients with outpatient endoscopy	Strong/moderate	ESGE recommends the use of the Glasgow–Blatchford Score (GBS) for pre-endoscopy risk stratification in patients with acute UGIH. Patients with a GBS ≤1 can be safely managed as outpatients with outpatient endoscopy	Strong/moderate
		ESGE does not recommend the routine use of video capsule endoscopy or telemetric blood-sensing capsules in the management of patients with suspected UGIH	Strong/very low
Antithrombotic medications (antiplatelet agents and anticoagulants)			
ESGE recommends in patients with acute UGIH taking low dose aspirin as monotherapy for primary cardiovascular prophylaxis, aspirin be temporarily interrupted. Aspirin can be restarted after careful re-evaluation of its clinical indication	Strong/low	No change, previous guideline recommendations were not re-evaluated	N/A
ESGE recommends in patients with acute UGIH taking low dose aspirin as monotherapy for secondary cardiovascular prophylaxis, aspirin not be interrupted. If for any reason it is interrupted, aspirin should be restarted as soon as possible, preferably within 3–5 days	Strong/moderate		
ESGE recommends in patients with acute UGIH taking dual antiplatelet therapy for secondary cardiovascular prophylaxis, aspirin not be interrupted. The second antiplatelet agent should be interrupted, but restarted as soon as possible, preferably within 5 days. Cardiology consultation is suggested	Strong/low		
ESGE does not recommend routine platelet transfusion for patients with acute non-variceal UGIH taking antiplatelet agents	Strong/low		
ESGE does not recommend the use of tranexamic acid in patients with acute non-variceal UGIH	Strong/high		
ESGE recommends in patients with acute UGIH taking a vitamin K antagonists (VKA), that the anticoagulant be withheld	Strong/low		
ESGE recommends in patients with acute UGIH taking VKAs who have hemodynamic instability, low dose vitamin K supplemented with intravenous prothrombin complex concentrate (PCC), or fresh frozen plasma (FFP) if PCC is not available, be administered. However, this should not delay endoscopy or if required, endoscopic hemostasis	Strong/low		

▶ **Table 1** (Continuation)

Previous ESGE Guideline 2021		Updated ESGE Guideline 2026	
Recommendation	**Strength of recommendation/quality of evidence**	**Recommendation**	**Strength of recommendation/quality of evidence**
ESGE recommends in patients with acute UGIH taking direct oral anticoagulants (DOACs), that the anticoagulant be withheld and endoscopy not delayed. In patients with severe ongoing bleeding, use of a DOAC reversal agent or intravenous PCC should be considered	Strong/low	No change, previous guideline recommendations were not re-evaluated	N/A
Prokinetic medications			
ESGE recommends pre-endoscopy administration of intravenous erythromycin in selected patients with clinically severe and/or ongoing active UGIH	Strong/high	No change	No change
No previous recommendation in 2021	N/A	ESGE suggests, if intravenous erythromycin is unavailable, pre-endoscopy administration of intravenous metoclopramide in selected patients with clinically severe or ongoing active UGIH	Conditional/low
Proton pump inhibitors (PPIs)			
ESGE suggests that pre-endoscopy high dose intravenous PPI be considered in patients presenting with acute UGIH to downstage endoscopic stigmata and thereby reduce the need for endoscopic therapy; however, this should not delay early endoscopy	Weak/high	ESGE suggests that pre-endoscopy high dose intravenous PPI therapy be considered in patients presenting with acute UGIH; however, this should not delay early endoscopy	Conditional/low
Somatostatin and somatostatin analogues			
ESGE does not recommend the use of somatostatin, or its analogue octreotide, in patients with nonvariceal UGIH	Strong/low	No change, previous guideline recommendation was not re-evaluated	N/A
Nasogastric/orogastric tube aspiration and lavage			
ESGE does not recommend the routine use of nasogastric or orogastric aspiration/lavage in patients presenting with acute UGIH	Strong/moderate	No change, previous guideline recommendation was not re-evaluated	N/A
Endotracheal intubation			
ESGE does not recommend routine prophylactic endotracheal intubation for airway protection prior to upper GI endoscopy in patients with acute UGIH	Strong/high	No change	No change
ESGE recommends prophylactic endotracheal intubation for airway protection prior to upper GI endoscopy only in selected patients with acute UGIH (i. e. those with ongoing active hematemesis, agitation, or encephalopathy with inability to adequately control the airway)	Strong/low	No change	No change

▶ **Table 1** (Continuation)

Previous ESGE Guideline 2021		Updated ESGE Guideline 2026	
Recommendation	**Strength of recommendation/quality of evidence**	**Recommendation**	**Strength of recommendation/quality of evidence**
Endoscopic management			
Timing of upper GI endoscopy			
ESGE recommends adopting the following definitions regarding the timing of upper GI endoscopy in acute UGIH relative to the time of patient presentation: urgent ≤12 hours, early ≤24 hours, and delayed >24 hours	Strong/moderate	No change	No change
ESGE recommends that, following hemodynamic resuscitation, early (≤24 hours) upper GI endoscopy be performed	Strong/high	No change	Strong/low
No previous recommendation in 2021	N/A	ESGE does not recommend emergent (≤6 hours) or urgent (≤12 hours) upper GI endoscopy unless the patient remains hemodynamically unstable despite adequate resuscitation	Strong/moderate
ESGE recommends that the use of antiplatelet agents, anticoagulants, or a predetermined INR cutoff level should not be used to define or guide the timing of upper GI endoscopy in patients with acute UGIH	Strong/low	No change, previous guideline recommendation was not re-evaluated	N/A
ESGE recommends the availability of both an on-call GI endoscopist proficient in endoscopic hemostasis and on-call nursing staff with technical expertise in the use of endoscopic devices to allow performance of endoscopy on a 24/7 basis	Strong/low	No change, previous guideline recommendation was not re-evaluated	N/A
Endoscopic diagnosis			
ESGE recommends the Forrest (F) classification be used in all patients with peptic ulcer hemorrhage to differentiate low and high risk endoscopic stigmata	Strong/high	No change	No change
ESGE recommends that peptic ulcers with spurting or oozing bleeding (FIa and FIb respectively) or with a nonbleeding visible vessel (FIIa) receive endoscopic hemostasis because these lesions are at high risk for persistent bleeding or recurrent bleeding	Strong/high	No change	No change
ESGE suggests that peptic ulcers with an adherent clot (FIIb) be considered for endoscopic clot removal. Once the clot is removed, any identified underlying active bleeding (FIa or FIb) or nonbleeding visible vessel (FIIa) should receive endoscopic hemostasis.	Weak/moderate	ESGE suggests that patients with peptic ulcers presenting with an adherent clot (FIIb) should undergo endoscopic therapy, with clot removal and subsequent endoscopic hemostasis if indicated, provided that the endoscopist has the technical competence to safely remove the clot and manage potential conversion to a higher risk bleeding lesion	Conditional/very low

▶ **Table 1** (Continuation)

Previous ESGE Guideline 2021		Updated ESGE Guideline 2026	
Recommendation	**Strength of recommendation/quality of evidence**	**Recommendation**	**Strength of recommendation/quality of evidence**
ESGE does not recommend endoscopic hemostasis in patients with peptic ulcers that have a flat pigmented spot (FIIc) or clean base (FIII), as these stigmata have a low risk of adverse outcomes. In selected clinical settings, these patients may have an expedited hospital discharge	Strong/moderate	No change	No change
ESGE does not recommend the routine use of Doppler endoscopic probe in the evaluation of endoscopic stigmata of peptic ulcer bleeding	Strong/low	ESGE could not reach a consensus for or against the routine use of a Doppler endoscopic probe in treatment decisions of high risk endoscopic stigmata of peptic ulcer bleeding	No recommendation/very low
Endoscopic hemostasis			
ESGE recommends, for patients with actively bleeding ulcers (FIa, FIb), combination therapy using epinephrine injection plus a second hemostasis modality (contact thermal or mechanical therapy)	Strong/high	No change	No change
ESGE suggests that, in selected actively bleeding ulcers (FIa, FIb), specifically those >2 cm in size, with a large visible vessel >2 mm, or located in a high risk vascular area (e. g. gastroduodenal, left gastric arteries), or in excavated/fibrotic ulcers, endoscopic hemostasis using a cap-mounted clip should be considered as first-line therapy	Weak/low	ESGE suggests the use of over-the-scope (OTS) clips as monotherapy as an alternative to combination therapy as first-line therapy for peptic ulcer bleeding with high risk stigmata (FIa, FIb) owing to a lower risk of further bleeding compared with standard endoscopic hemostatic therapy	Conditional/very low
ESGE recommends, for patients with an ulcer with a nonbleeding visible vessel (FIIa), contact or noncontact thermal therapy, mechanical therapy, or injection of a sclerosing agent, each as monotherapy or in combination with epinephrine injection	Strong/high	ESGE recommends, for patients with an ulcer with a nonbleeding visible vessel (FIIa), contact or noncontact thermal therapy, mechanical therapy (e. g. through-the-scope or OTS clips), or injection of a sclerosing agent, each as monotherapy or in combination with epinephrine injection	Strong/moderate
No previous recommendation in 2021	N/A	ESGE suggests, for patients with an ulcer with a nonbleeding visible vessel (FIIa), OTS clips may be used as alternative monotherapy	Conditional/very low
ESGE suggests considering the use of hemostatic forceps as an alternative endoscopic hemostasis option in peptic ulcer hemorrhage	Weak/moderate	ESGE suggests hemostatic forceps with soft coagulation may be used as monotherapy in the treatment of peptic ulcer bleeding with high risk stigmata (FIa, FIb, and FIIa)	Conditional/very low
ESGE does not recommend that epinephrine injection be used as endoscopic monotherapy. If used, it should be combined with a second endoscopic hemostasis modality	Strong/high	No change	No change
No previous recommendation in 2021	N/A	ESGE suggests that topical hemostatic agents should not be used as monotherapy in the first-line treatment of patients with high risk endoscopic stigmata of peptic ulcer bleeding	Conditional/very low

▶ **Table 1** (Continuation)

Previous ESGE Guideline 2021		Updated ESGE Guideline 2026	
Recommendation	**Strength of recommendation/quality of evidence**	**Recommendation**	**Strength of recommendation/quality of evidence**
ESGE recommends that persistent bleeding be defined as ongoing active bleeding refractory to standard hemostasis modalities	Strong/high	No change	No change
ESGE suggests that, in patients with persistent bleeding refractory to standard hemostasis modalities, the use of a topical hemostatic spray/powder or cap-mounted clip should be considered	Weak/low	ESGE suggests that, in patients with persistent bleeding refractory to standard hemostasis modalities, the use of a topical hemostatic agent or OTS clips should be considered	Conditional/very low
ESGE recommends that in patients with persistent bleeding refractory to **all** modalities of endoscopic hemostasis, transcatheter angiographic embolization (TAE) should be considered. Surgery is indicated when TAE is not locally available or after failed TAE	Strong/moderate	ESGE recommends that, in patients with persistent bleeding refractory to all modalities of endoscopic hemostasis, including topical hemostatic agents and OTS clips, TAE should be considered. Surgery is indicated when TAE is not locally available or after unsuccessful TAE	Strong/moderate
Postendoscopy management			
Prophylactic TAE			
No previous recommendation in 2021	N/A	ESGE suggests that prophylactic TAE be considered in selected high risk cases of peptic ulcer bleeding (e. g. patients with hemodynamic instability at presentation, posterior duodenal wall ulcer location, large ulcer size [>2 cm], or when durable endoscopic hemostasis is considered uncertain)	Conditional/very low quality
Antisecretory therapy			
ESGE recommends high dose PPI therapy for patients who have undergone endoscopic hemostasis and for patients with FIIb ulcer stigmata (adherent clot) not treated endoscopically PPI therapy should be administered as an intravenous bolus followed by continuous infusion (e. g. 80 mg then 8 mg/hour) for 72 hours postendoscopy or high dose PPI therapy given as intravenous bolus dosing (twice daily) or in oral formulation (twice daily) can be considered as alternative regimens	Strong/high	No change	No change
No previous recommendation in 2021	N/A	ESGE could not reach a consensus for or against the routine use of potassium-competitive acid blockers for patients who have undergone endoscopic hemostasis	No recommendation/very low
Second-look endoscopy			
ESGE does not recommend routine second-look endoscopy as part of the management of nonvariceal UGIH	Strong/high	No change, previous guideline recommendation was not re-evaluated	N/A
Management of recurrent bleeding			
ESGE recommends that recurrent bleeding be defined as bleeding following initial successful endoscopic hemostasis	Strong/high	No change	No change

▶ **Table 1** (Continuation)

Previous ESGE Guideline 2021		Updated ESGE Guideline 2026	
Recommendation	**Strength of recommendation/quality of evidence**	**Recommendation**	**Strength of recommendation/quality of evidence**
ESGE recommends, for patients with clinical evidence of recurrent bleeding, repeat upper GI endoscopy with hemostasis if indicated	Strong/high	No change	No change
ESGE recommends, in the case of failure of this second attempt at endoscopic hemostasis, TAE should be considered. Surgery is indicated when TAE is not locally available or after failed TAE	Strong/high	ESGE recommends that, for patients with clinical evidence of recurrent peptic ulcer bleeding, use of an OTS clip should be considered. Should this second attempt at endoscopic hemostasis also be unsuccessful, TAE should be considered. Surgery is indicated when TAE is either locally unavailable or after unsuccessful TAE	Strong/moderate
Restarting antithrombotic medications (antiplatelet agents, anticoagulants)			
ESGE recommends in patients who have had acute nonvariceal UGIH and require ongoing dual antiplatelet therapy, PPI be given as co-therapy	Strong/moderate	No change, previous guideline recommendation was not re-evaluated	N/A
ESGE recommends PPI for gastroduodenal prophylaxis in patients requiring ongoing anticoagulation and a history of nonvariceal UGIH	Strong/low	No change, previous guideline recommendation was not re-evaluated	N/A
No previous recommendation in 2021	N/A	ESGE recommends that, in patients with peptic ulcer hemorrhage who require ongoing anticoagulation therapy, anticoagulation should be resumed as soon as clinically indicated based on thromboembolic risk	Strong/low
Helicobacter pylori			
ESGE recommends, in patients with peptic ulcer bleeding, investigating for the presence of *H. pylori* in the acute setting (at first endoscopy), with initiation of appropriate antibiotic therapy if *H. pylori* is detected	Strong/high	No change	No change
ESGE recommends retesting for *H. pylori* in those patients with a negative test at first endoscopy	Strong/high	No change	No change
ESGE recommends documentation of successful *H. pylori* eradication	Strong/high	No change	No change
Iron therapy			
No previous recommendation in 2021	N/A	ESGE suggests that iron therapy be initiated prior to hospital discharge in patients with peptic ulcer bleeding and iron deficiency and/or anemia	Conditional/low
Restarting oral nutrition			
No previous recommendation in 2021	N/A	ESGE suggests that early oral nutrition, within 24 hours following endoscopic hemostasis, be initiated in patients with peptic ulcer bleeding in whom durable hemostasis has been achieved	Conditional/low

which the guideline was submitted to the journal *Endoscopy* for publication. This ESGE Guideline was published in 2026, and will be considered for update in 2031 or when new, potentially practice-changing evidence becomes available.

1 Pre-endoscopy management

1.1 Initial patient evaluation and hemodynamic resuscitation

RECOMMENDATION

ESGE recommends immediate assessment of hemodynamic status in patients who present with acute UGIH, with prompt intravascular volume replacement, initially using crystalloid fluids, if hemodynamic instability exists.

Strong recommendation, low quality evidence.

Early intensive hemodynamic resuscitation of patients with acute UGIH has been shown to significantly decrease mortality [5]. Two recent meta-analyses [6, 7] reported that hemodynamic instability is a common problem affecting 1 in 4 patients presenting with acute nonvariceal UGIH [6] and that it is associated with an increased risk of in-hospital mortality (odds ratio [OR] 4.79, 95%CI 2.62 to 8.97) and in-hospital rebleeding (OR 4.95, 95%CI 1.70 to 14.44) [7]. The definition of "hemodynamic instability" in acute UGIH varies among published studies [7]; however, the most common definitions are systolic blood pressure (SBP) <100 mmHg alone, SBP <90 mmHg alone, and SBP <100 mmHg with pulse >100 beats per minute [7]. Both meta-analyses underscore the importance of evaluating patients presenting with signs and/or symptoms of acute UGIH for hemodynamic instability and initiating immediate hemodynamic resuscitation. Moreover, any underlying patient co-morbidities should be addressed prior to upper GI endoscopy.

1.2 Red blood cell transfusion strategy

RECOMMENDATION

ESGE recommends, in hemodynamically stable patients with acute UGIH and no history of cardiovascular disease, a restrictive red blood cell (RBC) transfusion strategy, with a hemoglobin (Hb) threshold of <7 g/dL prompting RBC transfusion. A post-transfusion target Hb concentration of 7–9 g/dL is desirable.

Strong recommendation, moderate quality evidence.

RECOMMENDATION

ESGE recommends, in hemodynamically stable patients with acute UGIH and a history of acute or chronic cardiovascular disease, a more liberal RBC transfusion strategy, with a Hb threshold of ≤8 g/dL prompting RBC transfusion. A post-transfusion target Hb concentration of ≥10 g/dL is desirable.

Strong recommendation, low quality evidence.

A restrictive red blood cell (RBC) transfusion strategy is standard clinical practice in non-massive acute UGIH. This recommendation is based on several randomized controlled trials (RCTs) and meta-analyses reporting comparable, and sometimes improved, outcomes versus a liberal RBC transfusion strategy [1].

We identified one new RCT since the last guideline update and one meta-analysis of RCTs specifically addressing RBC transfusion thresholds in acute UGIH [8, 9]. Kola et al. randomized 224 UGIH patients to a restrictive (hemoglobin [Hb] <7 g/dL, post-transfusion target Hb 9 g/dL) versus a liberal transfusion strategy (Hb <8 g/dL, post-transfusion target Hb 10 g/dL) [9]. They reported that 45-day mortality (10/112 vs. 12/112; $P = 0.65$), in-hospital bleeding episodes, 45-day rebleeding, need for endoscopic band ligation, and hospital length of stay were similar between the groups, confirming the noninferiority of the RBC restrictive transfusion strategy. A meta-analysis by Teutsch et al., including seven RCTs of UGIH, found no signal of harm with the use of a lower Hb transfusion threshold. A restrictive RBC transfusion strategy did not increase in-hospital or 30-day mortality, nor in-hospital or 28–45-day rebleeding rates [8]. A restrictive transfusion strategy reduced the number of RBC units transfused, with individual studies suggesting there were fewer transfusion reactions and post-transfusion interventions, while Hb thresholds >8 g/dL were associated with more adverse outcomes.

These new data reinforce a restrictive RBC transfusion strategy. Evidence remains limited however in patients with acute or chronic cardiovascular disease, for whom a slightly more liberal blood transfusion threshold (Hb ≤8 g/dL) continues to be recommended by extrapolation from broader cardiovascular blood transfusion trials [1].

1.3 Patient risk stratification

RECOMMENDATION

ESGE recommends the use of the Glasgow–Blatchford score (GBS) for pre-endoscopy risk stratification in patients with acute UGIH. Patients with a GBS ≤1 can be safely managed as outpatients with outpatient endoscopy.

Strong recommendation, moderate quality evidence.

RECOMMENDATION
ESGE does not recommend the routine use of video capsule endoscopy or telemetric blood-sensing capsules in the management of patients with suspected UGIH.
Strong recommendation, very low quality evidence.

Given the lack of new evidence directly comparing outcomes between patients admitted to hospital and those discharged from the emergency department based on pre-endoscopic risk stratification scores, we did not change the recommendation from the previous guideline [10]. To ensure safe and feasible outpatient management, the patient must receive prompt outpatient GI/endoscopy follow-up, have the ability to return to the emergency department if needed, be instructed to be aware of any recurrent signs/symptoms of bleeding, and have an understanding of the follow-up clinical plan. The guideline group also wished to reiterate that no risk stratification tool should replace clinicians' judgement.

Across recently published studies, capsule-based strategies for acute UGIH have shown signals of benefit, although these have been primarily in patient triage, rather than in hard outcomes. Randomized and cohort data suggest that video capsule endoscopy performed in the emergency department safely increases same-day discharge and reduces the need for urgent inpatient upper GI endoscopy in hemodynamically stable patients, without evidence of rebleeding or mortality at 7–30 days [11]. Telemetric blood-sensing capsules may aid in patient triage and guide clinical decision-making for individuals presenting with suspected UGIH [12, 13]. These blood-sensing capsules demonstrate high technical success and diagnostic accuracy for detecting blood in the upper GI tract. Negative tests are associated with the absence of rebleeding and may allow for downgrading of the need for urgent upper GI endoscopy or the avoidance of endoscopy altogether [12, 13].

Systematic reviews/meta-analyses also appear to support these findings: as compared with standard risk stratification scores alone, capsule-based triage pathways reduce hospital admissions and the need for early upper GI endoscopy in suspected UGIH [14, 15]. A meta-analysis of artificial intelligence-assisted wireless capsule endoscopy further suggests that automated analyses could enhance the speed and consistency of capsule interpretation, although this did not translate into patient-level outcome data [16]. Most datasets are however small, often observational, heterogeneous in inclusion criteria and end points, and are powered for process outcomes (need for hospital admission and/or upper GI endoscopy) rather than mortality, which results in overall low certainty and restriction of recommendations to selected, hemodynamically stable patients in experienced centers. Moreover, cost-effectiveness, availability, and training have been incompletely addressed.

1.4 Prokinetic medications

RECOMMENDATION
ESGE recommends pre-endoscopy administration of intravenous erythromycin in selected patients with clinically severe and/or ongoing active UGIH.
Strong recommendation, high quality evidence.

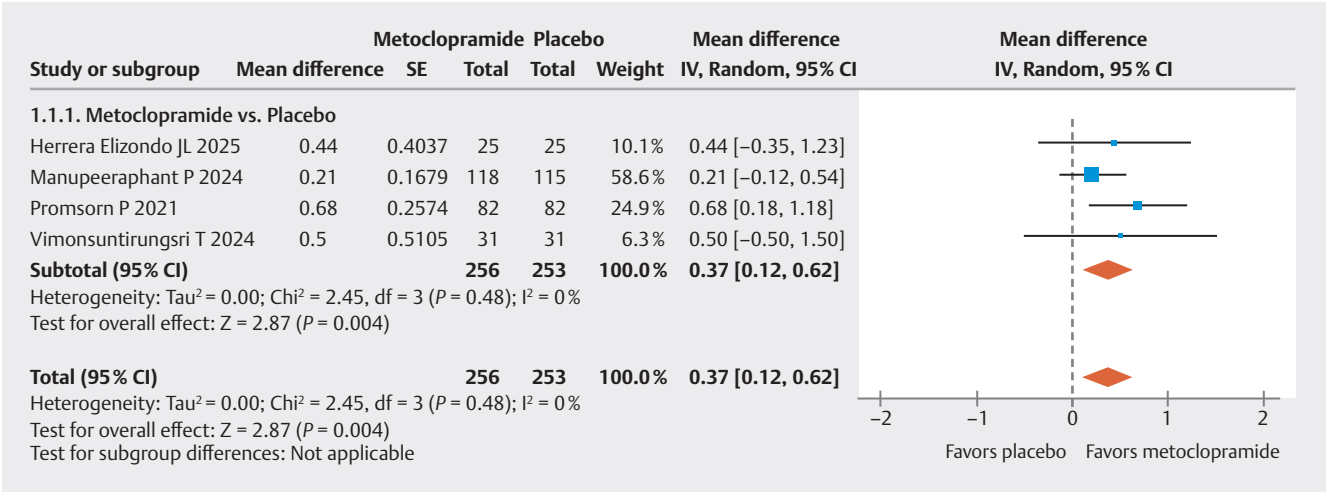
RECOMMENDATION
ESGE suggests, if intravenous erythromycin is unavailable, pre-endoscopy administration of intravenous metoclopramide in selected patients with clinically severe or ongoing active UGIH.
Conditional recommendation, low quality evidence.

Since the publication of ESGE's guideline on peptic ulcer bleeding in 2021 [1], there have been several published studies, including six RCTs, examining the efficacy of prokinetics (erythromycin, metoclopramide, azithromycin) for improving endoscopic visualization of the upper GI tract in patients with acute UGIH [17, 18, 19, 20, 21, 22].

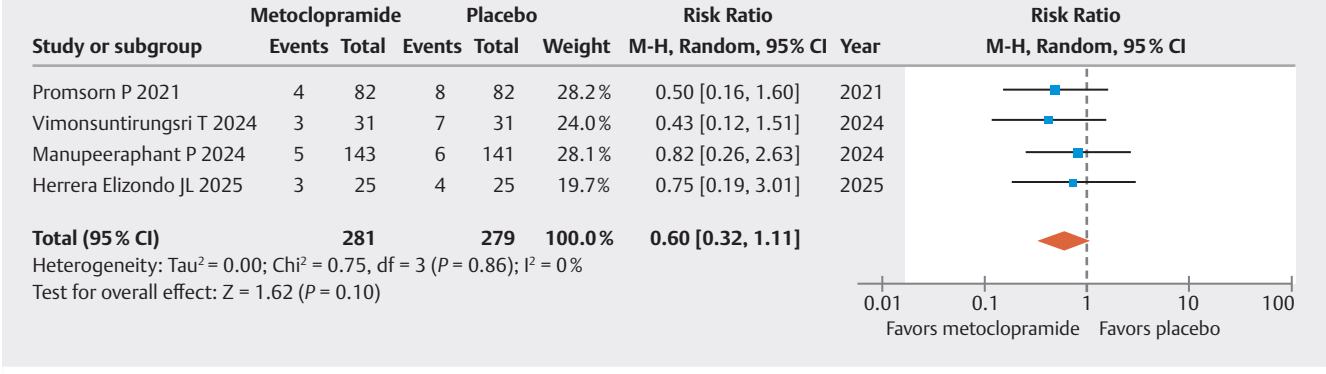
We performed a meta-analysis using data from the four RCTs (two fully published original articles and two published conference abstracts) that evaluated intravenous metoclopramide versus placebo in patients presenting with UGIH, both non-variceal and variceal in etiology. We found that, compared with placebo, intravenous metoclopramide administered prior to upper GI endoscopy significantly improved mucosal exposure and endoscopic visualization (▶ **Fig. 1**). There were however no significant differences in units of blood transfused or hospital length of stay, although there was a possible trend toward a reduced need for second-look endoscopy (▶ **Fig. 2**).

Our risk of bias assessment found the quality of the included studies to be of moderate quality. The lack of imprecision, indirectness, and inconsistency led to uprating the level of evidence and strength of recommendation according to GRADE. A meta-analysis by Waseem et al., published after our initial search strategy was performed, reported similar results [23].

The widespread availability, feasibility, and low costs associated with metoclopramide are factors that support its use; however, the potential for serious adverse events with its use, including anaphylaxis, serotonin syndrome, extrapyramidal reaction, and cardiac arrhythmia must be acknowledged. Only a single RCT among those included in our meta-analysis provided insights regarding adverse events following metoclopramide use, with the investigators reporting no adverse events [20]. Intravenous metoclopramide could be considered for use as part of the pre-endoscopy management of patients presenting with acute UGIH but, given the potential for adverse events, caution should be exercised. Therefore, the use of intravenous erythromycin is preferred as per ESGE's prior strong recommendation, but the use of intravenous metoclopramide is a



▶ **Fig. 1** Effect of metoclopramide vs. placebo regarding adequate mucosal exposure.



▶ **Fig. 2** Effect of metoclopramide vs. placebo regarding requirements for second-look endoscopy.

reasonable alternative when intravenous erythromycin is unavailable.

CRITERIA FOR "SELECTED" PATIENTS TO RECEIVE INTRAVENOUS ERYTHROMYCIN PRIOR TO UPPER GI ENDOSCOPY IN ACUTE UGIH

Criteria

- Presentation with acute UGIH (fresh blood hematemesis, coffee ground emesis, melena)
- Persisting hematemesis
- Clinical suspicion for residual blood / clots in upper GI tract
- No known macrolide allergy
- No known QT interval prolongation
- No concomitant use of a medication with possible interaction with macrolide antibiotics

1.5 Proton pump inhibitors

RECOMMENDATION

ESGE suggests that pre-endoscopy high dose intravenous proton pump inhibitor (PPI) therapy be considered in patients presenting with acute UGIH; however, this should not delay early endoscopy.

Conditional recommendation, low quality evidence.

In 2019, the International Consensus Group on nonvariceal UGIH recommended that "pre-endoscopic PPI therapy may be considered to downstage the endoscopic lesion and decrease the need for endoscopic intervention but should not delay endoscopy" [24]. In 2021, The American College of Gastroenterology could not reach a recommendation for or against pre-endoscopic PPI therapy in patients presenting with acute UGIH [25]. In our 2021 guideline, we have previously suggested that "pre-endoscopy high dose intravenous PPI be considered in patients presenting with acute UGIH to downstage endoscopic

stigmata and thereby reduce the need for endoscopic therapy; however, this should not delay early endoscopy" [1]. In a recent multicenter retrospective cohort study from Italy, including 2566 patients, there was no difference in the prevalence of high risk endoscopic stigmata, in peptic ulcer and nonulcer lesions, between those receiving a pre-endoscopic PPI and those not receiving PPI (51.8% vs. 53.4%; $P=0.58$) [26]. In multivariate analyses, PPI therapy was not an independent predictor of endoscopic high risk stigmata prevalence (OR 1.16, 95%CI 0.82 to 1.64; $P=0.40$).

A meta-analysis by the Cochrane Gut Group [27], referenced in the ESGE 2021 guideline, was updated in 2022 [28]. This updated meta-analysis did not identify new evidence between 2010 and 2020 and thus included the same six original RCTs. The updated meta-analysis found that pre-endoscopic PPI use may reduce rebleeding (OR 0.81, 95%CI 0.62 to 1.06) and likely reduces the need for endoscopic hemostasis at index endoscopy (OR 0.68, 95%CI 0.50 to 0.93). Pre-endoscopic PPI may not however reduce mortality (OR 1.14, 95%CI 0.76 to 1.70), the need for surgery (OR 0.91, 95%CI 0.65 to 1.26), or the proportion of UGIH patients with high risk endoscopic stigmata of recent hemorrhage at index endoscopy (OR 0.80, 95%CI 0.52 to 1.21) [28]. The authors pointed out that the certainty of evidence for mortality was downrated owing to study limitations. Moreover, some of the included RCTs were at high risk of bias owing to lack of blinding and unclear random sequence generation and allocation concealment.

1.6 Endotracheal intubation

RECOMMENDATION
ESGE does not recommend routine prophylactic endotracheal intubation for airway protection prior to upper GI endoscopy in patients with acute UGIH.
Strong recommendation, high quality evidence.

RECOMMENDATION
ESGE recommends prophylactic endotracheal intubation for airway protection prior to upper GI endoscopy only in selected patients with acute UGIH (i.e. those with ongoing active hematemesis, agitation, or encephalopathy with inability to adequately control the airway).
Strong recommendation, low quality evidence.

Since publication of the 2021 ESGE guideline on nonvariceal UGIH, only additional observational retrospective data on prophylactic endotracheal intubation have emerged. These data confirm earlier concerns regarding increased pulmonary adverse events (e.g. aspiration, pneumonia) and longer hospital stays without a consistent mortality benefit. These new studies remain at high risk of confounding and fail to resolve key uncertainties regarding clear indications, patient selection, or cost-effectiveness [29]. Consequently, the 2021 recommendations against routine prophylactic intubation and for selective use only in high risk patients remain unchanged.

2 Endoscopic management

2.1 Timing of upper GI endoscopy

RECOMMENDATION
ESGE recommends adopting the following definitions regarding the timing of upper GI endoscopy in acute UGIH relative to the time of patient presentation: urgent ≤12 hours, early ≤24 hours, and delayed >24 hours.
Strong recommendation, moderate quality evidence.

RECOMMENDATION
ESGE recommends that, following hemodynamic resuscitation, early (≤24 hours) upper GI endoscopy be performed.
Strong recommendation, low quality evidence.

RECOMMENDATION
ESGE does not recommend emergent (≤6 hours) or urgent (≤12 hours) upper GI endoscopy unless the patient remains hemodynamically unstable despite adequate resuscitation.
Strong recommendation, moderate quality evidence.

Evidence on the timing of upper GI endoscopy in acute UGIH is derived from four contemporary systematic reviews and meta-analyses [30, 31, 32, 33], incorporating randomized and observational studies, and one recent RCT [34]. Importantly, the available evidence is based mainly on nonrandomized observational studies with high inconsistency due to high heterogeneity. In addition, owing to high variability of the definitions of "high risk" bleeding, timing of upper GI endoscopy, the endoscopic modalities applied, and the mix of older and contemporary endoscopic practices, the guideline group has downgraded the quality of the evidence. However, across this body of evidence, early endoscopy, performed within 24 hours of hospital presentation following adequate hemodynamic resuscitation, is associated with a higher likelihood of the use of endoscopic hemostasis therapy and a modest reduction in hospital length of stay. There is however no observed reduction in mortality or rebleeding compared with delayed endoscopy, with reported mortality (3%–6%) and rebleeding rates (7%–11%) remaining similar between the groups [30, 31, 32, 33].

In contrast, very early or urgent endoscopy (≤12 hours), and in particular emergent endoscopy (≤6 hours), has not shown clinical benefit over early endoscopy in randomized trials [34] or in observational studies, and is frequently associated with higher rates of rebleeding and, in some cohorts, increased rates

of mortality, surgery, or repeat endoscopy, findings likely influenced by confounding by indication and incomplete hemodynamic resuscitation [33]. A pivotal RCT by Lau et al. [34] similarly demonstrated no improvement in 30-day mortality, rebleeding, transfusion requirements, or length of hospital stay with endoscopy performed within 6 hours of GI consultation, compared with that performed at 6–24 hours, despite the greater use of endoscopic hemostasis. Overall, these data support performing upper GI endoscopy within 24 hours of patient presentation following hemodynamic stabilization to optimize diagnostic and therapeutic efficiency. Unless there is ongoing active bleeding or persistent hemodynamic instability, routine urgent or emergent endoscopy in hemodynamically stable patients should be avoided.

2.2 Endoscopic diagnosis

RECOMMENDATION

ESGE recommends the Forrest (F) classification be used in all patients with peptic ulcer hemorrhage to differentiate low and high risk endoscopic stigmata.

Strong recommendation, high quality evidence.

RECOMMENDATION

ESGE recommends that peptic ulcers with spurting or oozing bleeding (FIa and FIb respectively) or with a nonbleeding visible vessel (FIIa) receive endoscopic hemostasis because these lesions are at high risk for persistent bleeding or recurrent bleeding.

Strong recommendation, high quality evidence.

RECOMMENDATION

ESGE suggests that patients with peptic ulcers presenting with an adherent clot (FIIb) should undergo endoscopic therapy, with clot removal and subsequent endoscopic hemostasis if indicated, provided that the endoscopist has the technical competence to safely remove the clot and manage potential conversion to a higher risk bleeding lesion.

Conditional recommendation, very low quality evidence.

RECOMMENDATION

ESGE does not recommend endoscopic hemostasis in patients with peptic ulcers that have a flat pigmented spot (FIIc) or clean base (FIII), as these stigmata have a low risk of adverse outcomes. In selected clinical settings, these patients may have an expedited hospital discharge.

Strong recommendation, moderate quality evidence.

RECOMMENDATION

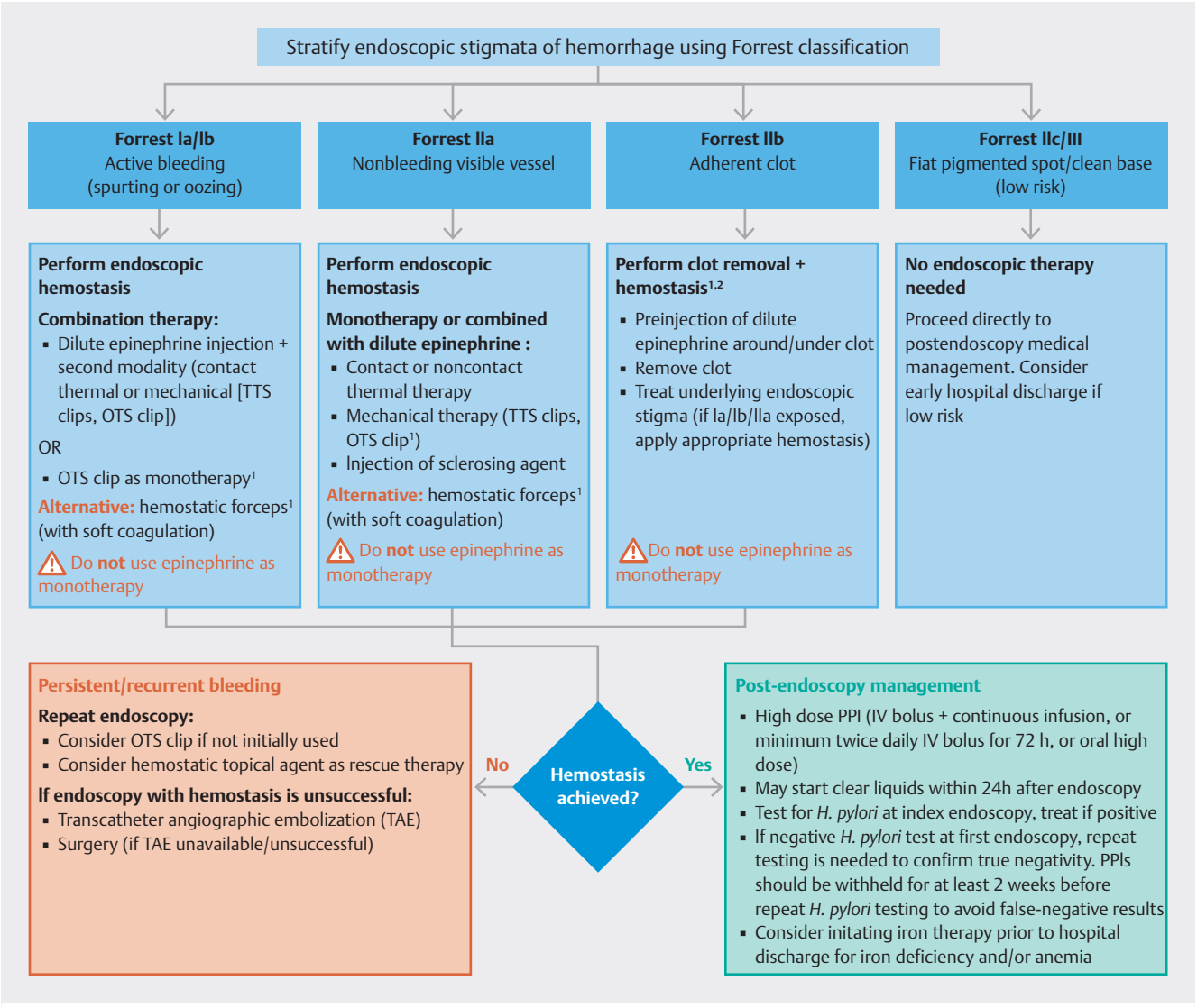
ESGE could not reach a consensus for or against the routine use of a Doppler endoscopic probe in treatment decisions of high risk endoscopic stigmata of peptic ulcer bleeding.

No recommendation, very low quality evidence.

The Forrest (F) classification was developed more than 50 years ago to standardize the endoscopic characterization of peptic ulcers [35]. It is defined as follows: FIa, spurting hemorrhage; FIb, oozing hemorrhage; FIIa, nonbleeding visible vessel; FIIb, adherent clot; FIIc, flat pigmented spot; and FIII, clean base ulcer. This classification has been used in numerous studies to identify patients at risk of persistent ulcer bleeding, recurrent ulcer bleeding, and mortality (▶ **Fig. 3**). Most of these studies have shown that the presence of an ulcer endoscopically classified as FIa or FIb is an independent risk factor for persistent bleeding or recurrent bleeding [36]. A potential limitation of the Forrest classification is that endoscopic stigmata recognition and identification, as well as interobserver agreement, may be less than optimal [37]. Artificial intelligence is being evaluated for improving endoscopic recognition of stigmata of recent hemorrhage in peptic ulcer bleeding, but as yet data remain limited [38].

Two contemporary systematic reviews and meta-analyses demonstrate that, in patients with peptic ulcers presenting with an adherent clot (FIIb), endoscopic therapy in addition to medical therapy significantly reduces rebleeding compared with medical therapy alone [39, 40]. In the larger meta-analysis by Beran et al., which included 11 studies (9 RCTs) comprising 833 patients (431 endoscopic vs. 402 conservative therapy), endoscopic therapy was associated with significantly lower odds of overall rebleeding (OR 0.41, 95%CI 0.22 to 0.79; $P = 0.007$) and 30-day rebleeding (OR 0.43, 95%CI 0.21 to 0.89; $P = 0.002$) compared with conservative treatment [40]. Endoscopic management was also associated with significantly lower odds of overall mortality (OR 0.47, 95%CI 0.23 to 0.95; $P = 0.04$), as well as a reduced need for surgery (OR 0.44, 95%CI 0.21 to 0.95; $P = 0.04$) and a mean shortening of hospital stay by 3.17 days (mean difference −3.17, 95%CI −4.14 to −2.19; $P<0.001$). However, in a subgroup analysis restricted to the nine RCTs, the mortality difference was not significant (OR 0.78, 95%CI 0.24 to 2.52; $P = 0.68$), but endoscopic therapy was associated with a trend toward a reduced overall rebleeding rate (7.2% vs. 18.5%; OR 0.42, 95%CI 0.17 to 1.05; $P = 0.06$) and a statistically significant reduction in the need for surgery (OR 0.28, 95%CI 0.08 to 0.96; $P = 0.04$).

A second meta-analysis by Tassone et al., restricted to seven RCTs with 268 patients, confirmed a significant reduction in recurrent bleeding with endoscopic hemostatic treatment (risk ratio [RR] 0.40, 95%CI 0.16 to 0.95) compared with medical therapy alone [40]. In this pooled cohort, there were no statistically significant differences in mortality (RR 0.90, 95%CI 0.23 to 3.59) or need for surgery (RR 0.48, 95%CI 0.10 to 2.28)



▶ **Fig. 3** Flowchart for the management of peptic ulcer bleeding identified on upper gastrointestinal endoscopy.
IV, intravenous; OTS, over the scope; PPI, proton pump inhibitor; TTS, through the scope.
[1] Conditional recommendation, very low quality evidence.
[2] Endoscopist should have technical competence to safely remove clot and manage potential conversion to a higher risk bleeding lesion.

between endoscopic and medical treatment groups, likely reflecting the limited number of events and low statistical power for these outcomes [39].

Importantly, clot removal in FIIb lesions frequently exposes an underlying higher risk stigma (FIa, FIb, or FIIa), necessitating immediate recognition and confident endoscopic hemostasis. As a practical consideration, preinjection of diluted epinephrine around and/or under the clot should be performed before attempting clot removal to mitigate the risk of inducing brisk bleeding; however, this practice is not supported by direct comparative evidence and should not replace definitive endoscopic hemostatic techniques. Therefore, the clinical benefit of treating FIIb ulcers is closely linked to endoscopist competence in clot removal, recognition of underlying stigmata, and management of spurting hemorrhage (FIa) should this occur, as well as access to appropriate endoscopic devices and endoscopy nurse support. These skills are explicitly addressed within the forthcoming ESGE endoscopy curriculum on competence in UGIH, which emphasizes structured training, supervised experience, and readiness to manage escalation in bleeding severity.

Whilst the guideline group could only make a conditional recommendation based on the current evidence, we believe clot removal in FIIb ulcer bleeds, to allow definitive endoscopic therapy of any underlying major stigma, should be attempted by endoscopists with the competence to deal with the potential consequence of clot removal.

The persistence of a positive Doppler endoscopic probe (DEP) signal following endoscopic hemostasis has been shown to have a significantly higher rate of recurrent bleeding: 100% vs. 11% ($P=0.003$) [41]. Moreover, others have reported that the use of a DEP to guide hemostatic therapy was associated

with a significant reduction in recurrence of bleeding, surgical intervention, and bleeding-associated mortality [42, 43].

Although stigmata of recent hemorrhage, based upon the Forrest classification, have been used to guide endoscopic hemostasis of peptic ulcer bleeding for more than 50 years, when most visually guided treatments are applied to lesions with major stigmata of recent hemorrhage, arterial blood flow underneath the stigma is not obliterated in 25%–30% of patients, resulting in rebleeding. The use of a DEP for the detection of arterial blood underneath stigmata of recent hemorrhage could serve a role in endoscopic risk stratification and as a guide to achieving definitive hemostasis. A recent RCT, two meta-analyses, and a narrative review of RCTs and prospective cohort studies reported that a DEP may be a beneficial tool in the management of bleeding ulcers and adds valuable information to visual evaluation of the stigmata of recent hemorrhage.

Nielsen et al. reported the results of a single-center RCT in which patients (n = 62) with FI–FIIb peptic ulcer bleeding were randomly assigned to second-look endoscopy with DEP <24 hours following successful endoscopic hemostasis or continued standard treatment [44]. The authors reported that 91% of patients had a positive Doppler signal in the ulcer base at follow-up endoscopy and all were retreated with repeat endotherapy. No statistically significant difference in rebleeding rates (3% vs. 13%; $P = 0.20$), transfusion rates, length of hospital stay, or mortality were observed. There were no reported adverse events associated with DEP evaluation.

In a meta-analysis published by Bhurwal et al., the authors reported that the use of DEP decreased rebleeding, mortality, and surgical intervention compared with visual observation of the stigmata. The risk of rebleeding was significantly higher if the Doppler signal persisted despite endoscopic therapy (48.5%, 95%CI 29.5% to 67.9%) [45]. Another meta-analysis published by Chapelle et al. confirmed that the use of a DEP during upper GI endoscopy significantly reduced overall rebleeding rates (OR 0.27, 95%CI 0.14 to 0.54), bleeding-related mortality, and the need for surgery [46]. Finally, in a review of RCTs and prospective cohort studies, definitive hemostasis achieved with the use of a DEP, significantly lowered rebleeding rates, and an improvement in other clinical outcomes (need for surgery, mortality) resulted when a DEP was used for risk stratification and as a guide to obliteration of arterial blood flow underneath the stigmata of recent hemorrhage [47].

ESGE could not reach a recommendation for or against the routine use of a DEP in treatment decisions for high risk endoscopic stigmata of peptic ulcer bleeding. This was due to a concern by the guideline group regarding the generalizability of this technique in clinical practice, the lack of data evaluating its cost-effectiveness, and the associated costs for the additional equipment and training needed.

2.3 Endoscopic hemostasis

RECOMMENDATION

ESGE recommends, for patients with actively bleeding ulcers (FIa, FIb), combination therapy using epinephrine injection plus a second hemostasis modality (contact thermal or mechanical therapy).

Strong recommendation, high quality evidence.

RECOMMENDATION

ESGE suggests the use of over-the-scope (OTS) clips as monotherapy as an alternative to combination therapy as first-line therapy for peptic ulcer bleeding with high risk stigmata (FIa, FIb) owing to a lower risk of further bleeding compared with standard endoscopic hemostatic therapy.

Conditional recommendation, very low quality evidence.

RECOMMENDATION

ESGE recommends, for patients with an ulcer with a nonbleeding visible vessel (FIIa), contact or noncontact thermal therapy, mechanical therapy (e. g. through-the-scope [TTS] or OTS clips), or injection of a sclerosing agent, each as monotherapy or in combination with epinephrine injection.

Strong recommendation, moderate quality evidence.

RECOMMENDATION

ESGE suggests, for patients with an ulcer with a nonbleeding visible vessel (FIIa), OTS clips may be used as alternative monotherapy.

Conditional recommendation, very low quality evidence.

RECOMMENDATION

ESGE suggests hemostatic forceps with soft coagulation may be used as monotherapy in the treatment of peptic ulcer bleeding with high risk stigmata (FIa, FIb, and FIIa).

Conditional recommendation, very low quality evidence.

RECOMMENDATION
ESGE does not recommend that epinephrine injection be used as endoscopic monotherapy. If used, it should be combined with a second endoscopic hemostasis modality.
Strong recommendation, high quality evidence.

RECOMMENDATION
ESGE suggests that topical hemostatic agents should not be used as monotherapy in the first-line treatment of patients with high risk endoscopic stigmata of peptic ulcer bleeding.
Conditional recommendation, very low quality evidence.

RECOMMENDATION
ESGE recommends that persistent bleeding be defined as ongoing active bleeding refractory to standard hemostasis modalities.
Strong recommendation, high quality evidence.

RECOMMENDATION
ESGE suggests that, in patients with persistent bleeding refractory to standard hemostasis modalities, the use of a topical hemostatic agent or OTS clips should be considered.
Conditional recommendation, very low quality evidence.

RECOMMENDATION
ESGE recommends that, in patients with persistent bleeding refractory to all modalities of endoscopic hemostasis, including topical hemostatic agents and OTS clips, transcatheter angiographic embolization (TAE) should be considered. Surgery is indicated when TAE is not locally available or after unsuccessful TAE.
Strong recommendation, moderate quality evidence.

In patients with peptic ulcer bleeding and high risk endoscopic stigmata (FIa, FIb, or FIIa), high quality evidence consistently supports combination endoscopic therapy over injection monotherapy, with epinephrine plus a second hemostasis modality (mechanical or thermal) achieving superior durable hemostasis and reduced rebleeding [1]. Epinephrine injection alone is inferior and should not be used as definitive therapy [1]. Multiple recent RCTs and meta-analyses of these studies evaluating cap-mounted OTS clips as first-line monotherapy in high risk nonvariceal UGIH demonstrate a significant reduction in the composite outcome of further bleeding at 30 days, driven primarily by lower rates of recurrent bleeding, compared with standard endoscopic therapy (through-the-scope [TTS] clips and/or thermal therapy ± injection) [48, 49, 50, 51, 52, 53, 54]. A benefit in 30-day rebleeding has been shown, while no clear advantage has been demonstrated for immediate hemostasis, mortality, or need for surgery.

However, despite being derived from RCTs, the overall certainty of evidence ranges from very low to low, owing to important methodological limitations. These include lack of blinding, heterogeneity in patient selection, ulcer characteristics, comparator therapies, variable use of epinephrine injection, and differences in operator expertise and technical success. Imprecision for key outcomes, such as mortality, surgery, and persistent bleeding, further limits the certainty of evidence, and external validity remains a concern as these RCTs were conducted in expert centers. Despite these methodological limitations in the available evidence, thereby leading to downgrading to a conditional recommendation, there was strong support from the guideline group for OTS clips to be considered as an alternative first-line therapy to treat FIa, FIb, and FIIa ulcer bleeding, assuming the endoscopist is competent in OTS clip application.

The available randomized evidence exclusively evaluates the OTS clip system made by Ovesco Endoscopy (Tübingen, Germany), and data on other cap-mounted devices are limited to case reports and small case series [55, 56].

Although OTS clip devices are associated with higher upfront costs, recent cost-effectiveness analyses indicate that reductions in rebleeding, fewer repeat endoscopies, and decreased need for rescue therapies render OTS clips a cost-effective strategy in high risk peptic ulcer bleeding, particularly when used upfront, rather than as rescue therapy [57, 58].

Topical hemostatic agents reliably achieve immediate hemostasis, but do not improve definitive clinical outcomes when used as first-line monotherapy, with rebleeding rates comparable to or higher than standard therapy. The evidence base for topical hemostatic agents comprises a mix of RCTs and prospective observational studies [59, 60, 61, 62]. As with all endoscopic hemostasis trials, blinding of the endoscopist to the allocated treatment is not feasible, which may influence lesion detection and characterization, as well as outcome assessment, particularly for subjective end points such as initial hemostasis.

Across the available meta-analyses there was high heterogeneity among studies with respect to bleeding etiology, rebleeding definition, and applied endoscopic therapies in the comparator arms. Moreover, observational studies within these meta-analyses lacked adequate control groups and did not adjust for potential confounders such as study site, endoscopist level of expertise, or lesion-related characteristics, thereby further limiting the certainty of evidence. Therefore, the guideline group did not recommend topical hemostatic agents as first-line therapy for high risk peptic ulcer bleeding. However, topical hemostatic agents do retain a role as rescue therapy in refractory ulcer bleeding or as a temporizing measure to allow for subsequent definitive therapy [59, 60, 61, 62].

It should be noted that a very recent RCT of 348 nonvariceal UGIH patients (317 with high risk stigmata peptic ulcer bleeding: FIa, FIb, FIIa, and FIIb) reported the efficacy of the adjuvant use of a topical hemostatic agent following successful initial hemostasis with standard endoscopic hemostasis modalities [63]. As compared with no adjuvant topical hemostatic agent, those patients with peptic ulcer bleeding who were randomized to receive adjuvant therapy had significantly lower rebleeding rates at 72 hours (5/167 [3.0%] vs. 18/150 [12.0%]; $P=0.004$) and at 30 days (12/167 [7.2%] vs. 29/150 [19.3%]; $P=0.004$). No adverse events were reported with the use of the adjuvant topical hemostatic agent [63].

Cap-mounted clips similarly provide effective rescue options in selected cases. Hemostatic forceps (bipolar and monopolar) with soft coagulation may be an alternative monotherapy, with very low quality evidence showing high rates of initial hemostasis, reduced rebleeding, and shorter procedure times compared with conventional modalities [64]. Overall, selection of the optimal endoscopic hemostasis modality should consider the ulcer characteristics, bleeding severity, endoscopist competence, and local availability of advanced devices.

Persistent or refractory ulcer bleeding is defined as ongoing active bleeding (spurting, arterial pulsatile bleeding, or oozing) that is present at the end of the first endoscopy and refractory to standard hemostasis modalities. This is also referred to as unsuccessful primary endoscopic hemostasis [65]. Six cohort studies have evaluated the usefulness of TAE or surgery in the context of persistent ulcer bleeding [66, 67, 68, 69, 70, 71]. One study directly compared these two strategies, showing no significant differences in mortality, rebleeding, length of hospital stay, adverse events, or transfusion requirements. Another multicenter retrospective study compared OTS clip treatment to TAE in refractory peptic ulcer bleeding. Clinical success was comparable between the groups (74.2% vs. 59.7%; $P=0.09$), but the mean intensive care unit stay was significantly longer in the TAE group (8.0 vs. 4.7 days; $P=0.002$) and serious adverse events (12.9% vs. 1.5%; $P=0.04$) and in-hospital mortality were significantly higher in the TAE group (9.1% vs. 22.6%; OR 2.92 [95%CI 1.04 to 8.16]; $P=0.05$) [72] (▶ **Fig. 3**).

3 Postendoscopy management

3.1 Prophylactic transcatheter angiographic embolization

RECOMMENDATION

ESGE suggests that prophylactic TAE be considered in selected high risk cases of peptic ulcer bleeding (e. g. patients with hemodynamic instability at presentation, posterior duodenal wall ulcer location, large ulcer size [>2 cm], or when durable endoscopic hemostasis is considered uncertain).

Conditional recommendation, very low quality evidence.

In patients with bleeding from an FI–FIIb ulcer where initial endoscopic hemostasis has been achieved, but who are considered at high risk for recurrent bleeding (e. g. hemodynamic instability at presentation, large ulcer size, large size visible vessel, difficult anatomic location of ulcer [36, 73, 74]), prophylactic TAE may be considered. We identified four meta-analyses and three retrospective cohort studies published from 2020 to 2025 evaluating the usefulness of prophylactic TAE [75, 76, 77, 78, 79, 80, 81]. We also included two previously published RCTs in our calculations [82, 83]. The available evidence on prophylactic TAE following endoscopic hemostasis for high risk peptic ulcers suggests a reduction in rebleeding rates compared with conservative management. The two RCTs suggest lower rebleeding rates with prophylactic TAE – although not always statistically significant – but no clear difference in mortality. In a post-hoc analysis, prophylactic TAE significantly reduced recurrent bleeding only in patients with ulcers ≥15 mm in size (2 [4.5%] vs. 12 [23.1%]; $P=0.03$) [82].

Observational data [77] and meta-analyses [78, 79, 80] reinforce this trend, reporting significant reductions in rebleeding and, in some cases, the need for surgery or reintervention. Overall, mortality does not appear to differ consistently between groups and hospital length of stay varies only minimally. Studies exclusively evaluating patients treated with prophylactic TAE [75, 76] report rebleeding rates ranging from 12% to 25% and mortality of 15% to 20%, likely reflecting very high risk populations. Taken together, the evidence suggests a potential benefit of prophylactic TAE, primarily in preventing rebleeding, while its impact on mortality and other secondary outcomes remains uncertain.

3.2 Antisecretory therapy

RECOMMENDATION

ESGE recommends high dose PPI therapy for patients who have undergone endoscopic hemostasis and for patients with FIIb ulcer stigmata (adherent clot) not treated endoscopically.

PPI therapy should be administered as an intravenous bolus followed by continuous infusion (e. g. 80 mg then 8 mg/hour) for 72 hours postendoscopy

or

high dose PPI therapy given as intravenous bolus dosing (twice daily) or in oral formulation (twice daily) can be considered as alternative regimens.

Strong recommendation, high quality evidence.

RECOMMENDATION

ESGE could not reach a consensus for or against the routine use of potassium-competitive acid blockers for patients who have undergone endoscopic hemostasis.

No recommendation, very low quality evidence.

ESGE's previous guideline on peptic ulcer bleeding recommended PPI therapy be given as an 80 mg intravenous bolus followed by an 8 mg/hour continuous infusion for 72 hours, to decrease rebleeding and mortality in patients with high risk endoscopic stigmata who had undergone successful endoscopic hemostasis [1]. Moreover, the guideline suggested that high dose PPI therapy could be given as intravenous bolus dosing (twice daily) or in oral formulation (twice daily) as alternative regimens.

Since then, two meta-analyses [84, 85], one combined RCT and cohort study [86], one prospective observational cohort study [87], and three retrospective single-center studies have been published [88, 89, 90]. None of the identified studies compared high dose PPI treatment to no treatment/placebo or H_2 antagonists; all compared patient outcome following different PPI regimens. None of the identified meta-analyses [84, 85], nor the RCT [86], found any significant differences in patient outcomes when comparing oral versus intravenous PPI, or high dose versus low dose PPI. Two retrospective single-center studies reported conflicting results regarding rebleeding rates [88, 90], but both studies were at high risk of bias.

Two recent RCTs demonstrate comparable efficacy between the potassium-competitive acid blocker vonoprazan and PPI in preventing recurrent bleeding in high risk peptic ulcer patients following successful endoscopic hemostasis [91, 92]. In a double-blind, double-dummy pilot RCT, patients (n = 44) with peptic ulcer bleeding (FI–FIIb) who underwent endoscopic hemostasis were randomly assigned to either PPI (pantoprazole infusion 8 mg/hour for 72 hours, followed by oral omeprazole 20 mg every 12 hours from day 3 to 14, followed by omeprazole 20 mg once daily) or vonoprazan (oral vonoprazan 20 mg every 12 hours from day 0 to 14, followed by 20 mg daily) [92]. There was no significant difference in rebleeding rates within 3, 7, or 30 days (18.2% vs. 11.1%; $P > 0.99$). In a multicenter noninferiority RCT from Thailand, 194 patients with FI–FIIb peptic ulcer bleeding were randomized to oral vonoprazan (20 mg twice daily for 3 days followed by 20 mg once daily) or high dose PPI bolus + infusion for 3 days, followed by oral omeprazole 20 mg twice daily for 28 days [91]. All patients were treated with high dose PPIs prior to endoscopy. There was no difference in 30-day rebleeding rates between the treatment groups (7.1% vs. 10.4%; $P < 0.001$ for noninferiority).

3.3 Recurrent bleeding

RECOMMENDATION

ESGE recommends that recurrent bleeding be defined as bleeding following initial successful endoscopic hemostasis.

Strong recommendation, high quality evidence.

RECOMMENDATION

ESGE recommends, for patients with clinical evidence of recurrent bleeding, repeat upper GI endoscopy with hemostasis if indicated.

Strong recommendation, high quality evidence.

RECOMMENDATION

ESGE recommends that, for patients with clinical evidence of recurrent peptic ulcer bleeding, use of an OTS clip should be considered. Should this second attempt at endoscopic hemostasis also be unsuccessful, TAE should be considered. Surgery is indicated when TAE is either locally unavailable or after unsuccessful TAE.

Strong recommendation, moderate quality evidence.

Recurrent bleeding is defined as bleeding following initial successful endoscopic hemostasis [93]. Clinical evidence of recurrent bleeding is defined as recurrent hematemesis or bloody nasogastric aspirate after the first endoscopy, recurrent tachycardia or hypotension after achieving hemodynamic stability, melena and/or hematochezia following normalization of stool color, or a reduction in Hb ≥2 g/dL after a stable Hb value has been attained [1]. We were unable to identify any recent studies that directly addressed the PICO question regarding the role of repeat endoscopy for recurrent bleeding after endoscopic therapy for peptic ulcers with high risk endoscopic stigmata.

3.4 Restarting anticoagulation

RECOMMENDATION

ESGE recommends that, in patients with peptic ulcer hemorrhage who require ongoing anticoagulation therapy, anticoagulation should be resumed as soon as clinically indicated based on thromboembolic risk.

Strong recommendation, low quality evidence.

A recent UK audit of 5141 patients with acute UGIH found that 30.6% were receiving an anticoagulant (direct oral anticoagulant [DOAC], vitamin K antagonist [VKA]) at the time of their bleeding episode [94], this being an increase from the 13% level of reported anticoagulant use in a similar UK audit in 2007 [95]. However, the evidence to guide the resumption of anticoagulation therapy (e. g. VKA, DOAC) following a peptic ulcer bleed remains limited. The decision to restart anticoagulation therapy must balance the risk of recurrent bleeding with the risk of thromboembolic events and/or the sequelae of these events, including death. As compared with patients with peptic ulcer bleeding who were not restarted on anticoagulation, patients who were restarted on anticoagulation after their peptic ulcer bleed (57% restarted; median 15 days) had a lower risk of

thrombosis and death at 1 year (hazard ratio [HR] 0.14 [95%CI 0.05 to 0.43]), with no significantly increased risk of recurrent bleeding (HR 1.42 [95%CI 0.10 to 19.8]) [96].

However, the precise timing for restarting anticoagulation in patients with peptic ulcer hemorrhage remains undefined. Those patients at the highest thrombotic risk should restart anticoagulant therapy as soon as possible and the use of subcutaneous low molecular weight heparin as a bridge to oral anticoagulation may be a good option. Early consultation with a cardiologist and/or hematologist is desirable. It should be remembered that VKAs should be restarted earlier because the time required to achieve adequate anticoagulation is longer (up to 5 days) compared with DOACs, which take hours. The use of validated clinical prediction scores that estimate thrombotic risk (CHA_2DS_2-VASc) and bleeding risk (HAS-BLED) can help guide clinical decision-making [97, 98].

3.5 *Helicobacter pylori*

RECOMMENDATION

ESGE recommends, in patients with peptic ulcer bleeding, investigating for the presence of *H. pylori* in the acute setting (at first endoscopy), with initiation of appropriate antibiotic therapy if *H. pylori* is detected.

Strong recommendation, high quality evidence.

RECOMMENDATION

ESGE recommends retesting for *H. pylori* in those patients with a negative test at first endoscopy.

Strong recommendation, high quality evidence.

RECOMMENDATION

ESGE recommends documentation of successful *H. pylori* eradication.

Strong recommendation, high quality evidence.

The value and cost-effectiveness of *H. pylori* eradication in patients with peptic ulcer bleeding is well established. We did not identify any new published studies on this topic. Therefore, ESGE's recommendations from 2021 remain.

3.6 Iron therapy

RECOMMENDATION

ESGE suggests that iron therapy be initiated prior to hospital discharge in patients with peptic ulcer bleeding and iron deficiency and/or anemia.

Conditional recommendation, low quality evidence.

Many patients who experience an acute GI bleed, including from a peptic ulcer, require iron supplementation to treat the iron deficiency anemia or iron deficiency that can result from the acute blood loss [99]. There are however no evidence-based guidelines relating to the provision and management of iron therapy in patients with acute peptic ulcer bleeding.

A single-center open-label RCT reported that, as compared with patients receiving no iron treatment, daily treatment with 600 mg oral ferrous fumarate was associated with a higher rate of normalized Hb or an increase in beta-Hb value ≥2 g/dL (72.7% vs. 45.9%; adjusted RR 2.98; $P=0.004$) 6 weeks after hospital discharge for nonvariceal UGIH (89% due to peptic ulcer bleeding). Moreover, 53% of patients not treated with oral iron following their nonvariceal UGIH had ongoing iron deficiency (ferritin <30 µg/L and transferrin saturation <16%; $P<0.05$) [100]. In a double-blind placebo-controlled RCT, Bager et al. randomly assigned patients with UGIH (70% peptic ulcer bleeding) with anemia to either single-dose intravenous administration of 1000 mg of iron, oral iron treatment 200 mg daily for 3 months, or placebo [101]. After 3 months, patients treated with iron had significantly higher levels of Hb (13.9 g/dL, 13.5 g/dL, and 11.5 g/dL, respectively; $P<0.01$). The frequency of full iron stores at 3 months (ferritin >100 µg/L) was 41%, 24%, and 10%, respectively ($P=0.11$). Patients with normalized Hb at the end of iron therapy reported higher quality of life at 6 months follow-up. Another RCT showed that a significantly higher proportion of patients receiving intravenous iron had normalization of Hb (100% vs. 61%; $P<0.001$) and better subjective state of health ($P=0.002$), as compared with those receiving oral ferrous sulfate 325 mg twice daily for 6 weeks [102]. We performed a meta-analysis of these two RCTs and found that oral iron therapy is associated with significantly higher values of Hb from week 4 onwards (mean Hb difference 0.78, 95%CI 0.27 to 1.28; $P=0.002$) (▶ **Fig. 4**).

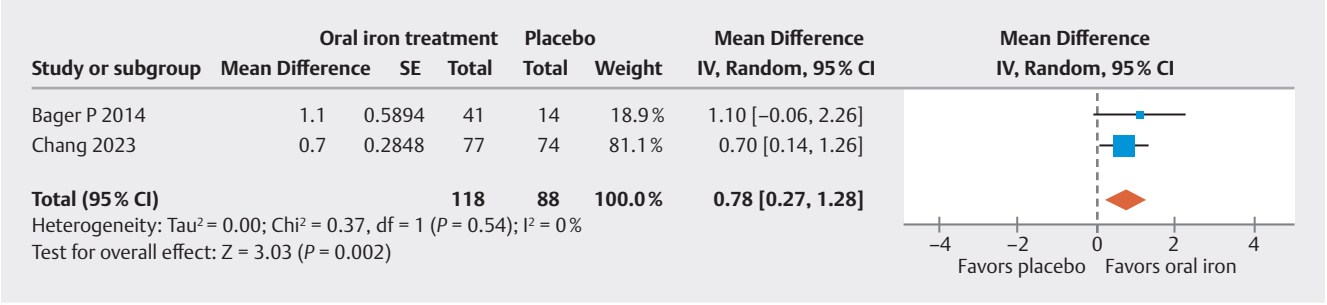
3.7 Restarting oral nutrition

RECOMMENDATION

ESGE suggests that early oral nutrition, within 24 hours following endoscopic hemostasis, be initiated in patients with peptic ulcer bleeding in whom durable hemostasis has been achieved.

Conditional recommendation, low quality evidence.

A recent meta-analysis of 10 RCTs, including 1051 patients with UGIH, compared the outcomes of early versus delayed oral nutrition following endoscopic hemostasis. The definitions for early and delayed nutrition were accepted as specified by the included studies. In the subgroup of peptic ulcer bleeding patients (n = 560) who received either early or delayed oral nutrition, there was no significant difference in early rebleeding (within 7 days; RR 0.95, 95%CI 0.54 to 1.68) or late rebleeding (within 30 days; RR 1.14, 95%CI 0.16 to 7.98). Moreover, there was no statistically significant difference in early (RR 0.98, 95%CI 0.85 to 1.14) or late mortality (RR 0.51, 95%CI 0.03 to



▶ **Fig. 4** Effect of oral iron therapy on mean hemoglobin value.

7.83), nor in the length of hospital stay between the two nutrition groups (mean difference −1.34 days, 95%CI −5.01 to 2.33) [103].

4 Future research directions

4.1 Pre-endoscopy management

Current evidence for pre-endoscopic management in acute UGIH is limited and provides little high quality data to define optimal hemodynamic resuscitation, transfusion thresholds, airway protection, PPI or prokinetic strategies, or their impact on mortality, need for surgery, need for repeat endoscopy, and hospital length of stay. In contrast, a rapidly growing body of machine-learning and artificial intelligence work is evaluating risk prediction compared with traditional scoring tools (e. g. GBS, Rockall, AIMS65) for predicting the need for intervention or mortality [104, 105]. Moreover, emerging image-based artificial intelligence data have been shown to perform satisfactorily in evaluating endoscopic stigmata (Forrest classification) in bleeding peptic ulcers [38]. As yet, these models remain mostly early stage, single-center, and insufficiently validated to support routine clinical adoption or robust cost-effectiveness conclusions. External validation, prospective impact studies, and head-to-head comparisons with simple clinical algorithms are largely lacking. Future studies should focus on integrated, patient-level randomized and pragmatic trials addressing the optimal sequence and intensity of pre-endoscopy management strategies.

4.2 Endoscopic management

Additional high quality studies are needed regarding: the timing of endoscopy in patients who are hemodynamically unstable despite ongoing efforts at volume resuscitation; the role of the DEP in guiding hemostasis therapy; a definition of peptic ulcer characteristics (e. g. anatomic location, size, Forrest class) that optimize hemostasis using OTS clips and learning curves for the acquisition of competence in using OTS clips; randomized trials of topical hemostatic agents versus standard endoscopic hemostasis modalities (e. g. mechanical, thermal); and evaluation of emerging/innovative hemostasis therapies (e. g. tissue suturing, tissue adhesives, hemostatic forceps).

4.3 Postendoscopy management

Although some data exist, there is plenty of room for additional studies in several areas in the postendoscopy management of patients with peptic ulcer bleeding. For example: evaluating the acid suppressive efficacy of potassium-competitive acid blockers after endoscopic hemostasis; better understanding the impacts of blood in the upper GI tract and PPI use at the time of initial endoscopy on the result of *H. pylori* testing during acute peptic ulcer bleeding; standardization of endoscopy reports in peptic ulcer bleeding; and establishing/evaluating “key performance indicators” in managing peptic ulcer bleeding.

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Conflict of Interest

I.M. Gralnek has been on the advisory board and provided consultancy to Olympus (2025 to present) and Magentiq Eye (2026), and provided consultancy to Medtronic and Viatris (both 2024 to present), Micro-Tech (2025 to present), and GistMD (2026); he has also received research support from Medtronic (2024 to present). J. Morris has received lecture fees from Falk, Astra Zeneca, and Olympus, and is on the advisory boards of Cook and Astra Zeneca (2024 to present); he is treasurer of the British Society of Gastroenterology (2024 to present). S.B. Laursen has received fees from Medtronic for participation in a data monitoring committee (2024) and for study involvement (2025 to present). M. Camus is receiving fees from Medtronic for study involvement (2025 to present). N. Forbes received consultancy fees from Boston Scientific (2021 to 2025). M. Bretthauer is Associate Editor of *Annals of Internal Medicine* (2017 to present) and is chair of an ESGE publication working group. G. Tziatzios, L.K. Debels, G.B. Nigam, B. Eross, M. Götz, T. Cúrdia Gonçalves, K. Kurek, and T.C. Tham declare that they have no conflict of interest.

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Supplementary Material

Endoscopic diagnosis and management of peptic ulcer bleeding: European Society of Gastrointestinal Endoscopy (ESGE) Guideline – Update 2026

CONTENTS

Taskforce 1: UGIB patient presentation and pre-endoscopy

Leader: Marine Camus

Members: Balint Eross, Nauzer Forbes

List of PICOs

PICO 1 – Initial patient hemodynamic resuscitation

P: Patients presenting with acute UGIB (e.g., hematemesis, coffee ground emesis, melena)

I: Crystalloid fluids

C: Plasma-expanders, fresh frozen plasma, platelets, other

O: Hemodynamic stability, mortality

PICO 2 – Red blood cell (RBC) transfusion strategy

P: Patients presenting with acute UGIB (hematemesis, coffee ground emesis, melena)

I : Restrictive blood transfusion strategy

C : Liberal transfusion strategy

O: Mortality

PICO 3 – Patient Risk Stratification

P: Patients presenting with acute UGIB to the emergency department deemed to be very low risk (e.g., Glasgow-Blatchford Score (GBS) 0 or 1; other risk scores)

I: Discharge from emergency department with outpatient management

C: Hospitalization

O: Further bleeding, mortality, composite of hospital-based intervention or death, hospital stay, cost, sensitivity of risk assessment score

Pico 4 – Role of capsule endoscopy / Pillsense in patient risk stratification

P: Patients with acute UGIB prior to endoscopy

I: Capsule endoscopy / Pillsense

C: Placebo/no treatment

O: Accuracy of risk stratification as compared to other pre-endoscopy risk stratification scores, discharge from hospital emergency department, need for upper endoscopy, mortality

PICO 5 – Prokinetic medications

P: Patients with acute UGIB prior to endoscopy

I: Erythromycin (also metoclopramide, other prokinetic agents)

C: Placebo/no treatment

O: Mortality, length of hospitalization, repeat/2nd look endoscopy needed while in hospital

PICO 6 - Proton pump inhibitor therapy

P: Patients with acute UGIB prior to endoscopy

I: Proton pump inhibitor administration

C: Placebo/no treatment

O: Mortality, need for surgery, length of hospital stay, need for repeat endoscopy, endoscopic hemostasis, costs

PICO 7 – Endotracheal intubation

P: Patients with acute UGIB prior to endoscopy

I: Endotracheal intubation

C: No endotracheal intubation

O: Mortality, aspiration, pneumonia, LOS, costs

PICO 8 – Future Research Directions

P: Patients with acute UGIB prior to endoscopy

I: Hemodynamic resuscitation, RBC transfusion stratégies, risk stratification, prokinetic medications, PPI therapy, endotracheal intubation, artificial intelligence

C: NA

O: Mortality, need for surgery, length of hospital stay, need for repeat endoscopy, endoscopic hemostasis, costs

Bibliographic Search

Search date: August 29th 2025

Tarjei Fiskergård Werner, senior librarian
University of Oslo - Library of medicine and science

The search strategies have been reviewed by Toril Marie Hestnes (University of Oslo - Library of medicine and science).

Number of references after duplicate removal
Systematic reviews: 295
Primary studies: 983

TF1- Medline reviews

Ovid MEDLINE(R) ALL <1946 to August 28, 2025>

1	(Gastrointestinal Hemorrhage/ and exp Upper Gastrointestinal Tract/) or Hematemesis/ or Melena/ or Peptic Ulcer Hemorrhage/	16031
2	(((upper gastrointestinal or upper gastro intestinal) adj3 (h?emorrhag* or bleed* or blood loss)) or ugib or h?ematemes?s or melena* or coffee ground emesis).tw,kf,kw.	16326
3	1 or 2	28214
4	fluid therapy/	22747
5	blood transfusion/ or blood component transfusion/ or erythrocyte transfusion/ or platelet transfusion/ or blood transfusion, autologous/	78774
6	Capsule Endoscopy/	3842
7	Erythromycin/	14454
8	Metoclopramide/	5055

9	Proton Pump Inhibitors/	14592
10	intubation, intratracheal/ or laryngeal masks/ or "rapid sequence induction and intubation"/	44686
11	Resuscitation/ and (exp Hemodynamics/ or h?emodynamic*.tw,kf,kw.)	4239
12	exp Artificial Intelligence/	247826
13	(fluid therap* or crystalloid fluid* or (blood adj3 transfus*) or (patient* adj3 discharge*) or capsule endoscop* or pillsense or pill sense or erythromycin or metoclopramide or prokinetic agent* or proton pump inhibitor* or endotracheal intubation* or h?emodynamic resuscitation* or (risk adj3 (strat* or assess* or manag*)) or artificial intelligence or machine learning).tw,kf,kw.	756267
14	4 or 13	775652
15	mortality/ or fatal outcome/ or hospital mortality/ or survival rate/	365134
16	Death/	20983
17	hemorrhage/ or blood loss, surgical/ or postoperative hemorrhage/	118060
18	Length of Stay/	112218
19	exp "Costs and Cost Analysis"/	281260
20	exp Risk Assessment/	336689
21	Patient Discharge/	43686
22	Hemostasis, Endoscopic/	2403
23	respiratory aspiration/ or "respiratory aspiration of gastric contents"/	1752
24	Pneumonia/	57335
25	((h?emodynamic* adj3 (stability or stable)) or mortal* or survival* or death* or h?emorrhag* or bleed* or blood loss or hospital-based intervention* or (stay adj3 (length or hospital)) or cost or costs or (risk adj3 (strat* or assess* or manag*)) or (patient* adj3 discharge*) or (need adj3 (endoscop* or surger*)) or repeat* endoscop* or endoscopic h?emostasis or aspiration or pneumonia).tw,kf,kw.	4827433

26 or/15-25 5285971

27 and/3,14,25 2935

28 limit 27 to yr="2020 -Current" 902

29 28 and ((Meta Analysis or Systematic Review).pt. or "Meta-Analysis as Topic"/ or (Review.pt. and (pubmed or medline).ti,ab.) or ((systematic* or literature or scoping) adj3 (overview or review* or search*)).ti,ab,kf. or (meta-anal* or metaanal* or meta-regression* or umbrella review* or overview of reviews or review of reviews or (evidence* adj2 synth*) or synthesis review*).ti,ab,kf.) 101

TF1 - Embase reviews

Embase Classic+Embase <1947 to 2025 August 27>

1 upper gastrointestinal bleeding/ or (gastrointestinal hemorrhage/ and upper gastrointestinal tract/) 14613

2 hematemesis/ 17192

3 melena/ 18567

4 peptic ulcer bleeding/ 6920

5 (((upper gastrointestinal or upper gastro intestinal) adj3 (h?emorrhag* or bleed* or blood loss)) or ugib or h?ematemes?s or melena* or coffee ground emesis).tw,kf,kw. 31350

6 or/1-5 55802

7 fluid therapy/ or fluid resuscitation/ 47526

8 blood transfusion/ or blood autotransfusion/ 195629

9 blood component therapy/ or erythrocyte transfusion/ or exp plasma transfusion/ 49345

10 capsule endoscopy/ 12881

11 erythromycin/ 94147

12	metoclopramide/	30334
13	proton pump inhibitor/	57644
14	endotracheal intubation/ or rapid sequence induction/	78135
15	laryngeal mask/	24499
16	resuscitation/ and (hemodynamics/ or h?emodynamic*.tw,kf,kw.)	12938
17	exp artificial intelligence/	156730
18	(fluid therap* or crystalloid fluid* or (blood adj3 transfus*) or (patient* adj3 discharge*) or capsule endoscop* or pillsense or pill sense or erythromycin or metoclopramide or prokinetic agent* or proton pump inhibitor* or endotracheal intubation* or h?emodynamic resuscitation* or (risk adj3 (strat* or assess* or manag*)) or artificial intelligence or machine learning).tw,kf,kw.	1104661
19	or/7-18	1531123
20	mortality/ or hospital mortality/ or mortality rate/ or standardized mortality ratio/ or surgical mortality/	1327950
21	death/ or fatality/	446292
22	survival/ or post treatment survival/ or survival factor/ or survival rate/	698644
23	bleeding/ or operative blood loss/ or postoperative hemorrhage/	539812
24	"length of stay"/	329210
25	"cost benefit analysis"/	101746
26	"health care cost"/ or "hospital cost"/	277074
27	risk assessment/ or health risk assessment/ or risk model/	812248
28	hospital discharge/	216933
29	endoscopic hemostasis/	961
30	pulmonary aspiration/	3155

31 pneumonia/ 274793

32 ((h?emodynamic* adj3 (stability or stable)) or mortal* or survival* or death* or h?emorrhag* or bleed* or blood loss or hospital-based intervention* or (stay adj3 (length or hospital)) or cost or costs or (risk adj3 (strat* or assess* or manag*)) or (patient* adj3 discharge*) or (need adj3 (endoscop* or surger*)) or repeat* endoscop* or endoscopic h?emostasis or aspiration or pneumonia).tw,kf,kw. 7211895

33 or/20-32 8453167

34 and/6,19,33 12531

35 limit 34 to ("clinical trials (clinicaltrials.gov)" or conference abstracts or "preprints (unpublished, non-peer reviewed)") 4335

36 34 not 35 8196

37 limit 36 to yr="2020 -Current" 2731

38 37 and ("Meta Analysis"/ or "Systematic Review"/ or (review and (pubmed or medline)).ti,ab,kw. or ((systematic* or scoping or literature) adj3 (overview or review* or search*)).ti,ab. or (meta-anal* or metaanal* or meta-regression* or umbrella review* or overview of reviews or review of reviews or (evidence* adj2 synth*) or synthesis review*).ti,ab.) 271

TF1- Medline studies

Ovid MEDLINE(R) ALL <1946 to August 28, 2025>

1 (*Gastrointestinal Hemorrhage/ and exp Upper Gastrointestinal Tract/) or *Hematemesis/ or *Melena/ or *Peptic Ulcer Hemorrhage/ 10183

2 (((upper gastrointestinal or upper gastro intestinal) adj3 (h?emorrhag* or bleed* or blood loss)) or ugib or h?ematemes?s or melena* or coffee ground emesis).ti,kf,kw. 6996

3 1 or 2 14899

4 fluid therapy/ 22747

5 blood transfusion/ or blood component transfusion/ or erythrocyte transfusion/ or platelet transfusion/ or blood transfusion, autologous/ 78774

6	Capsule Endoscopy/	3842
7	Erythromycin/	14454
8	Metoclopramide/	5055
9	Proton Pump Inhibitors/	14592
10	intubation, intratracheal/ or laryngeal masks/ or "rapid sequence induction and intubation"/	44686
11	Resuscitation/ and (exp Hemodynamics/ or h?emodynamic*.tw,kf,kw.)	4239
12	exp Artificial Intelligence/	247826
13	(fluid therap* or crystalloid fluid* or (blood adj3 transfus*) or (patient* adj3 discharge*) or capsule endoscop* or pillsense or pill sense or erythromycin or metoclopramide or prokinetic agent* or proton pump inhibitor* or endotracheal intubation* or h?emodynamic resuscitation* or (risk adj3 (strat* or assess* or manag*)) or artificial intelligence or machine learning).tw,kf,kw.	756267
14	4 or 13	775652
15	mortality/ or fatal outcome/ or hospital mortality/ or survival rate/	365134
16	Death/	20983
17	hemorrhage/ or blood loss, surgical/ or postoperative hemorrhage/	118060
18	Length of Stay/	112218
19	exp "Costs and Cost Analysis"/	281260
20	exp Risk Assessment/	336689
21	Patient Discharge/	43686
22	Hemostasis, Endoscopic/	2403
23	respiratory aspiration/ or "respiratory aspiration of gastric contents"/	1752
24	Pneumonia/	57335

25 ((h?emodynamic* adj3 (stability or stable)) or mortal* or survival* or death* or h?emorrhag* or bleed* or blood loss or hospital-based intervention* or (stay adj3 (length or hospital)) or cost or costs or (risk adj3 (strat* or assess* or manag*)) or (patient* adj3 discharge*) or (need adj3 (endoscop* or surger*)) or repeat* endoscop* or endoscopic h?emostasis or aspiration or pneumonia).tw,kf,kw. 4827433

26 or/15-25 5285971

27 and/3,14,25 1663

28 limit 27 to yr="2020 -Current" 443

29 28 and ((Meta Analysis or Systematic Review).pt. or "Meta-Analysis as Topic"/ or (Review.pt. and (pubmed or medline).ti,ab.) or ((systematic* or literature or scoping) adj3 (overview or review* or search*)).ti,ab,kf. or (meta-anal* or metaanal* or meta-regression* or umbrella review* or overview of reviews or review of reviews or (evidence* adj2 synth*) or synthesis review*).ti,ab,kf.) 55

30 28 not 29 388

TF1 - Embase studies

Embase Classic+Embase <1947 to 2025 August 25>

1 *upper gastrointestinal bleeding/ or (*gastrointestinal hemorrhage/ and *upper gastrointestinal tract/) 6068

2 *hematemesis/ 1908

3 *melena/ 1976

4 *peptic ulcer bleeding/ 3958

5 (((upper gastrointestinal or upper gastro intestinal) adj3 (h?emorrhag* or bleed* or blood loss)) or ugib or hematemes?s or melena* or coffee ground emesis).ti,kf,kw. 10123

6 or/1-5 17090

7 fluid therapy/ or fluid resuscitation/ 47508

8 blood transfusion/ or blood autotransfusion/ 195570

9	blood component therapy/ or erythrocyte transfusion/ or exp plasma transfusion/	49332
10	capsule endoscopy/	12869
11	erythromycin/	94121
12	metoclopramide/	30332
13	proton pump inhibitor/	57614
14	endotracheal intubation/ or rapid sequence induction/	78102
15	laryngeal mask/	24492
16	resuscitation/ and (hemodynamics/ or h?emodynamic*.tw,kf,kw.)	12921
17	exp artificial intelligence/	156214
18	(fluid therap* or crystalloid fluid* or (blood adj3 transfus*) or (patient* adj3 discharge*) or capsule endoscop* or pillsense or pill sense or erythromycin or metoclopramide or prokinetic agent* or proton pump inhibitor* or endotracheal intubation* or h?emodynamic resuscitation* or (risk adj3 (stratification or assess* or manag*)) or artificial intelligence or machine learning).tw,kf,kw.	1064717
19	or/7-18	1491521
20	mortality/ or hospital mortality/ or mortality rate/ or standardized mortality ratio/ or surgical mortality/	1327219
21	death/ or fatality/	446256
22	survival/ or post treatment survival/ or survival factor/ or survival rate/	698401
23	bleeding/ or operative blood loss/ or postoperative hemorrhage/	539509
24	"length of stay"/	329080
25	"cost benefit analysis"/	101714
26	"health care cost"/ or "hospital cost"/	276987
27	risk assessment/ or health risk assessment/ or risk model/	811962

28	hospital discharge/	216905
29	endoscopic hemostasis/	960
30	pulmonary aspiration/	3151
31	pneumonia/	274658
32	((hemodynamic* adj3 (stability or stable)) or mortal* or survival* or death* or hemorrhag* or bleed* or blood loss or hospital-based intervention* or (stay adj3 (length or hospital)) or cost or costs or (risk adj3 (stratification or assess* or manag*)) or (patient* adj3 discharge*) or (need adj3 (endoscop* or surger*)) or repeat endoscop* or endoscopic hemostasis or aspiration or pneumonia).tw,kf,kw.	7120254
33	or/20-32	8384745
34	and/6,19,33	4740
35	limit 34 to ("clinical trials (clinicaltrials.gov)" or conference abstracts or "preprints (unpublished, non-peer reviewed)")	1649
36	34 not 35	3091
37	limit 36 to yr="2020 -Current"	883
38	37 and ("Meta Analysis"/ or "Systematic Review"/ or (review and (pubmed or medline)).ti,ab,kw. or ((systematic* or scoping or literature) adj3 (overview or review* or search*)).ti,ab. or (meta-anal* or metaanal* or meta-regression* or umbrella review* or overview of reviews or review of reviews or (evidence* adj2 synth*) or synthesis review*).ti,ab.)	77
39	37 not 38	806

TF1 - Cochrane reviews & trials

#1	MeSH descriptor: [Gastrointestinal Hemorrhage] this term only	2052
#2	MeSH descriptor: [Upper Gastrointestinal Tract] explode all trees	5909
#3	#1 AND #2	165
#4	MeSH descriptor: [Hematemesis] this term only	22

#5	MeSH descriptor: [Melena] explode all trees	37
#6	MeSH descriptor: [Peptic Ulcer Hemorrhage] this term only	539
#7	((("upper gastrointestinal" OR "upper gastro intestinal") NEAR/3 (h?emorrhag* OR bleed* OR blood loss)) OR ugib OR haematemes?s OR hematemes?s OR melena* OR "coffee ground emesis"):ti,ab,kw	1849
#8	{OR #3-#7}	2391
#9	MeSH descriptor: [Fluid Therapy] this term only	2261
#10	MeSH descriptor: [Blood Transfusion] this term only	2550
#11	MeSH descriptor: [Blood Component Transfusion] this term only	207
#12	MeSH descriptor: [Erythrocyte Transfusion] this term only	848
#13	MeSH descriptor: [Platelet Transfusion] this term only	422
#14	MeSH descriptor: [Blood Transfusion, Autologous] this term only	732
#15	MeSH descriptor: [Patient Discharge] this term only	2731
#16	MeSH descriptor: [Capsule Endoscopy] this term only	182
#17	MeSH descriptor: [Erythromycin] this term only	1097
#18	MeSH descriptor: [Metoclopramide] this term only	1353
#19	MeSH descriptor: [Proton Pump Inhibitors] this term only	2011
#20	MeSH descriptor: [Intubation, Intratracheal] explode all trees	5700
#21	MeSH descriptor: [Risk Assessment] explode all trees	13612
#22	MeSH descriptor: [Artificial Intelligence] explode all trees	3640
#23	{OR #9-#22}	36245

#24	MeSH descriptor: [Resuscitation] this term only	976
#25	MeSH descriptor: [Hemodynamics] explode all trees	66436
#26	(h?emodynamic*):ti,ab,kw	51460
#27	#24 AND (#25 OR #26)	197
#28	((fluid NEXT therap*) OR (crystalloid NEXT fluid*) OR (blood NEAR/3 transfus*) OR (patient* NEAR/3 discharge*) OR (capsule NEXT endoscop*) OR pillsense OR "pill sense" OR erythromycin OR metoclopramide OR (prokinetic NEXT agent*) OR ("proton pump" NEXT inhibitor*) OR (endotracheal NEXT intubation*) OR (h?emodynamic NEXT resuscitation*) OR (risk NEAR/3 (strat* OR assess* OR manag*)) OR "artificial intelligence" OR "machine learning"):ti,ab,kw	103591
#29	{OR #23, #27, #28}	110020
#30	MeSH descriptor: [Mortality] this term only	992
#31	MeSH descriptor: [Fatal Outcome] this term only	21
#32	MeSH descriptor: [Hospital Mortality] this term only	1878
#33	MeSH descriptor: [Survival Rate] this term only	13442
#34	MeSH descriptor: [Death] this term only	413
#35	MeSH descriptor: [Hemorrhage] this term only	6218
#36	MeSH descriptor: [Blood Loss, Surgical] explode all trees	3583
#37	MeSH descriptor: [Postoperative Hemorrhage] explode all trees	1783
#38	MeSH descriptor: [Length of Stay] this term only	9635
#39	MeSH descriptor: [Costs and Cost Analysis] explode all trees	16634
#40	MeSH descriptor: [Risk Assessment] explode all trees	13612
#41	MeSH descriptor: [Patient Discharge] this term only	2731

#42 MeSH descriptor: [Hemostasis, Endoscopic] this term only 236

#43 MeSH descriptor: [Respiratory Aspiration] explode all trees 773

#44 MeSH descriptor: [Pneumonia] this term only 3112

#45 ((h?emodynamic* NEAR/3 (stability or stable)) OR mortal* OR survival* OR death* OR h?emorrhag* OR bleed* OR "blood loss" OR ("hospital-based" NEXT intervention*) OR (stay NEAR/3 (length or hospital)) OR cost OR costs OR (risk NEAR/3 (strat* or assess* or manag*)) OR (patient* NEAR/3 discharge*) OR (need NEAR/3 (endoscop* or surger*)) OR (repeat* NEXT endoscop*) OR (endoscopic NEXT hemostas?s) OR (endoscopic NEXT haemostas?s) OR aspiration OR pneumonia):ti,ab,kw 501352

#46 {OR #30-#45} 501469

#47 {AND #8, #29, #46} 725

Limiter: 2020-2025

Reviews: 3

Trials: 159

Bibliography Screening and Selection

Number of references after duplicate removal

Systematic reviews: 295

Primary studies: 983

PICO 1

Following scrutinization, 2 meta-analyses were considered[1,2].

List of references

1. Obeidat M, Teutsch B, Rancz A, Tari E, Marta K, Veres DS, et al. One in four patients with gastrointestinal bleeding develops shock or hemodynamic instability: A systematic review and meta-analysis. World J Gastroenterol. août 2023;29(28):4466-80. Located at: Embase; 2026280175. doi:10.3748/wjg.v29.i28.4466

2. Tari E, Frim L, Stolcz T, Teutsch B, Veres DS, Hegyi P, et al. At admission hemodynamic instability is associated with increased mortality and rebleeding rate in acute gastrointestinal bleeding: a systematic review and meta-analysis. Ther Adv Gastroenterol. 2023;16:17562848231190970. Located at: MEDLINE; 37655056. doi:10.1177/17562848231190970

PICO 2

After title reading 15 studies and 4 reviews, then after abstracts reading, 1 meta-analysis + 1 RCT were considered potentially relevant and were acquired in full text[3,4]. The RCT was included in the meta-analysis.

List of references

3. Kola G, Sureshkumar S, Mohsina S, Sreenath GS, Kate V. Restrictive versus liberal transfusion strategy in upper gastrointestinal bleeding: a randomized controlled trial. Saudi J Gastroenterol. 2021;27(1):13-19. Located at: CN-02159221. doi:10.4103/sjg.SJG_152_20

4. Teutsch B, Veres DS, Palinkas D, Simon OA, Hegyi P, Eross B. Potential benefits of restrictive transfusion in upper gastrointestinal bleeding: a systematic review and meta-analysis of randomised controlled trials. Sci Rep. 10 12;13(1):17301. Located at: MEDLINE; 37828128. doi:10.1038/s41598-023-44271-8

PICO 3

Following initial screening, 1,178 records were excluded as irrelevant, and 100 articles were retained for full-text evaluation. After full-text review, these 100 articles were excluded for the following reasons: wrong outcomes (n=58), wrong intervention (n=24), wrong patient population (n=6), duplicate data (n=4), wrong comparator (n=4), and wrong study design (n=4).

PICO 4

After title reading 18 studies and 3 reviews were considered, then after abstracts reading 9 studies: 3 meta-analysis and 6 studies were considered potentially relevant and were acquired in full text. After removing duplicates (n=1) and article writing in Chinese (n=1), 3 systematic review/meta-analysis[5–7] ; and 4 studies : 1 RCT[8], 1 CT[9], 1 retrospective study[10] and 1 observational prospective study[11] were included. The RCT and CT were included in the newest meta-analysis[5].

List of references

5. Alamro SM, Alanazi MM, Suwayyid WK. Capsule Endoscopy for the Risk Stratification and Management of Acute Upper Gastrointestinal Bleeding in Emergency Departments: A Systematic Review on Triage, Risk Stratification, and Management. Cureus. oct 2024;16(10):e71530. Located at: MEDLINE; 39553035. doi:10.7759/cureus.71530

6. Qin K, Li J, Fang Y, Xu Y, Wu J, Zhang H, et al. Convolution neural network for the diagnosis of wireless capsule endoscopy: a systematic review and meta-analysis. Surg Endosc. janv 2022;36(1):16-31. Located at: Embase; 2013515232. doi:10.1007/s00464-021-08689-3

7. Shah N, Chen C, Montano N, Cave D, Siegel R, Gentile NT, et al. Video capsule endoscopy for upper gastrointestinal hemorrhage in the emergency department: A systematic review and meta-analysis. Am J Emerg Med. 6apr. J.-C.;38(6):1245-52. Located at: MEDLINE; 32229221. doi:10.1016/j.ajem.2020.03.008

8. Meltzer AC, Limkakeng AT Jr, Gentile NT, Freeman JQ, Hall NC, Vargas NM, et al. Risk stratification with video capsule endoscopy leads to fewer hospital admissions in emergency department patients with low-risk to moderate-risk upper gastrointestinal bleed: A multicenter clinical trial. J Am Coll Emerg Physicians Open. oct 2021;2(5):e12579. Located at: MEDLINE; 34723247. doi:10.1002/emp2.12579

9. Akiki K, Mahmoud T, Alqaisieh MH, Sayegh LN, Lescalleet KE, Abu Dayyeh BK, et al. A novel blood-sensing capsule for rapid detection of upper GI bleeding: a prospective clinical trial. Gastrointest Endosc. mai 2024;99(5):712-20. Located at: Embase; 2031324518. doi:10.1016/j.gie.2023.11.051

10. Brunk T, Schmidt A, Hochberger J, Wedi E, Meier B, Braun G, et al. Telemetric capsule-based upper gastrointestinal tract - blood detection - first multicentric experience. Minim Invasive Ther Allied Technol Mitat. juin 2022;31(5):704-11. Located at: MEDLINE; 34342252. doi:10.1080/13645706.2021.1954534

11. Yu Y, Liao Z, Jiang X, Pan J, Zhou W, Lau JYW. The use of magnet-controlled capsule endoscopy as the initial diagnostic tool in patients with acute upper gastrointestinal bleeding. J Gastroenterol Hepatol. nov 2023;38(11):2027-34. Located at: MEDLINE; 37534802. doi:10.1111/jgh.16310

PICO 5

Following initial screening, 1,262 records were excluded as irrelevant, and 14 studies were retained for full-text evaluation. After full-text review, 7 studies were excluded, including 4 meta-analyses and 3 abstracts with duplicate data. Ultimately, 7 studies were included in the meta-analysis.

List of references

12. Boquera Ferrer M, Cardenas Jaen K, Mangas Sanjuan C, et al. Azithromycin versus erythromycin in intravenous infusion in upper gastrointestinal bleeding: preliminary results of a non-inferior, prospective, randomized, double-blind controlled clinical trial. United European gastroenterology journal 2021;9:781-782.

13. Herrera Elizondo JL, Gonzalez Gonzalez JA, Gonzalez-Martinez CE, et al. High dose metoclopramide versus placebo for gastroduodenal visualization during endoscopy in patients with acute upper gastrointestinal bleeding. a triple-blind randomized clinical trial. Gastrointestinal endoscopy 2025;101:S229.

14. Issa D, Solomon S, Hillyard J, et al. Azithromycin versus erythromycin infusions prior to endoscopy in upper gastrointestinal bleeding. Translational Gastroenterology & Hepatology 2022;7:35.

15. Manupeeraphant P, Wanichagool D, Songlin T, et al. Intravenous metoclopramide for increasing endoscopic mucosal visualization in patients with acute upper gastrointestinal bleeding: a multicenter, randomized, double-blind, controlled trial. Scientific Reports 2024;14:7598.

16. Promsorn P. ID: 3495973 Metoclopramide intravenous for increase endoscopic visualization score in patient with acute upper gastrointestinal bleeding: double-blind, controlled trial. Gastrointestinal endoscopy 2021;93:AB21-AB22.

17. Ali Shah SA, Nadeem M, Jameel M, et al. Oral Erythromycin Improves the Quality of Endoscopy in Upper Gastrointestinal Bleeding Patients. Cureus 2020;12:e10204.

18. Vimonsuntirungsri T, Thungsuk R, Nopjaroonsri P, et al. The Efficacy of Metoclopramide for Gastric Visualization by Endoscopy in Patients With Active Upper Gastrointestinal Bleeding: Double-Blind Randomized Controlled Trial. American Journal of Gastroenterology 2024;119:846-855.

PICO 6

Following scrutinization, 2 meta-analyses were considered[12,13]

List of references

19. Kanno T, Yuan Y, Tse F, Howden CW, Moayyedi P, Leontiadis GI. Proton pump inhibitor treatment initiated prior to endoscopic diagnosis in upper gastrointestinal bleeding. Cochrane Database Syst Rev. 01 07;1:CD005415. Located at: MEDLINE; 34995368. doi:10.1002/14651858.CD005415.pub4

20. Marmo R, Soncini M, Bucci C, Zullo A. Pre-endoscopic intravenous proton pump inhibitors therapy for upper gastrointestinal bleeding: A prospective, multicentre study. Dig Liver Dis. janv 2021;53(1):102-6. Located at: Embase; 2008480224. doi:10.1016/j.dld.2020.10.023

PICO 7

After initial screening, 9 studies and 2 reviews were considered. Then after abstracts, reading 2 meta-analyses + 2 retrospective studies were considered potentially relevant. One retrospective study was only an abstract without full publication[14]. The others were acquired in full text[15–17]. One of the meta-analysis was already included in the 2021 ESGE Guidelines[15]. The 2 retrospective studies were included in the latest meta-analysis[17].

List of references

21. Suchartlikitwong S, Juarez RM, Jaroudi S, Ismail A, Vutthikraivit W, Laoveeravat P, et al. Elective endotracheal intubation prior to EGD for upper gastrointestinal bleeding increased risk of cardiopulmonary events. Gastroenterology. 2020;158(6):S-872-S-873. Located at: CN-02132708. doi:10.1016/S0016-5085(20)32867-5

22. Chaudhuri D, Bishay K, Tandon P, Trivedi V, James PD, Kelly EM, et al. Prophylactic endotracheal intubation in critically ill patients with upper gastrointestinal bleed: A systematic review and meta-analysis. JGH Open. févr 2020;4(1):22-8. Located at: MEDLINE; 32055693. doi:10.1002/jgh3.12195

23. Lin Y, Song F, Zeng W, Han Y, Chen X, Chen X, et al. Cardiopulmonary prognosis of prophylactic endotracheal intubation in patients with upper gastrointestinal bleeding undergoing endoscopy. World J Emerg Med. 2023;14(5):372-9. Located at: MEDLINE; 37908798. doi:10.5847/wjem.j.1920-8642.2023.080

24. Pasha SB, Tarar ZI, Chela H, McDermott A, Ihnat J, Matteson-Kome ML, et al. Should Prophylactic Endotracheal Intubation Be Performed in Upper Gastrointestinal Bleeding? Cureus. juill 2024;16(7):e64567. Located at: MEDLINE; 39144893. doi:10.7759/cureus.64567

PICO 8

After initial screening, 21 studies and 9 reviews were considered, then after abstracts reading, removing duplicate (n=1), study with only abstract (n=1), comment of retrospective study (n=1) and non-English studies (n=1), 4 articles were considered potentially relevant[18–21].

List of references

25. Sun X, Zhang Y, Li J, Zhang B, Jia Q. Analysis of the Effect of Intelligent Red Blood Cell Distribution Diagnosis Model on the Diagnosis and Treatment of Gastrointestinal Bleeding. J Healthc Eng. 2021;2021(no pagination). doi:10.1155/2021/5216979

26. Raghareutai K, Tanchotsrinon W, Sattayalertyanyong O, Kaosombatwattana U. Development and validation of a machine learning model to predict hemostatic intervention in patients with acute upper gastrointestinal bleeding. BMC Med Inform Decis Mak. 24 mars 2025;25(1):145. Located at: MEDLINE; 40128792. doi:10.1186/s12911-025-02969-x

27. Li Q, Chen G, Li Q, Guo D. Application of machine learning in acute upper gastrointestinal bleeding: bibliometric analysis. Front Med. 2024;11:1490757. Located at: MEDLINE; 39624044. doi:10.3389/fmed.2024.1490757

28. Yen HH, Wu PY, Chen MF, Lin WC, Tsai CL, Lin KP. Current status and future perspective of artificial intelligence in the management of peptic ulcer bleeding: A review of recent literature. J Clin Med. août 2021;10(16) (no pagination). Located at: Embase; 2013352742. doi:10.3390/jcm10163527

Tables of Evidence: Characteristics of the included studies.

PICO 1

Author, year	Study design	No. of subjects	Intervention, n	Comparator, n	Outcome in meta-analysis
M Obeidat, 2023[1]	Meta-analysis	193 studies in quantitative synthesis	n/a	n/a	prevalence of hemodynamic instability
E Tari, 2023[2]	Meta-analysis	39 studies in quantitative synthesis	n/a	n/a	risk of mortality and rebleeding

PICO 2

Author, year	Country	Study design	No. of subjects	Age (y)	Male sex (%)	Intervention, n	Comparator ,n	Outcome in intervention arm	Outcome in comparator arm	Follow-up
Kola et al. 2021 (3)	India	RCT	224	48±15	Nd	Restrictive transfusion (threshold 7g/dl)	Liberal transfusion (threshold 8g/dl)	Demographic characteristics were comparable. All outcomes similar (restrictive vs. liberal) 45-day mortality (10/112 vs. 12/112; P = 0.65) number of in-hospital bleeding episodes 12 vs. 9; P = 0.25 incidence of re-bleeding during the 45-day 13 vs. 14; P = 0.84 need for endoscopic banding for varices 37/112 vs. 39/112, P = 0.99 mean hospital stay (days) 3.21 ± 2.78 vs. 2.73 ± 1.29; P = 0.10		45-day
Teutsch et al. 2023 (4)	Hungary	Meta-analysis	7 studies included UGIB population			Studies comparing lower to higher RBC transfusion thresholds Differences in the baseline characteristics or missing details of the randomization, deviations from the intended interventions, and selection of the reported results led to a moderate ("some concerns") to high risk of bias for all the included RCTs Due to the indirectness and inconsistency of the studies, low-quality evidence for most of the results		Fewer units of RBC transfused for restrictive strategy Restrictive transfusion did not increase the in-hospital- (RR: 0.94; CI 0.46, 1.94) and 30-day mortality (RR: 0.71; CI 0.35, 1.45). In-hospital- and 28 to 45-day rebleeding rate was also not higher with the restrictive modality (RR: 0.67; CI 0.30, 1.50; RR:0.75; CI 0.49, 1.16, respectively). Results of individual studies showed a lower rate of transfusion reactions and post-transfusion intervention if the transfusion was started at a lower threshold. A haemoglobin threshold > 80 g/L may result in a higher untoward outcome rate.		6-45 days

PICO 3 : N/A

PICO 4

Author, year	Country	Study design	No. of subjects	Age (y)	Male sex (%)	Intervention, n	Comparator, n	Outcome in intervention arm	Outcome in comparator arm	Follow-up
Alamro et al., 2024	Multiple (USA, China, Australia, etc.)	Systematic review (capsule endoscopy in ED UGIB)	9 studies, 634 patients with suspected/confirmed UGIB	Adults; mean ages mostly 55–70 across studies No pool data	No pool data	Capsule endoscopy-based triage pathways in ED or early during hospitalization	Standard care pathways without early capsule (clinical scores such as GBS/Rockall, nasogastric lavage, early EGD, inpatient observation)	Across RCTs and cohorts, capsule-guided triage reduced hospital admissions and early inpatient EGD in hemodynamically stable patients, without increasing rebleeding or mortality. No pool data	Standard care generally associated with higher admission and endoscopy rates for similar patients, without clear improvement in rebleeding or mortality compared with capsule-guided strategies.	Follow-up duration varied, typically up to 30 days in the primary studies.
Akiki et al., 2024	USA	Prospective diagnostic clinical trial (blood-sensing capsule vs EGD)	126 (safety set); 124 with paired PillSense–EGD data (mITT)	Mean 62.4 ± 14.3	59.5% (75/126)	PillSense blood-sensing capsule plus standard of care, n=126 (124 analysable for primary endpoint)	EGD and clinical course as reference standard (paired with capsule in 124 patients)	Detection of blood in upper GI tract vs EGD: sensitivity 92.9%, specificity 90.6%, NPV 97.8%, PPV 74.3%. No serious device-related adverse events.	EGD classified 28/124 as with blood and 96/124 as without blood	Follow-up until capsule passage (mean transit 3.6 days in those with known passage) and over this period for safety outcomes.

Yu et al., 2023	Hong Kong & China	Prospective cohort (magnet-controlled capsule as first test in acute UGIB)	99 (patients with acute UGIB who completed MCCE)	Mean 54.1 ± 16.7	70.7% (70/99)	Magnet-controlled capsule endoscopy (MCCE) as initial diagnostic test, n=99	Subgroup with inpatient EGD after MCCE, n=45 (no parallel no-capsule control arm)	MCCE diagnostic yield 95.8% (lesions in 96/99). Triage: 52/99 (52.5%) safely discharged without inpatient EGD; 0 rebleeding or rehospitalisation at 30 days	45/99 (45.5%) had inpatient EGD; some additional lesions/ulcers found but 30-day clinical outcomes similar to patients discharged without EGD (no excess adverse events).	30 days (rebleeding, rehospitalisation, need for additional endoscopy).
Qin et al., 2022	China (systematic review of international datasets)	Systematic review & diagnostic test accuracy meta-analysis of CNN-based AI for WCE	16 articles, 23 independent WCE datasets (~69,991,447 images; 15,291,964 lesion images)	Not applicable (image-based datasets)	Not applicable	CNN algorithms applied to WCE images for automatic detection of GI lesions (including bleeding)	Expert human reading / conventional labelling of images as ground truth	For GI bleeding detection in WCE images (7 studies): pooled sensitivity 0.97, specificity 1.00; AI can greatly shorten reading time and support real-time risk stratification based on capsule findings.	Comparator is conventional human reading/interpretation; no direct patient-level triage or outcome data (admission, mortality).	No patient follow-up (image-based diagnostic accuracy only).
Brunk et al., 2022	Germany & Switzerland (12 hospitals)	Multicenter retrospective cohort (telemetric blood-sensing capsule HemoPill acute)	61	Not reported in abstract	Not reported in abstract	HemoPill acute telemetric blood-detection capsule, n=61	No parallel control arm; compared against endoscopy and clinical course	Technical success 98%. Used in 45 (73%) suspected UGIB, 12 (20%) small bowel bleeding, 4 (7%) to exclude rebleeding. 35/60 (58%) capsule-positive with bleeding confirmed endoscopically in 20/35 (57%). 25/60 capsule-negative; none rebled.	Endoscopy and clinical outcomes served as reference: negative HemoPill results allowed downgrading the urgency or need for endoscopy without observed rebleeding or serious adverse events.	During index hospitalization (rebleeding and adverse events assessed; exact duration not specified in abstract).

								Negative result changed management in 18/25 (72%), avoiding emergency endoscopy in 10 and subsequent endoscopy in 8. No serious device-related adverse events.		
Meltzer et al., 2021	USA	Randomized controlled trial (VCE vs standard care in low–moderate risk UGIB in ED)	24 (11 VCE, 13 standard care)	VCE: median 55 (IQR 36–58); SC: 47 (41–54)	≈66.7% (16/24)	Video capsule endoscopy (PillCam)–guided triage in ED, n=11	Usual care with early inpatient EGD per guidelines, n=13	Hospital admission: 2/11 (18.2%) admitted; 9/11 (81.8%) discharged from ED without admission. No increase in complications, rebleeding or mortality at 7 and 30 days.	Hospital admission: 10/13 (76.9%) admitted; 3/13 (23.1%) discharged. No significant differences in 7- and 30-day adverse events, rebleeding or mortality vs VCE group.	Clinical follow-up at 7 and 30 days.
Shah et al., 2020	Multiple (international)	Systematic review & meta-analysis of VCE in ED UGIB	5 diagnostic-accuracy studies; 193 patients with suspected UGIB in ED	Adult ED population; mean age per study ~55–65	>50% male in most studies (pooled value not reported)	Video capsule endoscopy used in ED to detect high-risk lesions and guide triage	Reference standard EGD and/or standard triage based on clinical assessment and risk scores (e.g. GBS)	Pooled sensitivity of VCE for high-risk endoscopic lesions ~0.72 and specificity ~0.75; better discrimination for need of urgent EGD/admission than GBS alone.	Conventional pre-endoscopy scores (GBS/Rockall) alone less accurate for identifying high-risk lesions than strategies incorporating VCE; no clear mortality difference reported.	Follow-up across included studies typically about 30 days for rebleeding and other clinical outcomes.

PICO 5

Author, year	Country	Study design	No. of subjects	Age (y)	Male sex (%)	Intervention, n	Comparator, n	Outcome in intervention arm	Outcome in comparator arm	Follow-up
Boquera Ferrer M (2021)	Spain	RCT (abstract) (prelim data)	n=71	69 (SD 16)	64.8%	Azithromycin 250 mg IV 30-60 min pre-EGD (n=35)	Erythromycin 250 mg IV 30-60 min pre-EGD (n=36)	Diagnostic yield (n=23)	Diagnostic yield (n=28)	N/R
								Adequate mucosal exposure (n=28)	Adequate mucosal exposure (n=32)	N/R
Herrera Elizondo JL (2025)	Mexico	RCT (abstract)	n=50	60 (rng 48-70)	54.0%	Metoclopramide 20 mg IV 30-120 min pre-EGD (n=25)	Placebo (n=25)	Mucosal exposure per Avgerinos score (mean 7.0 +/- SD 1.04)	Mucosal exposure per Avgerinos score (mean 6.56 +/- SD 1.73)	N/R
								Requirement for second look EGD (n=3)	Requirement for second look EGD (n=4)	N/R
								Hospital LOS (mean 7.32 +/- SD 4.31)	Hospital LOS (mean 7.0 +/- SD 3.08)	N/R
Issa D (2022)	USA	Retrospective cohort	n=66	58 (rng 24-86)	76%	Azithromycin 250 mg IV up to 6 hrs pre-EGD (n=25)	Erythromycin 250 mg IV up to 6 hrs pre-EGD (n=41)	Mucosal exposure per 0-8 pt scale Frossard et al (mean 6.8 +/- SD 1.4)	Mucosal exposure per 0-8 pt scale Frossard et al (mean 5.5 +/- SD 2.2)	N/R
								'Excellent' mucosal exposure (n=17)	'Excellent' mucosal exposure (n=16)	N/R

								Requirement for second look EGD (n=3)	Requirement for second look EGD (n=11)	N/R
								Hospital LOS (median 6.0, 95% CI 3-9)	Hospital LOS (median 8.0, 95% CI 7-16)	N/R
								Units pRBC transfused (mean 2.8 +/- SD 1.7)	Units pRBC transfused (mean 3.4 +/- SD 4.0)	N/R
Manupeeraphant P (2024)	Thailand	RCT	n=233 (non-variceal)	62.8 +/-14.3	67.6%	Metoclopramide 10 mg IV 10-30 min pre-EGD (n=118)	Placebo (n=115)	Mucosal exposure per Avgerinos score (mean 7.31 +/- SD 1.16)	Mucosal exposure per Avgerinos score (mean 7.1 +/- SD 1.39)	N/R
								Requirement for second look EGD (n=5/143 variceal + NV)	Requirement for second look EGD (n=6/141 variceal + NV)	N/R
								Death (n=5/143 variceal + NV)	Death (n=9/141 variceal + NV)	During admission
Promsorn P (2021)	Thailand	RCT (abstract)	n=164	N/R	N/R	Metoclopramide 10 mg IV 30-120 min pre-EGD (n=82)	Placebo (n=82)	Mucosal exposure per Avgerinos score (mean 7.39 +/- SD 1.23)	Mucosal exposure per Avgerinos score (mean 6.71 +/- SD 1.98)	N/R
								Requirement for second look EGD (n=4)	Requirement for second look EGD (n=8)	N/R

								Hospital LOS (mean 10.43 +/- SD 9.51)	Hospital LOS (mean 14.91 +/- SD 32.79)	N/R
								Units pRBC transfused (mean 1.54 +/- SD 1.77)	Units pRBC transfused (mean 1.41 +/- SD 1.5)	N/R
Ali Shah SAA (2020)	Pakistan	RCT	n=60 (variceal 43% + NV 57%)	53.68 +/- 16.64	60.0%	Erythromycin 500 mg IV 30-60 min pre-EGD (n=30)	Placebo (n=30)	'Good' mucosal exposure (n=25)	'Good' mucosal exposure (n=12)	N/R
								Hospital LOS (mean 5.23 +/- SD 2.42)	Hospital LOS (mean 5.40 +/- SD 2.82)	N/R
								Units pRBC transfused (mean 1.37 +/- SD 1.30)	Units pRBC transfused (mean 1.77 +/- SD 1.59)	N/R
Vimonsuntirungsri T (2024)	Thailand	RCT	n=62 (only 35% PUD)	61.6 +/- 16.1	57.8%	Metoclopramide 10 mg IV 30-120 min pre-EGD (n=31)	Placebo (n=31)	'Adequate' mucosal exposure (n=24)	'Adequate' mucosal exposure (n=19)	N/R
								Mucosal exposure (mean 6.6 +/- SD 1.8)	Mucosal exposure (mean 6.1 +/- SD 2.2)	N/R
								Immediate hemostasis (n=28)	Immediate hemostasis (n=28)	N/R
								Requirement for second look EGD (n=3)	Requirement for second look EGD (n=7)	72 hours

								Units pRBC transfused (mean 2.3 +/- SD 1.7)	Units pRBC transfused (mean 1.9 +/- SD 2.5)	N/R
								Hospital LOS (mean 5.4 +/- SD 3.2)	Hospital LOS(mean 6.7 +/- SD 9.2)	N/R
								Rebleeding (n=5)	Rebleeding (n=4)	30 days

N/R = not reported.

PICO 6

Author, year	Country	Study design	No. of subjects	Age (y)	Male/female, n	Intervention, n	Comparator, n	Outcome in intervention arm	Outcome in comparator arm	p-value
R Marmo 2020	Italy 50 centers	Prospective	2556	68.9±16.7 (C) 71.1±14.9 (I)	1221/563 (C) 497/271 (I)	pre-endoscopic PPI use, 1792	no PPI prior to endoscopy, 774	high risk stigmata on ulcers 536/1035; 51,8%	high risk stigmata on ulcers 203/380; 53.4%	P=0.58
T Kanno 2022	-	Meta-analysis	2223 6 studies	-	-	pre-endoscopic PPI use	no PPI prior to endoscopy or H2RA or placebo	**Pre-endoscopic PPI use** • may not reduce mortality (OR 1.14, 95% CI 0.76 to 1.70; 5 studies; low-certainty evidence) • may reduce rebleeding (OR 0.81, 95% CI 0.62 to 1.06; 5 studies; low-certainty evidence) • may not reduce the need for surgery (OR 0.91, 95% CI 0.65 to 1.26; 6 studies; low-certainty evidence) • not reduce the proportion of participants with high-risk stigmata of recent hemorrhage at index endoscopy (OR 0.80, 95% CI 0.52 to 1.21; 4 studies; low-certainty evidence). • likely reduces the need for endoscopic hemostatic treatment at index endoscopy (OR 0.68, 95% CI 0.50 to 0.93; 3 studies; moderate-certainty evidence)		

PICO 7

Author, year	Country	Study design	No. of subjects	Age (y)	Male sex (%)	Intervention, n	Comparator ,n	Outcome in intervention arm	Outcome in comparator arm	Follow-up
Pasha et al., 2024	Multiple (predominantly USA, plus Denmark and China)	Systematic review and meta-analysis of observational cohort studies comparing prophylactic endotracheal intubation (PEI) vs no intubation before EGD in acute UGIB	7,332 adult patients with acute UGIB across 11 studies ***All studies are retrospective***	Adults ≥18 years; mean ages in individual studies typically ~48–68 years (no pooled mean reported)	Not reported as pooled value	Prophylactic endotracheal intubation before endoscopy; sample sizes vary by outcome (e.g. mortality: 2,891 PEI patients; pneumonia: 665; aspiration: 450)	No prophylactic intubation before endoscopy; sample sizes vary by outcome (e.g. mortality: 3,975 non-PEI patients; pneumonia: 2,842; aspiration: 1,652)	Pneumonia within 48 h: 151/665 (22.7%), significantly higher vs no-PEI (OR 5.83, 95% CI 3.15–10.79). Aspiration: 44/450 (9.8%), trend to higher rate (OR 2.79, 95% CI 0.89–8.70). Mortality: 14.7% (425/2,891), not significantly different (OR 1.68, 95% CI 0.78–3.64). Length of stay longer with PEI (mean difference +0.84 days).	Pneumonia within 48 h: 135/2,842 (4.8%). ` Aspiration: 36/1,652 (2.2%). Mortality: 7.5% (300/3,975). Overall, lower pneumonia and similar mortality, with shorter hospital stay than in PEI group.	In-hospital follow-up only; pneumonia assessed within 48 hours after endoscopy, aspiration, total length of hospital stay, and in-hospital mortality (no post-discharge outcomes or formal cost data).

PICO 8

Author, year	Country	Study design	No. of subjects	Age (y)	Male sex (%)	Intervention , n	Comparator ,n	Outcome in intervention arm	Outcome in comparator arm	Follow-up
Li et al., 2024	China (bibliometric analysis of 29 countries)	Systematic bibliometric analysis of machine learning research in acute upper GI bleeding (AUGIB)	73 original machine learning (ML) studies (articles) identified (not patient-level)	NA	NA	ML applications for AUGIB (risk prediction, endoscopic image analysis, decision-support) across published studies	Not applicable (no direct control group; literature-level analysis)	Identified 3 hotspots: clinical risk prediction, image-based diagnosis, and data integration/decision-support; many ML models outperform traditional scores (Rockall, AIMS65, GBS) in discrimination for intervention or mortality.	No direct comparator arm; conventional scores and standard care are described as less accurate in the primary studies summarized.	NA
Raghareutai et al., 2025	Thailand	Retrospective cohort with ML model development and internal validation (TRIPOD-AI)	1,389 patients with acute UGIB undergoing endoscopy (615 received hemostatic intervention)	Mean ~64 years (61.5 ± 14.6 in intervention vs 66.5 ± 15.1 in non-intervention group)	Approximately 65% overall; 69.9% in intervention group, 61.0% in non-intervention group	ML model (linear discriminant analysis) trained/validated to predict need for endoscopic hemostatic intervention using 18 pre-endoscopic variables	Same cohort used to compare model performance against conventional scores (GBS, Rockall, AIMS65)	Best ML model AUROC 0.74 in cross-validation and 0.81 in test set for predicting need for endoscopic intervention, with good negative predictive value to support triage.	Conventional scores showed lower AUROCs and weaker discrimination for need of endoscopic therapy compared with the ML model.	Index hospitalization/episode (outcome = whether endoscopic intervention was performed; no long-term follow-up reported).
Sun et al., 2021	China	Single-centre observational/exper	80 patients	21–70 years in	Approximately 66%	Application of an	Healthy controls	Higher RDW associated with	Conventional/controls had lower	Followed during hospitalization

		imental study using an intelligent Red blood cell distribution width (RDW)-based diagnostic model in GI bleeding	with upper GI hemorrhage; 90 healthy controls	UGIH group (mean not clearly reported)	male in UGIH group (53/80)	intelligent RDW-based model to evaluate bleeding severity and guide management in 80 UGIH patients	(n=90) for RDW comparison; internal comparisons between groups managed conventionally vs with the intelligent model	more severe bleeding; patients in the test/intelligent-model group showed lower bleeding volume and better recovery indices; all patients survived to discharge.	RDW and no bleeding (healthy), or higher bleeding volume and slightly poorer recovery metrics in internal comparisons.	until clinical recovery and discharge; no post-discharge outcomes reported.
Yen et al., 2021	Taiwan (review of international data)	Narrative review of AI applications in peptic ulcer bleeding (PUB) across pre-, peri-, and post-endoscopic phases	Not applicable (review of multiple primary studies)	Not applicable	Not applicable	AI/ML tools for pre-endoscopic risk prediction, endoscopic image interpretation, and post-endoscopic outcome prediction (rebleeding, mortality, malignancy, H. pylori)	Comparisons in primary studies versus conventional clinical scores (GBS, Rockall, AIMS65) and expert endoscopist assessment	Summarises that many ML models achieve higher AUROCs (often ~0.88–0.91) than conventional scores for predicting need for intervention or mortality, and that deep-learning image analysis can improve detection/classification of high-risk ulcers.	Standard risk scores and human-only image interpretation generally show lower discrimination and may misclassify some high- or low-risk PUB patients compared with AI tools.	Follow-up horizons vary across primary studies (in-hospital, 7–30 days, ICU stay); the review itself does not have independent follow-up.

Taskforce 2: Endoscopic management

Leader: John Morris

Members: Lynn Debels, Gaurav Nigam, Krzysztof Kurek

List of PICOs

PICO 1 Timing of Upper GI Endoscopy

Clinical Question

In patients presenting with acute UGIB admitted to hospital, does early upper endoscopy (within 24 hours) compared to delayed endoscopy (>24 hours) improve clinical outcomes?

PICO 1	Population	Intervention	Comparator	Outcome
Timing of upper GI endoscopy	Patients presenting with acute UGIB admitted to hospital	Upper endoscopy within 24 hours of patient presentation (subdivide by 6,12 and 24hrs)	Upper endoscopy after 24 hours of patient presentation	Immediate hemostasis, rebleeding, transfusion requirements, mortality, surgery, IR, LOS, costs

PICO 2 Role of Doppler Ultrasound Probe

Clinical Question

In patients with acute UGIB and peptic ulcer at upper endoscopy, does Doppler US probe assisted endoscopic hemostasis compared to visually guided hemostasis improve identification of stigmata and outcomes?

PICO 2	Population	Intervention	Comparator	Outcome
Endoscopic therapy for peptic ulcer hemorrhage	Patient presenting with acute UGIB and with peptic ulcer at upper endoscopy	Doppler US probe assisted endoscopic hemostasis	No Doppler US probe assistance (visually guided endoscopic hemostasis)	Identification of endoscopic stigmata of recent hemorrhage, immediate hemostasis, transfusion requirements, rebleeding, mortality

PICO 3 Endoscopic therapy for peptic ulcer hemorrhage

Clinical Question

In patients with ulcer with high-risk endoscopic stigmata (FIa/FIb/FIIa), does endoscopic therapy compared to no endoscopic therapy/IV PPI/placebo improve hemostasis and reduce further bleeding and mortality?

PICO 3	Population	Intervention	Comparator	Outcome
Endoscopic therapy for peptic ulcer hemorrhage	Patients with ulcer with high-rate endoscopic stigmata [active spurting (FIa) or active oozing (FIb) bleeding or a nonbleeding visible vessel (FIIa)]	Endoscopic therapy (all modalities: TTS clips, contact thermal therapy = bipolar and heater probe, ethanol injection, topical hemostatic agents, cap-mounted clips, soft coagulation forceps, APC)	No ndoscopic therapy, IV PPI, placebo	Initial hemostasis Further bleeding, mortality

PICO 4 Endoscopic hemostasis in ulcer with adherent clot (FIIb)

Clinical Question

In patients with ulcer with adherent clot (FIIb), does endoscopic therapy compared to no endoscopic therapy/PPI/interval endoscopy improve initial hemostasis, reduce further bleeding, and reduce mortality?

PICO 4	Population	Intervention	Comparator	Outcome
Endoscopic hemostasis in ulcer with adherent clot (FIIb)	Patients with ulcer with adherent clot (FIIb)	Endoscopic therapy (all modalities: TTS clips, contact thermal therapy = bipolar and heater probe, ethanol injection, topical hemostatic agents, cap-mounted clips, soft coagulation forceps, APC)	No endoscopic therapy, PPI, interval endoscopy/second look endoscopy	Initial hemostasis Further bleeding, mortality

PICO 5 Head-to-head comparisons of different endoscopic therapies

Clinical Question

In patients with ulcer with high-risk endoscopic stigmata (FIa/FIb, FIIa, or FIIb), which specific endoscopic therapy modality provides the best outcomes compared to other modalities?

PICO 5	Population	Intervention	Comparator	Outcome
Endoscopic hemostasis therapy – Head-to-head comparisons of different endoscopic therapies	Patients with ulcer with high-risk endoscopic stigmata [(spurting or oozing) FIa/FIb, non-bleeding visible vessel (FIIa)], or clot (FIIb)]	Specific endoscopic therapies (all modalities: TTS clips, contact thermal therapy = bipolar and heater probe, ethanol injection, topical agents, cap-mounted clips, soft coagulation forceps, APC)	Other specific endoscopic therapies (all modalities: TTS clips, contact thermal therapy = bipolar and heater probe, ethanol injection, topical agents, cap-mounted clips, soft coagulation forceps, APC)	Immediate hemostasis, further bleeding, mortality

Relevant Keywords

endoscopic hemostasis, peptic ulcer hemorrhage/bleeding, upper gastrointestinal hemorrhage/bleeding, UGIB, high-risk stigmata, adherent clot, active spurting, active oozing, non-bleeding visible vessel

Bibliographic search

Search date: September 10th 2025

By: Tarjei Fiskergård Werner, senior librarian, University of Oslo - Library of medicine and science

Bibliographic research was performed in Medline, Embase, and Cochrane from 2020 to September 2025 using the following search strategies:

Number of references after duplicate removal

Systematic reviews: 198

Primary studies: 1100

TF2 Medline reviews

Ovid MEDLINE(R) ALL <1946 to September 09, 2025>

1	gastrointestinal hemorrhage/ and exp Upper Gastrointestinal Tract/	4915
2	Hemostasis, Endoscopic/ and (Peptic Ulcer Hemorrhage/ or (exp Peptic Ulcer/ and Hemorrhage/))	592
3	((endoscopic h?emostas?s adj3 (peptic ulcer* adj3 (haemorrhag* or bleed* or blood loss))) or ((upper gastrointestinal or upper gastro intestinal or upper gi) adj3 (h?emorrhag* or bleed* or blood loss)) or ugib or (endoscop* adj3 high-risk stigmata*) or (ulcer* adj3 adherent clot*) or active spurt* or active ooz* or non-bleeding visible vessel* or nonbleeding visible vessel*).tw,kf,kw.	10616
4	or/1-3	14991
5	exp Endoscopy, Gastrointestinal/	106997
6	Ethanol/	100436

7 Surgical Instruments/ 21403

8 Anti-Infective Agents, Local/ 18609

9 Argon Plasma Coagulation/ 589

10 (endoscop* or ((doppler or bipolar or heater) adj3 probe*) or ((tts or through-the-scope or cap-mounted or capmounted or hemo or over-the-scope or otsc or padlock) adj3 clip*) or hemoclip* or contact thermal therap* or (ethanol adj3 inject*) or ((topical or anti-infective or antiinfective) adj3 agent*) or antiseptic or soft coagulation forcep* or argon plasma coagulation or apc).tw,kf,kw. 337578

11 or/5-10 515117

12 Hemostasis, Endoscopic/ 2406

13 hemorrhage/ or blood loss, surgical/ or postoperative hemorrhage/ 118244

14 Blood Transfusion/ 56402

15 Hemostatics/ 13169

16 mortality/ or fatal outcome/ or hospital mortality/ or survival rate/ 365836

17 exp "Costs and Cost Analysis"/ 281894

18 Radiology, Interventional/ 5110

19 Angiography/ and mesenteric.tw,kf,kw. 1494

20 Length of Stay/ 112636

21 (((immediate or initial) adj3 h?emostas?s) or h?emorrh* or bleed* or blood loss or rebleed* or transfusion* or hemostatic* or mortal* or survival* or death* or cost or costs or stigmata* or interventional radiolog* or mesenteric angiograph* or ((length or hospital*) adj3 stay*)).tw,kf,kw. 4495527

22 or/12-21 4765490

23 and/4,11,22 6525

24 limit 23 to yr="2020 -Current" 1400

25 24 and ((Meta Analysis or Systematic Review).pt. or "Meta-Analysis as Topic"/ or (Review.pt. and (pubmed or medline).ti,ab.) or ((systematic* or literature or scoping) adj3 (overview or review* or search*)).ti,ab,kf. or (meta-anal* or metaanal* or meta-regression* or umbrella review* or overview of reviews or review of reviews or (evidence* adj2 synth*) or synthesis review*).ti,ab,kf.) 142

TF2 Medline studies

Ovid MEDLINE(R) ALL <1946 to September 09, 2025>

1 *gastrointestinal hemorrhage/ and exp *Upper Gastrointestinal Tract/ 2010

2 *Hemostasis, Endoscopic/ and (*Peptic Ulcer Hemorrhage/ or (exp *Peptic Ulcer/ and *Hemorrhage/)) 382

3 ((endoscopic h?emostas?s adj3 (peptic ulcer* adj3 (haemorrhag* or bleed* or blood loss))) or ((upper gastrointestinal or upper gastro intestinal or upper gi) adj3 (h?emorrhag* or bleed* or blood loss)) or ugib or (endoscop* adj3 high-risk stigmata*) or (ulcer* adj3 adherent clot*) or active spurt* or active ooz* or non-bleeding visible vessel* or nonbleeding visible vessel*).ti,kf,kw. 5505

4 or/1-3 7505

5 exp Endoscopy, Gastrointestinal/ 106997

6 Ethanol/ 100436

7 Surgical Instruments/ 21403

8 Anti-Infective Agents, Local/ 18609

9 Argon Plasma Coagulation/ 589

10 (endoscop* or ((doppler or bipolar or heater) adj3 probe*) or ((tts or through-the-scope or cap-mounted or capmounted or hemo or over-the-scope or otsc or padlock) adj3 clip*) or hemoclip* or contact thermal therap* or (ethanol adj3 inject*) or ((topical or anti-infective or antiinfective) adj3 agent*) or antiseptic or soft coagulation forcep* or argon plasma coagulation or apc).tw,kf,kw. 337578

11	or/5-10	515117
12	Hemostasis, Endoscopic/	2406
13	hemorrhage/ or blood loss, surgical/ or postoperative hemorrhage/	118244
14	Blood Transfusion/	56402
15	Hemostatics/	13169
16	mortality/ or fatal outcome/ or hospital mortality/ or survival rate/	365836
17	exp "Costs and Cost Analysis"/	281894
18	Radiology, Interventional/	5110
19	Angiography/ and mesenteric.tw,kf,kw.	1494
20	Length of Stay/	112636
21	(((immediate or initial) adj3 h?emostas?s) or h?emorrh* or bleed* or blood loss or rebleed* or transfusion* or hemostatic* or mortal* or survival* or death* or cost or costs or stigmata* or interventional radiolog* or mesenteric angiograph* or ((length or hospital*) adj3 stay*)).tw,kf,kw.	4495527
22	or/12-21	4765490
23	and/4,11,22	3631
24	limit 23 to yr="2020 -Current"	806
25	24 and ((Meta Analysis or Systematic Review).pt. or "Meta-Analysis as Topic"/ or (Review.pt. and (pubmed or medline).ti,ab.) or ((systematic* or literature or scoping) adj3 (overview or review* or search*)).ti,ab,kf. or (meta-anal* or metaanal* or meta-regression* or umbrella review* or overview of reviews or review of reviews or (evidence* adj2 synth*) or synthesis review*).ti,ab,kf.)	91
26	24 not 25	715

TF2 Embase reviews

Embase Classic+Embase <1947 to 2025 September 08>

1 upper gastrointestinal bleeding/ or (gastrointestinal hemorrhage/ and upper gastrointestinal tract/) 14645

2 endoscopic hemostasis/ and (peptic ulcer bleeding/ or (peptic ulcer/ and bleeding/)) 141

3 ((endoscopic h?emostas?s adj3 (peptic ulcer* adj3 (haemorrhag* or bleed* or blood loss))) or ((upper gastrointestinal or upper gastro intestinal or upper gi) adj3 (h?emorrhag* or bleed* or blood loss)) or ugib or (endoscop* adj3 high-risk stigmata*) or (ulcer* adj3 adherent clot*) or active spurt* or active ooz* or non-bleeding visible vessel* or nonbleeding visible vessel*).tw,kf,kw. 19320

4 or/1-3 24007

5 gastrointestinal endoscopy/ 45370

6 alcohol/ 354726

7 surgical equipment/ 40838

8 topical antiinfective agent/ 9122

9 argon plasma coagulation/ 6626

10 (endoscop* or ((doppler or bipolar or heater) adj3 probe*) or ((tts or through-the-scope or cap-mounted or capmounted or hemo or over-the-scope or otsc or padlock) adj3 clip*) or hemoclip* or contact thermal therap* or (ethanol adj3 inject*) or ((topical or anti-infective or antiinfective) adj3 agent*) or antiseptic or soft coagulation forcep* or argon plasma coagulation or apc).tw,kf,kw. 555708

11 or/5-10 962056

12 endoscopic hemostasis/ 966

13 bleeding/ or operative blood loss/ or postoperative hemorrhage/ 540548

14 blood transfusion/ 187638

15 hemostatic agent/ 13209

16 mortality/ or hospital mortality/ or mortality rate/ or standardized mortality ratio/ or surgical mortality/ 1330132

17 "cost benefit analysis"/ or "health care cost"/ or "hospital cost"/ 359673

18 interventional radiology/ 29737

19 (angiography/ and mesenteric.tw,kf,kw.) or superior mesenteric angiography/ 4106

20 "length of stay"/ 330079

21 (((immediate or initial) adj3 h?emostas?s) or h?emorrh* or bleed* or blood loss or rebleed* or transfusion* or hemostatic* or mortal* or survival* or death* or cost or costs or stigmata* or interventional radiolog* or mesenteric angiograph* or ((length or hospital*) adj3 stay*)).tw,kf,kw. 6716192

22 or/12-21 7293751

23 and/4,11,22 11310

24 limit 23 to yr="2020 -Current" 3308

25 limit 24 to ("clinical trials (clinicaltrials.gov)" or conference abstracts or "preprints (unpublished, non-peer reviewed)") 1706

26 24 not 25 1602

27 26 and ("Meta Analysis"/ or "Systematic Review"/ or (review and (pubmed or medline)).ti,ab,kw. or ((systematic* or scoping or literature) adj3 (overview or review* or search*)).ti,ab. or (meta-anal* or metaanal* or meta-regression* or umbrella review* or overview of reviews or review of reviews or (evidence* adj2 synth*) or synthesis review*).ti,ab.) 154

TF2 Embase studies

Embase Classic+Embase <1947 to 2025 September 08>

1	*upper gastrointestinal bleeding/ or (*gastrointestinal hemorrhage/ and *upper gastrointestinal tract/)	6083
2	*endoscopic hemostasis/ and (*peptic ulcer bleeding/ or (*peptic ulcer/ and *bleeding/))	40
3	((endoscopic h?emostas?s adj3 (peptic ulcer* adj3 (haemorrhag* or bleed* or blood loss))) or ((upper gastrointestinal or upper gastro intestinal or upper gi) adj3 (h?emorrhag* or bleed* or blood loss)) or ugib or (endoscop* adj3 high-risk stigmata*) or (ulcer* adj3 adherent clot*) or active spurt* or active ooz* or non-bleeding visible vessel* or nonbleeding visible vessel*).ti,kf,kw.	9243
4	or/1-3	10158
5	gastrointestinal endoscopy/	45370
6	alcohol/	354726
7	surgical equipment/	40838
8	topical antiinfective agent/	9122
9	argon plasma coagulation/	6626
10	(endoscop* or ((doppler or bipolar or heater) adj3 probe*) or ((tts or through-the-scope or cap-mounted or capmounted or hemo or over-the-scope or otsc or padlock) adj3 clip*) or hemoclip* or contact thermal therap* or (ethanol adj3 inject*) or ((topical or anti-infective or antiinfective) adj3 agent*) or antiseptic or soft coagulation forcep* or argon plasma coagulation or apc).tw,kf,kw.	555708
11	or/5-10	962056
12	endoscopic hemostasis/	966
13	bleeding/ or operative blood loss/ or postoperative hemorrhage/	540548
14	blood transfusion/	187638
15	hemostatic agent/	13209
16	mortality/ or hospital mortality/ or mortality rate/ or standardized mortality ratio/ or surgical mortality/	1330132

17	"cost benefit analysis"/ or "health care cost"/ or "hospital cost"/	359673
18	interventional radiology/	29737
19	(angiography/ and mesenteric.tw,kf,kw.) or superior mesenteric angiography/	4106
20	"length of stay"/	330079
21	(((immediate or initial) adj3 h?emostas?s) or h?emorrh* or bleed* or blood loss or rebleed* or transfusion* or hemostatic* or mortal* or survival* or death* or cost or costs or stigmata* or interventional radiolog* or mesenteric angiograph* or ((length or hospital*) adj3 stay*)).tw,kf,kw.	6716192
22	or/12-21	7293751
23	and/4,11,22	5814
24	limit 23 to yr="2020 -Current"	1669
25	limit 24 to ("clinical trials (clinicaltrials.gov)" or conference abstracts or "preprints (unpublished, non-peer reviewed)")	736
26	24 not 25	933
27	26 and ("Meta Analysis"/ or "Systematic Review"/ or (review and (pubmed or medline)).ti,ab,kw. or ((systematic* or scoping or literature) adj3 (overview or review* or search*)).ti,ab. or (meta-anal* or metaanal* or meta-regression* or umbrella review* or overview of reviews or review of reviews or (evidence* adj2 synth*) or synthesis review*).ti,ab.)	87
28	26 not 27	846

TF2 Cochrane reviews & trials

#1	MeSH descriptor: [Gastrointestinal Hemorrhage] this term only	2056
#2	MeSH descriptor: [Upper Gastrointestinal Tract] explode all trees	5917

#3 #1 AND #2 165

#4 MeSH descriptor: [Hemostasis, Endoscopic] this term only 237

#5 MeSH descriptor: [Peptic Ulcer Hemorrhage] this term only 540

#6 MeSH descriptor: [Peptic Ulcer] explode all trees 4448

#7 MeSH descriptor: [Hemorrhage] this term only 6239

#8 #4 AND (#5 OR (#6 AND #7)) 125

#9 (((endoscopic NEXT h?emostas?s) NEAR/3 ((peptic NEXT ulcer*) NEAR/3 (hemorrhag* OR haemorrhag* OR bleed* OR "blood loss"))) OR (("upper gastrointestinal" OR "upper gastro intestinal" OR "upper gi") NEAR/3 (hemorrhag* OR haemorrhag* OR bleed* OR blood loss)) OR ugib OR (endoscop* NEAR/3 ("high risk" NEXT stigmata*)) OR (endoscop* NEAR/3 ("high-risk" NEXT stigmata*)) OR (ulcer* NEAR/3 (adherent NEXT clot*)) OR (active NEXT (spurt* or ooz*)) OR ("non-bleeding visible" NEXT vessel*) OR ("non bleeding visible" NEXT vessel*) OR ("nonbleeding visible" NEXT vessel*)):ti,ab,kw 1532

#10 {OR #3, #8-#9}1749

#11 MeSH descriptor: [Endoscopy, Gastrointestinal] explode all trees 6491

#12 MeSH descriptor: [Ethanol] this term only 4197

#13 MeSH descriptor: [Surgical Instruments] this term only 773

#14 MeSH descriptor: [Anti-Infective Agents, Local] this term only 2630

#15 MeSH descriptor: [Argon Plasma Coagulation] this term only 48

#16 (endoscop* OR ((doppler OR bipolar OR heater) NEAR/3 probe*) OR ((tts OR "through-the-scope" OR "through the scope" OR "cap-mounted" OR "cap mounted" OR capmounted OR hemo OR "over-the-scope" OR "over the scope" OR otsc OR padlock) NEAR/3 clip*) OR hemoclip* OR ("contact thermal" NEXT therap*) OR (ethanol NEAR/3 inject*) OR ((topical OR "anti-infective" OR "anti infective" OR antiinfective) NEAR/3 agent*) OR antiseptic OR ("soft coagulation" NEXT forcep*) OR "argon plasma coagulation" OR apc):ti,ab,kw 48708

#17 {OR #11-#16} 55218

#18 MeSH descriptor: [Hemostasis, Endoscopic] this term only 237

#19	MeSH descriptor: [Hemorrhage] this term only	6239
#20	MeSH descriptor: [Blood Loss, Surgical] this term only	3590
#21	MeSH descriptor: [Postoperative Hemorrhage] this term only	1743
#22	MeSH descriptor: [Blood Transfusion] this term only	2555
#23	MeSH descriptor: [Hemostatics] this term only	1258
#24	MeSH descriptor: [Mortality] this term only	992
#25	MeSH descriptor: [Fatal Outcome] this term only	21
#26	MeSH descriptor: [Hospital Mortality] this term only	1882
#27	MeSH descriptor: [Survival Rate] this term only	13448
#28	MeSH descriptor: [Costs and Cost Analysis] explode all trees	16690
#29	MeSH descriptor: [Radiology, Interventional] this term only	67
#30	MeSH descriptor: [Angiography] this term only	865
#31	MeSH descriptor: [Length of Stay] this term only	9669
#32	(((immediate OR initial) NEAR/3 h?emostas?s) OR hemorrh* OR haemorrh* OR bleed* OR "blood loss" OR rebleed* OR transfusion* OR h?emostatic* OR mortal* OR survival* OR death* OR cost OR costs OR stigmata* OR (interventional NEXT radiolog*) OR (mesenteric NEXT angiograph*) OR ((length OR hospital*) NEAR/3 stay*)):ti,ab,kw	459698
#33	{OR #18-#32}	460399
#34	{AND #10, #17, #33}	895Limiter: 2020-2025

Reviews: 4

Trials: 181

Summary

a. Medline - Search for Systematic Reviews (September 9, 2025)

Ovid MEDLINE(R) ALL <1946 to September 09, 2025>

1 gastrointestinal hemorrhage/ and exp Upper Gastrointestinal Tract/ 4915

2 Hemostasis, Endoscopic/ and (Peptic Ulcer Hemorrhage/ or (exp Peptic Ulcer/ and Hemorrhage/)) 592

3 ((endoscopic h?emostas?s adj3 (peptic ulcer* adj3 (haemorrhag* or bleed* or blood loss))) or ((upper gastrointestinal or upper gastro intestinal or upper gi) adj3 (h?emorrhag* or bleed* or blood loss)) or ugib or (endoscop* adj3 high-risk stigmata*) or (ulcer* adj3 adherent clot*) or active spurt* or active ooz* or non-bleeding visible vessel* or nonbleeding visible vessel*).tw,kf,kw. 10616

4 or/1-3 14991

5 exp Endoscopy, Gastrointestinal/ 106997

6 Ethanol/ 100436

7 Surgical Instruments/ 21403

8 Anti-Infective Agents, Local/ 18609

9 Argon Plasma Coagulation/ 589

10 (endoscop* or ((doppler or bipolar or heater) adj3 probe*) or ((tts or through-the-scope or cap-mounted or capmounted or hemo or over-the-scope or otsc or padlock) adj3 clip*) or hemoclip* or contact thermal therap* or (ethanol adj3 inject*) or ((topical or anti-infective or antiinfective) adj3 agent*) or antiseptic or soft coagulation forcep* or argon plasma coagulation or apc).tw,kf,kw. 337578

11 or/5-10 515117

12 Hemostasis, Endoscopic/ 2406

13 hemorrhage/ or blood loss, surgical/ or postoperative hemorrhage/ 118244

14 Blood Transfusion/ 56402

15 Hemostatics/ 13169

16 mortality/ or fatal outcome/ or hospital mortality/ or survival rate/ 365836

17 exp "Costs and Cost Analysis"/ 281894

18 Radiology, Interventional/ 5110

19 Angiography/ and mesenteric.tw,kf,kw. 1494

20 Length of Stay/ 112636

21 (((immediate or initial) adj3 h?emostas?s) or h?emorrh* or bleed* or blood loss or rebleed* or transfusion* or hemostatic* or mortal* or survival* or death* or cost or costs or stigmata* or interventional radiolog* or mesenteric angiograph* or ((length or hospital*) adj3 stay*)).tw,kf,kw. 4495527

22 or/12-21 4765490

23 and/4,11,22 6525

24 limit 23 to yr="2020 -Current" 1400

25 24 and ((Meta Analysis or Systematic Review).pt. or "Meta-Analysis as Topic"/ or (Review.pt. and (pubmed or medline).ti,ab.) or ((systematic* or literature or scoping) adj3 (overview or review* or search*)).ti,ab,kf. or (meta-anal* or metaanal* or meta-regression* or umbrella review* or overview of reviews or review of reviews or (evidence* adj2 synth*) or synthesis review*).ti,ab,kf.) 142

Results: 142 systematic reviews

b. Medline - Search for Primary Studies (September 9, 2025)

Same search strategy as reviews with focused MeSH (*) terms and title-only text word search.

Results: 715 primary studies (after removing 91 reviews)

c. Embase - Search for Systematic Reviews (September 8, 2025)

Embase Classic+Embase <1947 to 2025 September 08>

Same conceptual strategy adapted for Embase subject headings. Conference abstracts and preprints excluded.

Results: 154 systematic reviews (from 1,602 after excluding conference abstracts)

d. Embase - Search for Primary Studies (September 8, 2025)

Same strategy with focused subject headings (*) and title-only text word search. Conference abstracts and preprints excluded.

Results: 846 primary studies (from 933 after excluding 87 reviews)

e. Cochrane Library (2020-2025)

Same conceptual strategy adapted for Cochrane search syntax.

Results: 4 reviews + 181 trials = 185

Results of the bibliographic searches

Number of references after duplicate removal:

Systematic reviews: 198

Primary studies: 1,100

Tables of evidence for each PICO and list of references

PICO 1 Timing of Upper GI Endoscopy

Number of studies identified:

1. 4 systematic reviews and meta-analysis
2. 1 randomised controlled trial
3. Additional 9 primary cohort data beyond these SR/MAs show similar heterogeneity and definitions; we judged that a de novo SR is unlikely to materially change conclusions, so we relied on the most recent SR/MAs.

Included studies:

1. 4 systematic reviews and meta-analysis and 1 randomised controlled trial

Table 1. Characteristics of the included studies.

Study (Author, year)	Country	Study design	No. of sites (no. of subjects)	Age (y)	Male sex (%)	Intervention	Comparator	Outcome in intervention arm	Outcome in comparator arm	Follow-up	Significance	Bias
Systematic reviews and meta-analysis												
Aziz et al. (2021). *Eur JGastroenterol Hepatol 2021;33(8):1055-1062.[1]*	Authors from USA; included studies from USA, UK, South Korea, Taiwan, Switzerland	Systematic review & meta-analysis of observational cohort studies	13 studies; total N = 1,827,903 (E-EGD: 1,008,408; L-EGD: 819,495)	Mean age across studies ~64–69	Male % across studies ~52–58%	Early EGD (within 24h)	Late EGD (>24h)	Mortality (4 studies): 3.1%; Recurrent bleeding (8 studies): 11.1%; Transfusion requireme	Mortality (4 studies): 4.9%; Recurrent bleeding (8 studies): 9.4%; Transfusion requireme	In-hospital	*No significant difference in overall mortality (risk ratio: 0.97; CI, 0.74–1.27), recurrent bleeding (risk ratio: 1.12; CI,*	*Entirely observational; confounding by indication (sicker patients may get earlier scopes in some systems); varying*

								nt (3 studies): 54.8%; Use of endotherapy (5 studies): 43.1%; Surgery (4 studies): 4.4%; Length of stay (6 studies):NA	nt (3 studies): 51.2%; Use of endotherapy (5 studies): 30.9%; Surgery (4 studies): 4.7%; Length of stay (6 studies): NA		*0.62–2.00), transfusion requriement (risk ratio, 1.12; CI, 0.97–1.30), need for surgery (risk ratio: 1.01; CI, 0.38–2.68) and length of stay (SMD: –0.07, CI, –0.31 to 0.18) was observed for E-EGD group compared to L-EGD group. The possibility of endoscopic intervention was higher in E-EGD group (risk ratio: 1.70, CI, 1.28–2.27).*	*definitions of "early"; incomplete adjustment for risk; heterogeneity across health-care systems and eras*
Merola et al. (2021). Intern Emerg Med ;16(5):1331-1340.[2]	Italy (review authors); trials from USA, UK, China	Systematic review & meta-analysis of RCTs	5 RCTs; total N = 926 (Very early: 468; Early: 458)	Age range varied across trials; typically 50–70 yrs	Male % varies by trial; typically around	Very early endoscopy (<2 h, <6 h, or <12 h depending on trial)	**Early endoscopy** (6–48 h or >12 h	Endoscopic therapy required (3 RCTs) – 51.8%;	Endoscopic therapy required (3 RCTs) – 42.1%;	In-hospital outcomes	*No statistically significant benefit for very early endoscopy compared to*	Total RCT sample size modest; variable "very early" cut-offs (2–12 h); some

					55–70%		depending on trial)	Rebleeding (4 RCTs) – 8.9%; Transfusion requirement (2 RCTs) – 81.9%; Mortality (5 RCTs) – 6.6%; Surgery (5 RCTs) – 5.1%; LOS(3 RCTS) – Median/mean 1-12 days	Rebleeding (4 RCTs) – 7%; Transfusion requirement (2 RCTs) – 81.9%; Mortality (5 RCTs) – 5.9%; Surgery (5 RCTs) – 4.4%; LOS(3 RCTS) – Median/mean 2-12 days		*early endoscopy in terms of risk of rebleeding, mortality, ICU admission, blood transfusion, surgery and length of hospital stay. significantly higher need for haemostatic treatment when very early endoscopy was performed (RR 1.23, 95% CI 1.06–1.42, p < 0.01) in comparison to early endoscopy.*	trials older (equipment and care pathways outdated); unclear blinding; potential performance bias and selection of higher-risk patients in some trials
Bai et al. (2022). Gut Liver;17(4):566-580.[3]	China (multi-country studies: USA, Canada, UK,	Systematic review & meta-analysis of RCTs and cohort studies in	25 studies total: 5 RCTs + 20 observational cohorts; individual	Pooled age not reported; individual studies mostly older	Pooled male % not reported; most cohort	Main comparison: early endoscopy within 24 h of admission; subgroup very	Nonearly endoscopy (>24 h), and in some analyses endoscop	Mortality (13 studies): 0–46.5%; Rebleeding (11 studies):	Mortality: 1.8–39.4%; Rebleeding: 5–25%; Primary hemostasi	Primarily in-hospital outcomes; some report	Early ≤24 h: no mortality benefit but shorter LOS and more use of hemostasis.	Substantial heterogeneity (I^2 often high); many observational cohorts with risk of

	Poland, South Korea, Taiwan, Japan, Hong Kong, etc.)	acute non-variceal UGIB (ANVUGIB)	study N ranges from ~60 to >870,000; overall >1 million patients	adults (often ≥60 y)	s majority male	early endoscopy within 3–12 h; also East vs West, high-risk subgroups	y performed after the "very early" window	3.6–20%; Primary hemostasis (10 studies): 31.8–95%; Transfusion (11 studies): 31.8–90.6%; Surgery (10 studies): 0–9.3%; LOS (14): 2.3–52 days	s: 12.1–77.8%; Transfusion: 31.7–91.6%; Surgery: 0–7.9%; Repeat EGD: 3.1–50%; LOS: 2.4–57 days	30-day mortality; LOS until discharge	Very early ≤12 h in unselected/high-risk populations linked to higher mortality, rebleeding, surgery, transfusion and repeat endoscopy in cohort data; RCTs in high-risk patients showed more haemostasis but no mortality benefit	confounding and selection bias; definitions of "high-risk" and timing vary; mix of older and contemporary practice; funnel-plot asymmetry suggests possible publication bias; limited blinding in RCTs
Bilder et al. (2022) Rev Gastroenterol Mex 2022;87:320–329 [4]	Argentina (review authors); included studies from multiple countries (USA, Europe, Asia)	Systematic review & meta-analysis of RCTs and observational cohort studies evaluating urgent vs non-urgent endoscopy in non-	21 studies; total N = 489,622 • 5 RCTs: 1,032 patients • 16 cohort studies: 488,590 patients	Mean age across included studies approximately 55–70 years (varies by study)	Ranged from 40% to 90% male across included studies	Urgent endoscopy (definitions varied across studies: ≤2 h, ≤6 h, ≤12 h, or ≤24 h)	Non-urgent / elective endoscopy (>24 h or outside the urgent window)	Mortality (21 studies): RR 1.12 (95% CI 0.72–1.72) Rebleeding (19 studies): RR 1.30 (95% CI 1.05–1.60) Red blood cell units transfused	Mortality: similar to intervention (reference group in meta-analysis) Rebleeding: lower than urgent endoscopy RBC units transfused	In-hospital mortality and 30-day mortality (varies across included studies)	Urgent endoscopy did not reduce mortality, was associated with significantly higher rebleeding, and resulted in fewer transfused RBC units.	High heterogeneity in definitions of "urgent" (2–24 h). Majority of included studies were observational with moderate–high risk of bias.

		variceal upper GI bleeding						(7 studies): RR 0.52 (95% CI 0.05–0.99)	: higher than urgent endoscopy		RCT-only subgroup showed no significant differences in mortality or rebleeding; the harm signal was driven largely by observational studies with sicker early-scoped patients.	Residual confounding (sicker patients more likely to undergo urgent endoscopy) Limited number of RCTs. Severity grading (e.g., Forrest classification) often missing, limiting comparability.
Randomised controlled Trial												
Lau et al. (2020). N Engl J Med. 2020;382:1299–1308.[5]	Hong Kong (single-region, multicentre trial)	Prospective, multicentre randomized controlled trial	Several hospitals in Hong Kong; N = 516 (Urgent 258, Early 258)	Mean age: Urgent 69.6 ± 16.0, Early 71.4 ± 14.9	Urgent 60.9%, Early 65.1%	Urgent endoscopy <6 hours after gastroenterology consultation	Early endoscopy 6–24 hours after consultation	Mortality 30d: 8.9% (23/258); Rebleeding 30d: 10.9% (28/258); Endoscopic therapy at index: 60.1%; Surgery: 2/258 (0.8%);	Mortality 30d: 6.6% (17/258); Rebleeding 30d: 7.8% (20/258); Endoscopic therapy at index: 48.4%; Surgery: 1/258 (0.4%);	30 days	No difference in mortality (HR 1.35, 95% CI 0.72–2.54). Urgent EGD showed no reduction in rebleeding or LOS; Urgent EGD had more	High-quality RCT; limitations: excluded patients in refractory shock; uncommon variceal bleeding reduces generalizability; conducted

								IR embolisation: 3/258 (1.2%); Transfusion: 89.5%; mean RBC 2.4 units; LOS: median 5 days	IR embolisation: 2/258 (0.8%); Transfusion: 90.7%; mean RBC 2.4 units; LOS: median 5 days		high-risk stigmata and greater use of hemostasis, but no clinical outcome benefit.	in expert 24/7 endoscopy centres.

References:

1 Aziz M, Dasari CS, Zafar Y, *et al.* Does timing of endoscopy affect outcomes in patients with upper gastrointestinal bleeding: a systematic review and meta-analysis. *Eur J Gastroenterol Hepatol*. 2021;33:1055–62. doi: 10.1097/MEG.0000000000001975

2 Merola E, Michielan A, de Pretis G. Optimal timing of endoscopy for acute upper gastrointestinal bleeding: a systematic review and meta-analysis. *Intern Emerg Med*. 2021;16:1331–40. doi: 10.1007/s11739-020-02563-1

3 Bai L, Jiang W, Cheng R, *et al.* Does Early Endoscopy Affect the Clinical Outcomes of Patients with Acute Nonvariceal Upper Gastrointestinal Bleeding? A Systematic Review and Meta-Analysis. *Gut Liver*. 2023;17:566–80. doi: 10.5009/gnl220291

4 Bilder HG, Soccini C, Lasa JS, *et al.* Impact of time to esophagogastroduodenoscopy in patients with nonvariceal upper gastrointestinal bleeding: A systematic review and meta-analysis. *Rev Gastroenterol Mex*. 2022;87:320–9. doi: 10.1016/j.rgmx.2021.02.008

5 Lau JYW, Yu Y, Tang RSY, *et al.* Timing of Endoscopy for Acute Upper Gastrointestinal Bleeding. *N Engl J Med*. 2020;382:1299–308. doi: 10.1056/nejmoa1912484

PICO 2 Role of Doppler Ultrasound Probe

Number of studies identified:

1. 3 systematic reviews and meta-analysis
2. 2 scientific abstracts from conference presentations

Included studies:

2. 3 systematic reviews and meta-analysis

Table 2 Characteristics of the included studies.

Study (Author, year)	Country	Study design	No. of sites (no. of subjects)	Age (y)	Male sex (%)	Intervention	Comparator	Outcome in intervention arm	Outcome in comparator arm	Follow-up
1. Bhurwal 2020.[6]	USA	Systematic review and meta-analysis	8 studies (5 prospective, 2 RCT, 1 retrospective), 732 patients	N/A	N/A	Patients with peptic UGIB, receiving DOP-US (Doppler Ultrasonography) signal-guided endoscopic therapy	Patients with peptic UGIB, receiving standard visual evaluation guided endoscopic therapy.	The use of DOP-US probe decreases rebleeding, mortality, and surgical intervention as compared to Forrest Classification. The risk of rebleeding is significantly higher if the signal persists	Visual evaluation guided therapy was characterized with increased rebleeding, mortality and surgical intervention as compared to Forrest Classification.	N/A Conclusions: The first systematic review and meta-analysis showed that the DOP-US is a beneficial tool in the management of bleeding

								despite endoscopic therapy (48.5% (95% CI 29.5–67.9%)).		ulcers and adds valuable information to visual evaluation.
2. Chapelle 2022. [7]	France, Canada, Saudi Arabia	Systematic review and meta-analysis	11 studies (10 cohorts, 1 RCT)	65.1 ± 2.7	63.5	Patients with UGIB, DEP (Doppler endoscopic probe)-assisted management	Patients with UGIB, standard endoscopy management	The use of DEP during upper endoscopy significantly reduced overall rebleeding rates (OR 0.27 [0.14, 0.54]).	Standard endoscopy management is related with higher overall rebleeding rates.	N/A Conclusions: although with low certainty evidence, DEP-related information improves on sole visual prediction of rebleeding in NVUGIB, with DEP-guided management yielding decreased overall rebleeding, bleeding-related mortality, and

										need for surgery.
3. Jensen 2023.[8]	USA	Review of randomized controlled trials and prospective cohort study	10 studies	N/A	N/A	Utilization of a Doppler endoscopic probe (DEP) for the detection of arterial blood underneath SRH (stigmata of recent hemorrhage), for risk stratification, and as a guide to definitive hemostasis.	Standard endoscopic management based on visual analysis of SRH.	Definitive hemostasis achieved with the utilization of a DEP, significantly lower rebleeding rates, and improvements in other clinical outcomes (surgery, mortality) resulted when DEP was used for risk stratification and as a guide to obliteration of arterial blood flow underneath SRH (stigmata of recent hemorrhage). Although SRH have been utilized to guide endoscopic hemostasis of NVUGIB for 50	Standard endoscopic management based on visual analysis of SRH was associated with higher rebleeding rate.	30 days DEP-guided endoscopic hemostasis is a very effective and safe new method to improve patient outcomes for NVUGIB.

								years, when most visually guided treatments are applied to lesions with major SRH, arterial blood flow underneath SRH is not obliterated in 25–30% of patients and results in rebleeding.		

References:

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2 Chapelle N, Martel M, Bardou M, *et al*. Role of the endoscopic Doppler probe in nonvariceal upper gastrointestinal bleeding: Systematic review and meta-analysis. *Dig Endosc*. 2023;35:4–18. doi: 10.1111/den.14356

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PICO 3 Endoscopic therapy for peptic ulcer hemorrhage

No new evidence

PICO 4 Endoscopic hemostasis in ulcer with adherent clot (FIIb)

Number of studies identified relevant to PICO 4:

- 2 systematic reviews and meta-analyses
- 1 retrospective study

Included studies:

- 2 systematic reviews and meta-analyses

Table 3 Characteristics of the included studies.

Study (Author, year)	Country	Study design	No. of sites (no. of subjects)	Age (y)	Male sex (%)	Intervention	Comparator	Outcome in intervention arm	Outcome in comparator arm	Follow-up	Significance
Beran A et al., 2023 (Dig Dis Sci 68:3921-34) [1]	USA	Systematic review and meta-analysis (11 studies; 9 RCT + 2 cohort)	11 studies (833 patients – 431 endoscopic therapy vs 402 conservative therapy)	N/A	N/A	Endoscopic therapy (injection ± thermal ± clip + medical therapy)	Conservative therapy (medical therapy alone — PPI or H□RA)	Overall rebleeding 8.1%; 30-day rebleeding 3.5%; mortality 3.7%; need for surgery 4%; LOS shorter by ~3 days	Rebleeding 20.1%; 30-day rebleeding 8.3%; mortality 8%; need for surgery 9%; longer LOS	30 days (majority)	Statistically significant lower overall rebleeding, 30-day rebleeding, mortality, need for surgery. Not significant in subgroup analysis:

											mortality (only numerically lower)
Tassone D et al., 2024 (J Gastroenterol Hepatol 39:2031-42) [2]	Australia	Systematic review and meta-analysis (7 RCTs) (same RCT's as Beran A et al. study included)	7 RCTs (268 patients – 120 endo / 148 medical)	N/A	N/A	Endoscopic therapy (adrenaline ± thermal, clip, laser, ethanol, ± medical therapy)	Medical therapy only (PPI or H□RA; ± sham endo)	Rebleeding 5.8%; mortality 8.3%; need for surgery 5.6%; no difference in LOS (~5 days)	Rebleeding 18.9%; mortality 9.6%; need for surgery 11.5%; LOS ~7 days	20 days (mean) to 6 weeks	Significant reduction in recurrent bleeding with treatment. NO difference in mortality or need for surgery.

References

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2. Tassone D, Kazi S, Lee T et al. Systematic review and meta-analysis of endoscopic versus medical management of peptic ulcers with adherent clots. J Gastroenterol Hepatol 2024; 39: 2031-2042. doi:10.1111/jgh.16611

PICO 5 Head-to-head comparisons of different endoscopic therapies

Number of studies identified relevant to PICO 5:

- 12 systematic reviews and meta-analyses
- 9 randomized controlled trials (RCTs)
- 24 other studies (non-randomized trials, abstract only RCTs, retrospective studies, reviews, narratives)

Included studies:

- 12 systematic reviews and meta-analyses

Table 4 Characteristics of the included studies per type of therapy.

a. **OTSC vs standard endoscopic therapy**

Study (Author, year)	Country	Study design	No. of sites (no. of subjects)	Age (y)	Male sex (%)	Intervention	Comparator	Outcome in intervention arm	Outcome in comparator arm	Follow-up
Faggen, 2023, Dig Dis Sci (+ correction 2024) [1]	USA	Systematic review and meta-analysis	11 studies, 1608 patients (5 RCTs, 6 observational: 494 OTSC / 1114 standard)	N/A	N/A	OTSC as first-line endoscopic hemostasis in NVUGIB	Standard endoscopic therapy (clips ± thermal ± injection)	OTSC significantly reduces rebleeding (RR 0.58, 95% CI 0.41–0.82), no clear difference in mortality or initial hemostasis	Reference group, higher rebleeding	30 days
Bapaye, 2022, GIE [2]	USA	Systematic review and meta-analysis (incl 4 RCT Jensen, Meier and Chan)	10 studies, (incl 4 RCTs), 914 patients	N/A	N/A	OTSC as first-line endoscopic hemostasis in high risk NVUGIB (Forrest Ia and Ib) and those ulcers located in	Standard endoscopic therapy	In **high-risk** NVUGIB: OTSCs is associated with a lower 7-day and 30-day rebleeding rates, higher clinical success rates, and shorter pro-	Higher rebleeding (7-day and 30-day), lower clinical success rates, longer pro- cedure time. Similar mortality rates and	30 days

						high-risk vascular areas		cedure time, similar mortality rates and length of hospital stay	length of hospital stay	
Alali, 2024, SJG [3]	Canada	Systematic review and meta-analysis (of 5 RCT Jensen, Meier, Lau, Soriani and Chan)	5 studies, 555 patients	N/A	N/A	OTSC as primary hemostasis for NVUGIB	Standard therapy (clips/thermal ± injection)	Further (persistent or recurrent) bleeding is lower with OTSC (RR 0.33, 95%CI 0.20–0.54). 30-day rebleeding lower (RR 0.38, 95%CI 0.21–0.70)	Higher rebleeding, similar mortality	30 days
Mega, 2025, EIO [4]	Brazil	Meta-analysis (of 5 RCT Jensen, Meier, Lau, Soriani and Chan)	5 studies, 555 patients: 277 OTSC vs 278 ST	N/A	N/A	OTSC as first-line endoscopic therapy for NVUGIB	Standard endoscopic interventions (clips ± thermal ± injection)	Lower 30-day rebleeding (RR 0.43 95%CI 0.24-0.77) and higher clinical success (RR 1.19 95%CI 1.11-1.28)	Higher rebleeding; lower clinical success Similar technical success and 30-day all-cause mortality	30 days
Koh, 2025, JGH [5]	Singapore	Meta-analysis	14 (5 RCT, 9 non-RCT) 7211 patients	58.56±12.46 years;	70% male	OTSC as first-line endoscopic therapy for NVUGIB	Standard endoscopic interventions	Lower rates of 30-day rebleeding (RR 0.44, 95%CI 0.32-0.61) 7-day	Higher rebleeding, higher 30-day mortality longer	30 days

								rebleeding (RR 0.50, 95%CI 0.35-0.71) and 30-day mortality (RR 0.47, 95%CI 0.33-0.67), higher overall clinical success rates (RR 1.16, 95%CI 1.09-1.24), lower procedural time	procedural time	
Giri, 2023 J Dig Endosc[6]	India	Meta-analysis and systematic review	5 studies (RCTs: Schmidt 2018, Jensen, Meier, Chan, Lau)	N/A	N/A	OTSC for endoscopic treatment for NVUGIB (first and second line)	Standard endoscopic therapy	Significantly lower risk of 7-day (RR 0.30) and 30-day (RR 0.42) rebleeding No significant difference in the risk of persistent bleeding (RR 0.29) Similar risk of 30-day mortality and duration of hospitalization.	Higher rebleeding; similar mortality, persistent bleeding (failure to control bleeding)	30 days

Yang, 2024, World J Clin Cases [7]	China	Meta-analysis	11 studies with 1266 patients	N/A	N/A	OTSC in upper GI ANVUGIB	Standard endoscopic therapy	Lower rebleeding at 7 days(OR 2.08) and 30 days (OR 2.20); technical success higher, reduces hospital stay	Higher rebleeding with standard	.

b. **Hemostatic powder vs standard endoscopic therapy**

Study (Author, year)	Country	Study design	No. of sites (no. of subjects)	Age (y)	Male sex (%)	Intervention	Comparator	Outcome in intervention arm	Outcome in comparator arm	Follow-up
Liu 2025, GIE [8]	China	Meta-analysis and trial sequential analysis (TSA)	8 studies (6 RCT's, 2 prospective studies), 653 patients Hong 2017, Kwek 2017, Bang 2018, Park 2018 Chen 2019, Lau 2021, Paoluzi 2021, Pittayanon 2023	N/A	N/A	Hemostatic powder monotherapy for NVGIB (malignancy and non-malignancy related)	Conventional endoscopic therapy	For non-malignancy related bleeding: Similar initial hemostasis and 30-day recurrent bleeding rates (RR 1.08, 95%CI 0.98-1.19, p=.11; RR 1.15 95%CI 0.46-2.90, p=.76), TSA did not confirm results	Similar outcomes (in malignant bleeding HP better)	30 days

Mutneja, 2020, J GI Liver Dis [9]	USA	Meta-analysis and systematic review	15 studies (11 prospective studies, 4 RCTs)	N/A	N/A	Hemospray for Upper GI bleeding (variceal and no-variceal)	Conventional therapy	The pooled immediate haemostasis rate with Hemospray was 93% (95% CI 90.3-95%, p<0.001). Rebleeding occurred in 14.4% (95% CI 8.8-22.8%, p<0.001) of patients. The odds were in its favour compared to conventional endoscopic modalities, but not statistically significant.	No significant results	30 days
Shah, 2024, Cureus [10]	USA	Meta-analysis and systematic review	4 studies (RCTs), 303 patients	N/A	N/A	Hemospray (Cook)	Standard of care	Significantly higher odds of primary hemostasis (OR: 3.48, 95% CI: 1.09-11.18, p = 0.04).	No statistically significant difference in terms of rebleeding rates (OR: 0.79, 95% CI: 0.24-2.55, p = 0.69), need for surgery (OR: 1.62, 95% CI: 0.35-7.41, p = 0.54), or overall mortality	30 days

									(OR: 1.08, 95% CI: 0.56-2.08, p =0.83).	
Ofosu 2021 PMID: 33470608	USA	Systematic review and meta-analysis	19 studies, 814 patients	66.7	77	Patients with UGIB treated with Hemospray as monotherapy.	Patients with UGIB treated with Hemospray with conventional hemostatic techniques (combination therapy)	Overall pooled clinical success after the application of Hemospray was 92% [95% confidence interval (95% CI), 87%-96%; I2 = 70.4%]. Overall pooled early rebleeding rates after application of Hemospray was 20% (95% CI, 16%-26%; I2= 54%). Overall pooled delayed rebleeding rates after the application of Hemospray was 23% (95% CI, 16%-31%; I2= 34.9%).	There was no statistical difference in clinical success (RR, 1.02; 95% CI, 0.96-1.08; P = 0.34) and early rebleeding (RR, 0.89; 95% CI, 0.75-1.07; P = 0.214) in studies that compared the use of Hemospray as monotherapy versus combination therapy with conventional therapy.	Early rebleeding (7 days), delayed rebleeding (30 days).

c. Monopolar hemostatic forceps with soft coagulation vs standard endoscopic therapy

Study (Author, year)	Country	Study design	No. of sites (no. of subjects)	Age (y)	Male sex (%)	Intervention	Comparator	Outcome in intervention arm	Outcome in comparator arm	Follow-up	Bias
Kamal, 2020, Euro J Gastro Hep [12]	USA	Systematic Review and Meta-analysis	5 RCTs, 1 observational study, 693 patients with bleeding ulcers (spurting or oozing) or non-bleeding visible vessel	N/A	N/A	Monopolar hemostatic forceps with soft coagulation for the treatment of peptic ulcer bleeding	Hemoclips, heater probe, APC	Superior for initial hemostasis (OR 0.25; 95% CI 0.08–0.81; I 2=67%) and prevention of rebleeding (OR 0.28; 95% CI 0.09–0.86; I 2=46%). Procedure times were shorter (mean difference −4.15min; 95% CI −4.83 to −3.47; I 2=59%). Length of hospital stay was shorter	Rates of adverse events were similar.	30 days	all RCTs had high risk of performance bias. All RCTs had low risk of selection, attrition, and reporting bias. One RCT had low risk of detection bias; all other RCTs had unclear risk of detection bias. The observational study was moderate quality on NOS assessment.

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10. Shah MP, Saleem S, Attar B et al. Hemospray Versus Conventional Therapy for Non-variceal Upper Gastrointestinal Bleeding: A Systematic Review and Meta-Analysis. Cureus 2024; 16: e55079. doi:10.7759/cureus.55079
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12. Kamal F, Khan MA, Tariq R et al. Systematic review and meta-analysis: monopolar hemostatic forceps with soft coagulation in the treatment of peptic ulcer bleeding. Eur J Gastroenterol Hepatol 2020; 32: 678-685. doi:10.1097/meg.0000000000001738

Evidence assessment for each PICO

Certainty assessment									Effect Absolute and relative	Certainty	Importance
PICO	No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Publication bias	Other factors			
1 Timing of Endoscopy	Impact of early endoscopy within 24 h of admission on mortality, rebleeding, ICU admission, blood transfusion, surgery, length of hospital stay	5 RCTs, 20 observational cohorts and 4 meta-analyses	Low	High	High	High	No	Many observational cohorts with risk of confounding and selection bias	Mortality 0–46.5% vs. 1.8–39.4%	⊕◯◯◯ Very low	Based mainly on non-randomized observational studies with high inconsistency due to high heterogeneity in the estimates. High indirectness for the different definitions of "high-risk", timing and endoscopic modalities applied; mix of older and contemporary practice. High imprecision (wide Cis crossing the unity)
2 Role of Doppler Ultrasound Probe	Effectiveness of Doppler endoscopic probe (DEP) in patients with NVUGIB on overall rebleeding; all-cause mortality, bleeding related mortality, need for surgery, length of stay, intensive care unit stay, and angiography.	2 RCTs, 12 observational cohorts and 3 meta-analyses	High	High	High	Low	No	Many studies with small sample size and small event rate	Overall rebleeding (OR 0.27 [0.14, 0.54]).	⊕◯◯◯ Very low	Based mainly on non-randomized observational studies with high risk of bias due to difference in methodology and lack of blinding in RCTs. High inconsistency due to high heterogeneity in the estimates. High indirectness for mixture of older and contemporary practice.

5 Endoscopic hemostasis therapy – Head-to-head comparisons of different endoscopic therapies	Impact of different endoscopic therapies OTSC, hemostatic powder, monopolar hemostatic forceps with soft coagulation vs standard endoscopic therapy on bleeding, 30day rebleeding, clinical technical success rate, procedure time, need for further intervention (TAE - Surgery), Length of stay (LOS)										
Over the scope clip compared to Through the scope clip (TTS)											
		4 RCTs and 8 meta-analyses (RCTs and observational cohort studies)	High	High	High	High	No	Many observational cohorts with risk of confounding and selection bias	Overall rebleeding (RR 0.58, 95% CI 0.41–0.82),	⊕◯◯◯ Very low	All included studies were unblinded RCTs, susceptible to performance and detection biases. High Heterogeneity among different studies with respect to rebleeding definition, bleeding etiologies and methods used as standard endoscopic interventions. Potential presence of several confounding factors (ie endoscopist experience) not possible to adjust our analysis for center-, endoscopist- (i.e. as endoscopist's level of expertise) or lesion-related data. The summary estimate (like an average effect) has a wide confidence interval (CI), indicating uncertainty due to small sample sizes or few events. High value of I2, a measure of the consistency between trials in a meta-analysis.

Hemostatic powder vs. standard endoscopic therapy											
		4 RCTs and 4 meta-analyses	High	High	High	High	No	No	Similar initial hemostasis and 30-day recurrent bleeding rates (RR 1.08, 95%CI 0.98-1.19, p=.11; RR 1.15 95%CI 0.46-2.90, p=.76),	⊕◯◯◯ Very low	All included studies were unblinded RCTs, susceptible to performance and detection biases. High Heterogeneity among different studies with respect to rebleeding definition, bleeding etiologies and methods used as standard endoscopic interventions. Potential presence of several confounding factors (ie endoscopist experience) not possible to adjust our analysis for center-, endoscopist- (i.e. as endoscopist's level of expertise) or lesion-related data. High value of I2, a measure of the consistency between trials in a meta-analysis.
Monopolar hemostatic forceps with soft coagulation vs standard endoscopic therapy											
		1 meta-analyses (5 RCTs, 1 observational study)	High	High	High	High	No	No	Superior for initial hemostasis (OR 0.25; 95% CI 0.08–0.81;	⊕◯◯◯ Very low	RCTs had high risk of performance bias. All RCTs had low risk of selection, attrition, and reporting bias. One RCT had low risk of detection bias; all other. RCTs had unclear risk of detection bias. Potential presence of several confounding factors (ie endoscopist experience) not possible to adjust our analysis for center-, endoscopist- (i.e. as endoscopist's level of expertise) or lesion-related data. High value of I2, a measure of the consistency between trials in a meta-analysis.

Certainty of the evidence assessment

PICO 1

The risk of bias assessment for each study can be found in Suppl Table XXX. Overall, the included studies were considered to be of good quality. The certainty of evidence for all clinical outcomes in this PICO question was downgraded owing to the fact that there the vast majority of the studies were only noncomparative observational studies. Moreover, it was further downgraded due to inconsistency (high heterogeneity) in the estimates, indirectness (for the different definitions of "high-risk", timing and endoscopic modalities applied; mix of older and contemporary practice) and imprecision (wide Cis crossing the unity), so the quality of evidence was downgraded to very low and a conditional recommendation was proposed.

PICO 2

The risk of bias assessment for each study can be found in Suppl Table XXX. Overall, the included studies were considered to be of good quality. The certainty of evidence for all clinical outcomes in this PICO question was downgraded owing to the fact that there the vast majority of the studies were only noncomparative observational studies. Moreover, it was further downgraded due to inconsistency (high heterogeneity) in the estimates, indirectness and studies with small sample size and small event rate, so the quality of evidence was downgraded to very low and a conditional recommendation was proposed.

PICO 5

The risk of bias assessment for each study can be found in Suppl Table XXX. Overall, the included studies were considered of moderate quality as they were unblinded RCTs, susceptible to performance and detection biases. The certainty of evidence in this PICO question was downgraded due to inconsistency (heterogeneity among different studies with respect to rebleeding definition, bleeding etiologies and methods used as standard endoscopic interventions) and presence of several confounding factors (i.e. endoscopist experience) not possible to adjust our analysis for center-, endoscopist- (i.e. as endoscopist 's level of expertise) or lesion-related data. High value of I2, a measure of the consistency between trials in a meta-analysis) so the quality of evidence was downgraded to very low, and a conditional recommendation was proposed.

Taskforce 3: Postendoscopy management

Leader: Stig Borbjerg Laursen

Members: Tiago Cúrdia Gonçalves, Martin Götz

List of PICOs

PICO 1: Prophylactic transarterial embolization

P: Patients with bleeding from Forrest I-IIb ulcers in which initial endoscopic hemostasis was achieved, but the patient is at high-risk for recurrent bleeding (e.g., large ulcer size, large size visible vessel, difficult anatomic location ulcer, gastroduodenal artery bleed)

I: Prophylactic transarterial embolization < 24-48 hrs

C: No prophylactic transarterial embolization

O: Rebleeding, transfusion requirements, mortality, surgery, LOS, costs

PICO 2a – Proton pump inhibitor (PPI) therapy

P: Patients with UGIB due to peptic ulcer after endoscopic hemostasis

I: High-dose PPI

C: Placebo/no treatment

O: Further bleeding, mortality, IR, surgery

PICO 2b – PPI Therapy

P: Patients with UGIB due to peptic ulcers after endoscopic hemostasis

I: High-dose PPI

C: H2-receptor antagonist

O: Further bleeding, mortality, IR, surgery

PICO 2c – PPI Therapy

P: Patients with UGIB due to peptic ulcer after endoscopic hemostasis

I: High-dose PPI IV bolus followed by continuous IV infusion of PPI

C: Alternative PPI regimen (dose, route, frequency)

O: Further bleeding, mortality, IR, surgery

PICO 3 – Repeat endoscopy for recurrent bleeding after endoscopic therapy for high-risk endoscopic stigmata peptic ulcer

P: Patients with recurrent peptic ulcer bleeding in hospital after initial endoscopic therapy

I: Repeat endoscopy with endoscopic hemostasis therapy where indicated

C: Surgery or IR

O: Immediate hemostasis, further bleeding, mortality; adverse events, IR, surgery, LOS

PICO 4 - Management of patients with persistently bleeding ulcer

P: Patients with ulcer bleeding who fail endoscopic hemostasis therapy (persistent ulcer bleeding)

I: Interventional radiology with transcatheter arterial embolization

C: Surgery

O: Further bleeding, mortality; adverse events, LOS

PICO 5 – Anti-coagulation

P: Patients with ulcer bleeding who have endoscopic hemostasis

I: Restart anti-coagulation (VKA, DOAC)

C: Do not restart anti-coagulation

O: Further bleeding, embolism, mortality; additional outcomes: adverse events

PICO 6 – Iron Therapy

P: Patients with ulcer bleeding who have endoscopic hemostasis and have anemia / iron deficiency / low ferritin

I: Start iron therapy (IV, oral route)

C: Do not start iron therapy

O: Resolution of anemia, iron normalization, ferritin normalization, adverse events

PICO 7 – H. Pylori

P: Patients with peptic ulcer bleeding and H. pylori infection

I: H. pylori eradication

C: No treatment

O: Rebleeding, mortality, costs

PICO 8 – Future Research Directions

P: Patients with peptic ulcer bleeding (requiring or not requiring endoscopic hemostasis at index endoscopy) post endoscopy

I: PPI therapy, repeat endoscopy for persistent bleeding or recurrent bleeding, IR, surgery, anti-coagulation management, iron therapy

C: ?

O: Further bleeding, mortality; adverse events, LOS, resolution of anemia, iron normalization, ferritin normalization

Bibliographic Search

Search date: August 29th 2025

Performed by: Tarjei Fiskergård Werner, senior librarian, University of Oslo - Library of medicine and science

Reviewed by: Toril Marie Hestnes, University of Oslo - Library of medicine and science.

Bibliographic research was performed in Medline, Embase, and Cochrane from 2020 to 2025.

PICO 1-6 and 8:

Number of references after duplicate removal

Systematic reviews: 446

Primary studies: 1,039

Detailed search strategies and results:

a) Medline reviews.

Bibliographic search was performed in Ovid MEDLINE(R) from 1946 to August 28, 2025 using the following strategy:

1 (Gastrointestinal Hemorrhage/ and exp Upper Gastrointestinal Tract/) or Hematemesis/ or Melena/ or Peptic Ulcer Hemorrhage/16031

2 (((upper gastrointestinal or upper gastro intestinal) adj3 (h?emorrhag* or bleed* or blood loss)) or ((forrest adj3 ulcer*) and h?emostas?s) or (endoscop* and stigmata*)).tw,kw,kf. 9834

3 1 or 2 23717

4 Embolization, Therapeutic/ and (prophylactic or transarterial or trans arterial).tw,kf,kw. 2946

5 exp Proton Pump Inhibitors/ 22765

6 exp Hemostasis/ 123851

7 Radiology, Interventional/ 5103

8 exp Anticoagulants/ 252990

9 Factor Xa Inhibitors/ 6844

10 Iron Deficiencies/ or Anemia, Iron-Deficiency/ 17550

11 Iron/ad, tu, th [Administration & Dosage, Therapeutic Use, Therapy] 9312

12 Surgical Procedures, Operative/ 57691

13 ferritins/ or apoferritins/ 24160

14 ((prophylactic adj3 (transarterial or trans arterial) adj3 emboli?ation*) or proton pump inhibitor* or (repeat* adj3 endoscop*) or interventional radiolog* or transcatheter arterial emboli?ation* or trans catheter arterial emboli?ation* or anticoagula* or anti coagula* or vitamin k antagonist* or vka or direct oral anticoagula* or direct oral anti coagula* or doac or factor xa inhibitor* or (iron adj3 (therap* or deficien*)) or surger* or surgical or ferritin* or apoferritin*).tw,kf,kw. 2688539

15 or/4-14 2984558

16 hemorrhage/ or blood loss, surgical/ 108405

17 mortality/ or "cause of death"/ or fatal outcome/ or hospital mortality/ or survival rate/ 406180

18 Death/ 20983

19 exp "Costs and Cost Analysis"/ 281260

20 exp Hemostasis/ 123851

21 exp "Drug-Related Side Effects and Adverse Reactions"/ 140987

22 exp Postoperative Complications/ 657337

23 exp Embolism/ 68726

24 Treatment Outcome/ 1264506

25 (h?emorrhag* or bleed* or blood loss or rebleed* or transfusion* or mortal* or survival* or death* or cost or costs or h?emostas?s or (adverse adj3 (outcome* or event* or reaction*)) or embolism* or resolution* or normali?ation*).tw,kf,kw. 5298349

26 or/16-25 6903498

27 and/3,15,26 6706

28 limit 27 to yr="2020 -Current" 1062

29 28 and ((Meta Analysis or Systematic Review).pt. or "Meta-Analysis as Topic"/ or (Review.pt. and (pubmed or medline).ti,ab.) or ((systematic* or literature or scoping) adj3 (overview or review* or search*)).ti,ab,kf. or (meta-anal* or metaanal* or meta-regression* or umbrella review* or overview of reviews or review of reviews or (evidence* adj2 synth*) or synthesis review*).ti,ab,kf.) 144

b) **Embase reviews.**

Embase Classic+Embase <1947 to 2025 August 27>

1 upper gastrointestinal bleeding/ or (gastrointestinal hemorrhage/ and upper gastrointestinal tract/) 14613

2 hematemesis/ 17192

3 melena/ 18567

4 peptic ulcer bleeding/ 6920

5 (((upper gastrointestinal or upper gastro intestinal) adj3 (h?emorrhag* or bleed* or blood loss)) or ((forrest adj3 ulcer*) and h?emostas?s) or (endoscop* and stigmata*)).tw,kw,kf. 17165

6 or/1-5 53973

7 arterial embolization/ or (artificial embolization/ and (prophylactic or transarterial or trans arterial).tw,kf,kw.) 16320

8 proton pump inhibitor/ 57644

9 hemostasis/ 101283

10 interventional radiology/ 29713

11 anticoagulant agent/ 171527

12 blood clotting factor 10a inhibitor/ 5871

13 iron deficiency/ or exp iron deficiency anemia/ 63287

14 iron/ad, dt, th [Drug Administration, Drug Therapy, Therapy] 12807

15 surgery/ 1129439

16 ferritin/ 79199

17 apoferritin/ 1363

18 ((prophylactic adj3 (transarterial or trans arterial) adj3 emboli?ation*) or proton pump inhibitor* or (repeat* adj3 endoscop*) or interventional radiolog* or transcatheter arterial emboli?ation* or trans catheter arterial emboli?ation* or anticoagula* or anti coagula* or vitamin k antagonist* or vka or direct oral anticoagula* or direct oral anti coagula* or doac or factor xa inhibitor* or (iron adj3 (therap* or deficien*)) or surger* or surgical or ferritin* or apoferritin*).tw,kf,kw. 3978247

19 or/7-18 4527851

20 bleeding/ or operative blood loss/ or postoperative hemorrhage/ 539812

21 mortality/ or hospital mortality/ or mortality rate/ or standardized mortality ratio/ or surgical mortality/ 1327950

22 death/ or fatality/ 446292

23 "cost benefit analysis"/ 101746

24 "health care cost"/ or "hospital cost"/ 277074

25 hemostasis/ 101283

26 side effect/ 564945

27 adverse event/ or adverse drug reaction/ 510321

28 postoperative complication/ 501357

29 embolism/ 39145

30 treatment outcome/ or clinical outcome/ or patient-reported outcome/ 1590327

31 (h?emorrhag* or bleed* or blood loss or rebleed* or transfusion* or mortal* or survival* or death* or cost or costs or h?emostas?s or (adverse adj3 (outcome* or event* or reaction*)) or embolism* or resolution* or normali?ation*).tw,kf,kw. 7834219

32 or/20-31 10097017

33 and/6,19,32 20308

34 limit 33 to ("clinical trials (clinicaltrials.gov)" or conference abstracts or "preprints (unpublished, non-peer reviewed)") 7484

35 33 not 34 12824

36 limit 35 to yr="2020 -Current" 3553

37 36 and ("Meta Analysis"/ or "Systematic Review"/ or (review and (pubmed or medline)).ti,ab,kw. or ((systematic* or scoping or literature) adj3 (overview or review* or search*)).ti,ab. or (meta-anal* or metaanal* or meta-regression* or umbrella review* or overview of reviews or review of reviews or (evidence* adj2 synth*) or synthesis review*).ti,ab.) 410

c) Medline studies.

Ovid MEDLINE(R) ALL <1946 to August 28, 2025>

1 (*Gastrointestinal Hemorrhage/ and exp Upper Gastrointestinal Tract/) or *Hematemesis/ or *Melena/ or *Peptic Ulcer Hemorrhage/ 10183

2 (((upper gastrointestinal or upper gastro intestinal) adj3 (h?emorrhag* or bleed* or blood loss)) or ((forrest adj3 ulcer*) and h?emostas?s) or (endoscop* and stigmata*)).ti,kw,kf. 5066

3 1 or 2 14372

4 Embolization, Therapeutic/ and (prophylactic or transarterial or trans arterial).tw,kf,kw. 2946

5 exp Proton Pump Inhibitors/ 22765

6 exp Hemostasis/ 123851

7 Radiology, Interventional/ 5103

8 exp Anticoagulants/ 252990

9 Factor Xa Inhibitors/ 6844

10 Iron Deficiencies/ or Anemia, Iron-Deficiency/ 17550

11 Iron/ad, tu, th [Administration & Dosage, Therapeutic Use, Therapy] 9312

12 Surgical Procedures, Operative/ 57691

13 ferritins/ or apoferritins/ 24160

14 ((prophylactic adj3 (transarterial or trans arterial) adj3 emboli?ation*) or proton pump inhibitor* or (repeat* adj3 endoscop*) or interventional radiolog* or transcatheter arterial emboli?ation* or trans catheter arterial emboli?ation* or anticoagula* or anti coagula* or vitamin k antagonist* or vka or direct oral anticoagula* or direct oral anti coagula* or doac or factor xa inhibitor* or (iron adj3 (therap* or deficien*)) or surger* or surgical or ferritin* or apoferritin*).tw,kf,kw. 2688539

15 or/4-14 2984558

16 hemorrhage/ or blood loss, surgical/ 108405

17 mortality/ or "cause of death"/ or fatal outcome/ or hospital mortality/ or survival rate/ 406180

18 Death/ 20983

19 exp "Costs and Cost Analysis"/ 281260

20 exp Hemostasis/ 123851

21 exp "Drug-Related Side Effects and Adverse Reactions"/ 140987

22 exp Postoperative Complications/ 657337

23 exp Embolism/ 68726

24 Treatment Outcome/ 1264506

25 (h?emorrhag* or bleed* or blood loss or rebleed* or transfusion* or mortal* or survival* or death* or cost or costs or h?emostas?s or (adverse adj3 (outcome* or event* or reaction*)) or embolism* or resolution* or normali?ation*).tw,kf,kw. 5298349

26 or/16-25 6903498

27 and/3,15,26 4059

28 limit 27 to yr="2020 -Current" 526

29 28 and ((Meta Analysis or Systematic Review).pt. or "Meta-Analysis as Topic"/ or (Review.pt. and (pubmed or medline).ti,ab.) or ((systematic* or literature or scoping) adj3 (overview or review* or search*)).ti,ab,kf. or (meta-anal* or metaanal* or meta-regression* or umbrella review* or overview of reviews or review of reviews or (evidence* adj2 synth*) or synthesis review*).ti,ab,kf.) 75

30 28 not 29 451

d) Embase studies.

Embase Classic+Embase <1947 to 2025 August 27>

1 *upper gastrointestinal bleeding/ or (*gastrointestinal hemorrhage/ and *upper gastrointestinal tract/) 6074

2 *hematemesis/ 1908

3 *melena/ 1976

4 *peptic ulcer bleeding/ 3958

5 (((upper gastrointestinal or upper gastro intestinal) adj3 (h?emorrhag* or bleed* or blood loss)) or ((forrest adj3 ulcer*) and h?emostas?s) or (endoscop* and stigmata*)).ti,kw,kf. 8236

6 or/1-5 16529

7 arterial embolization/ or (artificial embolization/ and (prophylactic or transarterial or trans arterial).tw,kf,kw.) 16320

8 proton pump inhibitor/ 57644

9 hemostasis/ 101283

10 interventional radiology/ 29713

11 anticoagulant agent/ 171527

12 blood clotting factor 10a inhibitor/ 5871

13 iron deficiency/ or exp iron deficiency anemia/ 63287

14 iron/ad, dt, th [Drug Administration, Drug Therapy, Therapy] 12807

15 surgery/ 1129439

16 ferritin/ 79199

17 apoferritin/ 1363

18 ((prophylactic adj3 (transarterial or trans arterial) adj3 emboli?ation*) or proton pump inhibitor* or (repeat* adj3 endoscop*) or interventional radiolog* or transcatheter arterial emboli?ation* or trans catheter arterial emboli?ation* or anticoagula* or anti coagula* or vitamin k antagonist* or vka or direct oral anticoagula* or direct oral anti coagula* or doac or factor xa inhibitor* or (iron adj3 (therap* or deficien*)) or surger* or surgical or ferritin* or apoferritin*).tw,kf,kw. 3978247

19 or/7-18 4527851

20 bleeding/ or operative blood loss/ or postoperative hemorrhage/ 539812

21 mortality/ or hospital mortality/ or mortality rate/ or standardized mortality ratio/ or surgical mortality/ 1327950

22 death/ or fatality/ 446292

23 "cost benefit analysis"/ 101746

24 "health care cost"/ or "hospital cost"/ 277074

25 hemostasis/ 101283

26 side effect/ 564945

27 adverse event/ or adverse drug reaction/ 510321

28 postoperative complication/ 501357

29 embolism/ 39145

30 treatment outcome/ or clinical outcome/ or patient-reported outcome/ 1590327

31 (h?emorrhag* or bleed* or blood loss or rebleed* or transfusion* or mortal* or survival* or death* or cost or costs or h?emostas?s or (adverse adj3 (outcome* or event* or reaction*)) or embolism* or resolution* or normali?ation*).tw,kf,kw. 7834219

32 or/20-31 10097017

33 and/6,19,32 6875

34 limit 33 to ("clinical trials (clinicaltrials.gov)" or conference abstracts or "preprints (unpublished, non-peer reviewed)") 2272

35 33 not 34 4603

36 limit 35 to yr="2020 -Current" 945

37 36 and ("Meta Analysis"/ or "Systematic Review"/ or (review and (pubmed or medline)).ti,ab,kw. or ((systematic* or scoping or literature) adj3 (overview or review* or search*)).ti,ab. or (meta-anal* or metaanal* or meta-regression* or umbrella review* or overview of reviews or review of reviews or (evidence* adj2 synth*) or synthesis review*).ti,ab.) 107

38 36 not 37 838

e) Cochrane - reviews & trials

#1 MeSH descriptor: [Gastrointestinal Hemorrhage] this term only 2052

#2 MeSH descriptor: [Upper Gastrointestinal Tract] explode all trees 5909

#3 #1 AND #2 165

#4 MeSH descriptor: [Hematemesis] this term only 22

#5 MeSH descriptor: [Melena] this term only 37

#6 MeSH descriptor: [Peptic Ulcer Hemorrhage] this term only 539

#7 ((("upper gastrointestinal" OR "upper gastro intestinal") NEAR/3 (h?emorrhag* OR bleed* OR "blood loss")) OR ((forrest NEAR/3 ulcer*) AND (hemostas?s OR haemostas?s)) OR (endoscop* AND stigmata*)):ti,ab,kw 1370

#8 {OR #3-#7} 1924

#9 MeSH descriptor: [Embolization, Therapeutic] this term only 598

#10 (prophylactic OR transarterial OR "trans arterial"):ti,ab,kw 21074

#11 #9 AND #10 39

#12 MeSH descriptor: [Proton Pump Inhibitors] this term only 2011

#13 MeSH descriptor: [Hemostasis] explode all trees 5968

#14 MeSH descriptor: [Radiology, Interventional] this term only 67

#15 MeSH descriptor: [Anticoagulants] explode all trees 7148

#16 MeSH descriptor: [Factor Xa Inhibitors] this term only 944

#17 MeSH descriptor: [Iron Deficiencies] explode all trees 2119

#18 MeSH descriptor: [Surgical Procedures, Operative] this term only 1395

#19 MeSH descriptor: [Ferritins] explode all trees 1328

#20 ((prophylactic NEAR/3 (transarterial OR "trans arterial") NEAR/3 emboli?ation*) OR ("proton pump" NEXT inhibitor*) OR (repeat* NEAR/3 endoscop*) OR (interventional NEXT radiolog*) OR ("transcatheter arterial" NEXT emboli?ation*) OR anticoagula* OR (anti NEXT coagula*) OR ("vitamin k" NEXT antagonist*) OR vka OR ("direct oral" NEXT anticoagula*) OR ("direct oral anti" NEXT coagula*) OR doac OR ("factor xa" NEXT inhibitor*) OR (iron NEAR/3 (therap* or deficien*)) OR surger* OR surgical OR ferritin* OR apoferritin*):ti,ab,kw 381960

#21 {OR #11-#20} 385913

#22 MeSH descriptor: [Hemorrhage] this term only 6218

#23 MeSH descriptor: [Blood Loss, Surgical] this term only 3583

#24 MeSH descriptor: [Mortality] this term only 992

#25 MeSH descriptor: [Cause of Death] this term only 2284

#26 MeSH descriptor: [Fatal Outcome] this term only 21

#27 MeSH descriptor: [Hospital Mortality] this term only 1878

#28 MeSH descriptor: [Survival Rate] this term only 13442

#29 MeSH descriptor: [Death] this term only 413

#30 MeSH descriptor: [Costs and Cost Analysis] explode all trees 16634

#31 MeSH descriptor: [Hemostasis] this term only 1028

#32 MeSH descriptor: [Drug-Related Side Effects and Adverse Reactions] explode all trees 5151

#33 MeSH descriptor: [Postoperative Complications] explode all trees 56337

#34 MeSH descriptor: [Embolism] explode all trees 2090

#35 MeSH descriptor: [Treatment Outcome] this term only 195010

#36 (h?emorrhag* OR bleed* OR "blood loss" OR rebleed* OR transfusion* OR mortal* OR survival* OR death* OR surger* OR surgical* OR cost OR costs OR hemostas?s OR haemostas?s OR (adverse NEAR/3 (outcome* OR event* OR reaction*)) OR embolism* OR resolution* OR normali?ation*):ti,ab,kw 829898

#37 {OR #22-#36} 923233

#38 {AND #8, #21, #37} 865

Limiter:2020-2025

Reviews: 3

Trials: 151

PICO 7:

Number of references after duplicate removal

Systematic reviews: 78

Primary studies: 82

Detailed search strategies and results:

a) Medline reviews.

Bibliographic search was performed in Ovid MEDLINE(R) from 1946 to August 28, 2025 using the following strategy:

1	Peptic Ulcer Hemorrhage/ or (*Peptic Ulcer/ and *Hemorrhage/)	7549
2	(peptic ulcer* adj3 (h?emorrhag* or bleed*)).tw,kf,kw.	3339
3	1 or 2	8475
4	Helicobacter pylori/	40658
5	Helicobacter Infections/	35755
6	(helicobacter pylori or h pylori or "h. pylori").tw,kf,kw.	52379
7	or/4-6	56665
8	3 and 7	641
9	8 and ((Meta Analysis or Systematic Review).pt. or "Meta-Analysis as Topic"/ or (Review.pt. and (pubmed or medline).ti,ab.) or ((systematic* or literature or scoping) adj3 (overview or review* or search*)).ti,ab,kf. or (meta-anal* or metaanal* or meta-regression* or umbrella review* or overview of reviews or review of reviews or (evidence* adj2 synth*) or synthesis review*).ti,ab,kf.)	42
10	limit 9 to yr="2005 -Current"	33

b) Embase reviews.

Embase Classic+Embase <1947 to 2025 August 27>

1	peptic ulcer bleeding/ or (peptic ulcer/ and bleeding/)	10251
2	(peptic ulcer* adj3 (h?emorrhag* or bleed*)).tw,kf,kw.	4246
3	1 or 2	11832
4	Helicobacter pylori/	68274
5	Helicobacter infection/	42365
6	(helicobacter pylori or h pylori or "h. pylori").tw,kf,kw.	75692
7	or/4-6	93823
8	3 and 7	1340
9	8 and ("Meta Analysis"/ or "Systematic Review"/ or (review and (pubmed or medline)).ti,ab,kw. or ((systematic* or scoping or literature) adj3 (overview or review* or search*)).ti,ab. or (meta-anal* or metaanal* or meta-regression* or umbrella review* or overview of reviews or review of reviews or (evidence* adj2 synth*) or synthesis review*).ti,ab.)	111
10	limit 9 to ("clinical trials (clinicaltrials.gov)" or conference abstracts or "preprints (unpublished, non-peer reviewed)")	21
11	9 not 10	90
12	limit 11 to yr="2005 -Current"	69

c) Medline studies.

Ovid MEDLINE(R) ALL <1946 to August 28, 2025>

1	*Peptic Ulcer Hemorrhage/ or (*Peptic Ulcer/ and *Hemorrhage/)	5118
2	(peptic ulcer* adj3 (h?emorrhag* or bleed*)).ti,kf,kw.	2412
3	1 or 2	5509
4	*Helicobacter pylori/	33096
5	*Helicobacter Infections/	29652
6	(helicobacter pylori or h pylori or "h. pylori").ti,kf,kw.	39283

7 or/4-6 44178

8 3 and 7 262

9 8 and ((Meta Analysis or Systematic Review).pt. or "Meta-Analysis as Topic"/ or (Review.pt. and (pubmed or medline).ti,ab.) or ((systematic* or literature or scoping) adj3 (overview or review* or search*)).ti,ab,kf. or (meta-anal* or metaanal* or meta-regression* or umbrella review* or overview of reviews or review of reviews or (evidence* adj2 synth*) or synthesis review*).ti,ab,kf.) 13

10 8 not 9 249

11 limit 10 to yr="2005 -Current" 108

12 exp Mortality/ 445713

13 exp Costs/ and Cost Analysis/ 52378

14 (mortal* or survival* or death* or rebleed* or re-bleed* or cost*).tw,kf,kw. 3919719

15 or/12-14 4065238

16 11 and 15 41

d) Embase studies.

Embase Classic+Embase <1947 to 2025 August 27>

1 *peptic ulcer bleeding/ or (*peptic ulcer/ and *bleeding/) 4599

2 (peptic ulcer* adj3 (h?emorrhag* or bleed*)).ti,kf,kw. 2512

3 1 or 2 5449

4 *Helicobacter pylori/ 33119

5 *Helicobacter infection/ 24368

6 (helicobacter pylori or h pylori or "h. pylori").ti,kf,kw. 55807

7 or/4-6 60067

8 exp mortality/ 1671759

9	death/ or "cause of death"/ or fatality/	590025
10	exp economic evaluation/	402666
11	(mortal* or survival* or death* or rebleed* or re-bleed* or cost*).tw,kf,kw.	5788600
12	or/8-11	6372726
13	and/3,7,12	97
14	limit 13 to ("clinical trials (clinicaltrials.gov)" or conference abstracts or "preprints (unpublished, non-peer reviewed)")	18
15	13 not 14	79
16	15 and ("Meta Analysis"/ or "Systematic Review"/ or (review and (pubmed or medline)).ti,ab,kw. or ((systematic* or scoping or literature) adj3 (overview or review* or search*)).ti,ab. or (meta-anal* or metaanal* or meta-regression* or umbrella review* or overview of reviews or review of reviews or (evidence* adj2 synth*) or synthesis review*).ti,ab.)	4
17	15 not 16	75
18	limit 17 to yr="2005 -Current"	42

e) Cochrane - reviews

#1	MeSH descriptor: [Peptic Ulcer Hemorrhage] this term only	540
#2	MeSH descriptor: [Peptic Ulcer] this term only	1067
#3	MeSH descriptor: [Hemorrhage] this term only	6249
#4	#2 AND #3	66
#5	((peptic NEXT ulcer*) NEAR/3 (h?emorrhag* OR bleed*)):ti,ab,kw	1029
#6	#1 OR #4 OR #5	1037
#7	MeSH descriptor: [Helicobacter pylori] this term only	2589
#8	MeSH descriptor: [Helicobacter Infections] this term only	2756

#9	("helicobacter pylori" OR "h pylori" OR "h. pylori"):ti,ab,kw	7004
#10	{OR #7-#9}	7021
#11	#6 AND #10	123

Limiter: 2005-2025

Reviews: 5

f) Cochrane - trials

#1	MeSH descriptor: [Peptic Ulcer Hemorrhage] this term only	540
#2	MeSH descriptor: [Peptic Ulcer] this term only	1067
#3	MeSH descriptor: [Hemorrhage] this term only	6249
#4	#2 AND #3	66
#5	((peptic NEXT ulcer*) NEAR/3 (h?emorrhag* OR bleed*)):ti,ab,kw	1029
#6	#1 OR #4 OR #5	1037
#7	MeSH descriptor: [Helicobacter pylori] this term only	2589
#8	MeSH descriptor: [Helicobacter Infections] this term only	2756
#9	("helicobacter pylori" OR "h pylori" OR "h. pylori"):ti,ab,kw	7004
#10	{OR #7-#9}	7021
#11	MeSH descriptor: [Mortality] explode all trees	18615
#12	MeSH descriptor: [Costs and Cost Analysis] explode all trees	16744
#13	(mortal* OR survival* OR death* OR rebleed* OR re-bleed* OR cost*):ti,ab,kw	361989
#14	{OR #11-#13}	362061

#15 #6 AND #10 AND #14 56

Limiter: 2005-2025

Trials: 31

Bibliography Screening and Selection

PICO 1-6 and 8:

After removing duplicates, 1,485 publications were found. 202 articles were considered potentially relevant for the post-endoscopy management of peptic ulcer bleeding.

PICO 1

Following scrutinization, 195 articles were excluded (Guidelines – 5; Review Paper – 19; Non-English papers – 10; Unrelated Topic – 148; Comment article – 8; Mixed population – 2; Case Reports – 2; Study Protocol – 1). Additionally, two RCTs published before 2020 were identified and included [1,2]. A total of nine articles were included [1-9].

List of references

1. Laursen SB, Hansen JM, Andersen PE, Schaffalitzky de Muckadell OB. Supplementary arteriel embolization an option in high-risk ulcer bleeding--a randomized study. Scand J Gastroenterol. 2014 Jan;49(1):75-83. PMID: 24256098

2. Lau JYW, Pittayanon R, Wong KT, Pinjaroen N, Chiu PWY, Rerknimitr R, Holster IL, Kuipers EJ, Wu KC, Au KWL, Chan FKL, Sung JJY. Prophylactic angiographic embolisation after endoscopic control of bleeding to high-risk peptic ulcers: a randomised controlled trial. Gut. 2019 May;68(5):796-803. PMID: 29802172

3. Lan T, Tong H, Qian S, Wei B, Huang Z, Wu H, Tan Q, Gao J, Bai S, Gong H, Jiang T, Yang J, Zhang Q, Hu B, Tang C. Prophylactic transcatheter angiographic embolization reduces Forrest IIa ulcer rebleeding: A retrospective study. Medicine (Baltimore). 2021 Mar 19;100(11):e23855. PMID: 33725926

4. Chang JHE, Lye TJY, Zhu HZ, Syn NL, Tang SS, Gogna A, Chan WH, Ong HS, Tan JTH, Lim CH. Systematic Review and Meta-Analysis of Prophylactic Transarterial Embolization for High-Risk Bleeding Peptic Ulcer Disease. J Vasc Interv Radiol. 2021 Apr;32(4):576-584.e5. PMID: 33526343

5. Boros E, Sipos Z, Hegyi P, Teutsch B, Frim L, Váncsa S, Kiss S, Dembrovszky F, Oštarijaš E, Shawyer A, Erőss B. Prophylactic transcatheter arterial embolization reduces rebleeding in non-variceal upper gastrointestinal bleeding: A meta-analysis. World J Gastroenterol. 2021 Oct 28;27(40):6985-6999. PMID: 34790019

6. Yu Q, Liu C, Collura B, Navuluri R, Patel M, Yu Z, Ahmed O. Prophylactic transcatheter arterial embolization for high-risk ulcers following endoscopic hemostasis: a meta-analysis. World J Emerg Surg. 2021 Jun 10;16(1):29. PMID: 34112185

7. Zetner D, Rasmussen IR, Frykman CP, Jensen LR, Jensen RJ, Possfelt-Møller E, Taudorf M, Penninga L. Risk factors for rebleeding and mortality following prophylactic transarterial embolization for patients with high-risk peptic ulcer bleeding: a single-center retrospective cohort study. Surg Endosc. 2024 Apr;38(4):2010-2018. PMID: 38413471

8. Zetner D, Roost I, Rosenberg J, Andresen K. Prophylactic transarterial embolization in patients with bleeding peptic ulcers following endoscopic control of bleeding. Cochrane Database Syst Rev. 2025 Feb 10;2(2):CD014999. PMID: 39927555

9. Ozen C, Al-Hashimi M, Tornby Stender M, Thorlacius-Ussing O, Larsen AC. Transarterial embolization of gastroduodenal peptic ulcer bleeding: a single-center study of safety and efficacy. Langenbecks Arch Surg. 2025 Apr 2;410(1):117. PMID: 40175682

PICO 2

Two meta-analyses [1-2], one RCT [3], one combined RCT and cohort study [4], one prospective cohort study [5], five retrospective studies [6-10], and two reviews [11,12], were considered potentially relevant and acquired in full text. Three studies were excluded: two because they included patients with UGIB in general without clearly presenting data for those with peptic ulcer bleeding [6,9], and one because it both included patients with UGIB in general **and** provided an insufficient description of methods and results [3]. The reviews did not lead to identification of any supplementary studies.

Accordingly, seven studies published in the update period (2020–2025) met the eligibility criteria and were included: two meta-analyses [1,2], one combined RCT and cohort study [4], one prospective observational cohort study [5], and three retrospective single-centre studies [7,8,10].

None of the identified studies compared high-dose PPI treatment to no treatment/placebo or H2 antagonists (PICO 2a and 2b). All identified studies compared patient outcome following different PPI regimens (PICO 2c).

List of references

1. Csiki E, Szabó H, Hanák L, Szakács Z, Kiss S, Vörhendi N, Pécsi D, Hegyi E, Hegyi P, Erőss B. Oral Proton Pump Inhibitors May Be as Effective as Intravenous in Peptic Ulcer Bleeding: A Systematic Review and Meta-analysis. Clin Transl Gastroenterol. 2021 Apr 14;12(4):e00341. doi: 10.14309/ctg.0000000000000341. PMID: 33988530; PMCID: PMC8049165.
2. Zhu W, Chen L, Zhang J, Wang P. Effects of high-dose versus low-dose proton pump inhibitors for treatment of gastrointestinal ulcer bleeding: a meta-analysis of randomized controlled trials. J Int Med Res. 2022 Apr;50(4):3000605211067396. doi: 10.1177/03000605211067396. PMID: 35414289; PMCID: PMC9014724.
3. Jafari S, Novin MS, Salarpour F. A Comparison between the impacts of continuous and intermittent intravenous pantoprazole injection on high risk upper gastrointestinal bleeding J Adv Med Biomed Res. 2024; 32(152): 185-190.

4. Chiang HC, Yang EH, Hu HM, Chen WY, Chang WL, Wu CT, et al. An extended 36-week oral esomeprazole improved long-term recurrent peptic ulcer bleeding in patients at high risk of rebleeding BMC gastroenterology 2022;22: 439.
5. Salman AA, Salman MA, Sarhan MD, Shaaban HE, Yousef M, Ibrahim A, Tourky M, Youssef A, Sherbiny ME. High- versus low-dose proton pump inhibitors post endoscopic hemostasis in hemodialysis cases with peptic ulcer bleeding. Acta Gastroenterol Belg. 2021 Jan-Mar;84(1):3-8. doi: 10.51821/84.1.654. PMID: 33639687.
6. Alzubaidi AS, Basilim AF. Comparison of intermittent and continuous proton pump inhibitor infusions in patients with non-variceal upper gastrointestinal bleeding at King Abdulaziz University Hospital, Jeddah, Saudi Arabia: A retrospective study. Saudi Med J. 2022 Aug;43(8):941-945. doi: 10.15537/smj.2022.43.8.20220128. PMID: 35964952; PMCID: PMC9749666.
7. Hsieh HH, Wu TY, Chen CH, Hour MJ. Cost-effectiveness and clinical outcomes of intermittent/continuous proton pump inhibitors infusion in high bleeding risk of ulcers: A retrospective observational cohort study. Medicine (Baltimore). 2021 Dec 10;100(49):e28064. doi: 10.1097/MD.0000000000028064. PMID: 34889253; PMCID: PMC8663891.
8. Khan RS, Hadi YB, Chima N and Kupec J. Skipping the Drip: Intravenous Proton Pump Inhibitor Bolus Therapy Leads to Poor Outcomes in High-Risk Bleeding. Cureus 2020 Vol. 12 Issue 5 Pages e8362. Accession Number: 32617233 DOI: https://dx.doi.org/10.7759/cureus.8362
9. Leung T, Kedzior S, Moore K, Bierman J and Coralic Z. Intermittent Versus Continuous Infusion Dosing of Intravenous Proton Pump Inhibitors for Upper Gastrointestinal Bleeding. Annals of Pharmacotherapy 2022 Vol. 56 Issue 10 Pages 1127-1132 Accession Number: 35135340 DOI: https://dx.doi.org/10.1177/10600280211073936
10. Zhu Z, Lai Y, Ouyang L, et al. High-Dose Proton Pump Inhibitors Are Superior to Standard-Dose Proton Pump Inhibitors in High-Risk Patients With Bleeding Ulcers and High-Risk Stigmata After Endoscopic Hemostasis. Clinical and Translational Gastroenterology 12(1):p e00294, January 2021. DOI: 10.14309/ctg.0000000000000294
11. Shung DL, Laine L. Review article: Upper gastrointestinal bleeding - review of current evidence and implications for management. Aliment Pharmacol Ther. 2024 May;59(9):1062-1081. doi: 10.1111/apt.17949. Epub 2024 Mar 22. PMID: 38517201.
12. Rattanasuwan, T., Khoury, A.P. & Ebied, A.M. Proton Pump Inhibitors: for What and for How Long. *SN Compr. Clin. Med.* **2**, 719–726 (2020). https://doi.org/10.1007/s42399-020-00268-2

PICO 3

Following careful review all articles were excluded (Guidelines – 5; Review Paper – 19; Non-English papers – 10; Unrelated Topic – 166; Case Reports – 2). None of the identified publications directly addressed the management of in-hospital recurrent peptic ulcer bleeding.

PICO 4

Following review, 196 articles were excluded (Guidelines – 5; Review Paper – 19; Non-English papers – 10; Unrelated Topic – 160; Case Reports – 2). Six cohort studies were included [1-6].

List of references

1. Darmon I, Rebibo L, Diouf M, Chivot C, Riault C, Yzet T, Le Mouel JP, Regimbeau JM. Management of bleeding peptic duodenal ulcer refractory to endoscopic treatment: surgery or transcatheter arterial embolization as first-line therapy? A retrospective single-center study and systematic review. Eur J Trauma Emerg Surg. 2020 Oct;46(5):1025-1035. PMID: 32246169

2. Ishak C, Ghazanfar H, Kandhi S, Alemam A, Abbas H, Patel H, Chilimuri S. Role of Transcatheter Arterial Embolization in Acute Refractory Non-variceal Upper Gastrointestinal Bleeding Not Controlled by Endoscopy: A Single-Center Experience and a Literature Review. Cureus. 2022 Oct 5;14(10):e29962. PMID: 36381746

3. Khazi ZM, Marjara J, Nance M, Ghouri Y, Hammoud G, Davis R, Bhat A. Gastroduodenal artery embolization for peptic ulcer hemorrhage refractory to endoscopic intervention: A single-center experience. J Clin Imaging Sci. 2022 Jun 3;12:31. PMID: 35769094

4. Kim SY, Kim SJ, Lee A, Yoon K, Park JY, Lee JY, Park JM. Clinical Outcomes of Transcatheter Arterial Embolization after Failed Endoscopic Intervention for Acute Non-Variceal Bleeding Associated with Benign Upper Gastrointestinal Diseases. Korean J Helicobacter Up Gastrointest Res. 2023 Mar;23(1):52-62. PMID: 40503384

5. McGraw JR, Kiefer RM, Shah A, Clark TWI, Shlansky-Goldberg RD, Nadolski GJ, Hunt SJ, Gade TP. Outcomes of Transarterial Embolization for Acute Nonvariceal Upper Gastrointestinal Bleeding: Correlation with Periprocedural Endoscopy. J Vasc Interv Radiol. 2023 Jun;34(6):1062-1069. PMID: 36739084

6. Rifatbegovic Z, Kovacevic M, Zildzic M, Kesetovic A, Ahmetasevic E. Surgical Treatment of Bleeding Ulcer in Cases When the Gastroenterological and Radiological Approach is Insufficient or Disabled - Single Center Expirience. Med Arch. 2024;78(3):211-214. PMID: 39944194

PICO 5

Following review 198 articles were excluded (Guidelines – 5; Review Paper – 19; Non-English papers – 9; Unrelated Topic – 162; Case Reports – 2). Four cohort studies were included [1-4].

List of references

1. N. Causada-Calo, F. Angriman, M. A. Mahler-Spinelli, S. Duran, D. Manazzoni, R. Gonzalez-Sueyro, et al. Anticoagulation after peptic ulcer bleeding: Risks of thrombosis, death and re-bleeding. Acta Gastroenterologica Latinoamericana 2020; 50:28-39. Not indexed at Pubmed

2. Peng D, Zhang M. The effect of aspirin in patients with nonvaricose upper gastrointestinal bleeding and risk factors analysis. Scand J Gastroenterol. 2022 Feb;57(2):149-153. PMID: 34693854.

3. Yamaguchi D, Tominaga N, Miyahara K, Tsuruoka N, Sakata Y, et al. Safety and Efficacy of the Noncessation Method of Antithrombotic Agents after Emergency Endoscopic Hemostasis in Patients with Nonvariceal Upper Gastrointestinal Bleeding: A Multicenter Pilot Study. Can J Gastroenterol Hepatol. 2021:6672440. PMID: 34095017

4. Yang SC, Wu CK, Tai WC, Liang CM, Yao CC, et al. Risks of adverse events for users of proton-pump inhibitors plus aspirin or clopidogrel in patients with aspirin-related ulcer bleeding. J Gastroenterol Hepatol. 2021;36:1828-1835. doi: 10.1111/jgh.15360. Epub 2020 Dec 11. PMID: 33247982.

PICO 6

Following review, 199 publications were excluded (Guidelines – 5; Review Paper – 19; Non-English papers – 10; Unrelated Topic – 163; Case Reports – 2). One study of relevance was identified and published in both full text [1] and in two abstracts. Additionally, two RCTs [2,3] and a cohort study [4] published before 2020 were identified and included.

List of references

1. Chang A, Rugivarodom M, Pungpipattrakul N, Akarapatima K, Suwanno K, Rattanasupar A, Ovartlarnporn B, Prachayakul V. Role of oral iron supplementation for anemia secondary to acute nonvariceal upper gastrointestinal bleeding: a randomized controlled trial. J Gastroenterol Hepatol. 2023 Aug;38(8):1283-1291. doi: 10.1111/jgh.16185. Epub 2023 Apr 6. PMID: 36999193.

2. Bager P, Dahlerup JF. Randomised clinical trial: oral vs. intravenous iron after upper gastrointestinal haemorrhage--a placebo-controlled study. Aliment Pharmacol Ther. 2014 Jan;39(2):176-87. doi: 10.1111/apt.12556. Epub 2013 Nov 19. PMID: 24251969.

3. Ferrer-Barceló L, Sanchis Artero L, Sempere García-Argüelles J, Canelles Gamir P, P Gisbert J, Ferrer-Arranz LM, Monzó Gallego A, Plana Campos L, Huguet Malavés JM, Luján Sanchis M, Ruiz Sánchez L, Barceló Cerdá S, Medina Chuliá E. Randomised clinical trial: intravenous vs oral iron for the

treatment of anaemia after acute gastrointestinal bleeding. Aliment Pharmacol Ther. 2019 Aug;50(3):258-268. doi: 10.1111/apt.15327. Epub 2019 Jun 14. PMID: 31197861; PMCID: PMC6771644.

4. Bager P, Dahlerup JF. Patient-reported outcomes after acute nonvariceal upper gastrointestinal hemorrhage. Scand J Gastroenterol. 2014 Aug;49(8):909-16. doi: 10.3109/00365521.2014.910544. Epub 2014 Jun 19. PMID: 24945872.

PICO 7

After removing duplicates, 160 publications were identified including 78 reviews and 82 studies. None of the identified publications presented new data on the management of H. pylori infection among patients with peptic ulcer bleeding.

PICO 8

Following review 197 articles were excluded (Guidelines – 5; Review Paper – 19; Non-English papers – 10; Unrelated Topic – 161; Case Reports – 2). Five RCTs were included, two studies compared Vonoprazan vs PPI in treatment of peptic ulcer bleeding [1,2], one study evaluated optimal timing of feeding in peptic ulcer bleeding [3], one study evaluated doppler-guided second-look endoscopy in peptic ulcer bleeding [4], and one study evaluated the effect of octreatid in NVUGIB [5].

List of references

1. Geeratragool T, Kaosombatwattana U, Boonchote A, Chatthammanat S, Preechakawin N, Srichot J, Sudcharoen A, Sirisunhirun P, Termsinsuk P, Rugivarodom M, Limsrivilai J, Maneerattanaporn M, Pausawasdi N, Leelakusolvong S. Comparison of Vonoprazan Versus Intravenous Proton Pump Inhibitor for Prevention of High-Risk Peptic Ulcers Rebleeding After Successful Endoscopic Hemostasis: A Multicenter Randomized Noninferiority Trial. Gastroenterology. 2024 Sep;167(4):778-787.e3. doi: 10.1053/j.gastro.2024.03.036. Epub 2024 Apr 5. PMID: 38582271.

2. Pattarapuntakul T, Wong T, Wetwittayakhlang P, Netinatsunton N, Keeratichananont S, Kaewdech A, Jandee S, Chamroonkul N, Sripongpun P, Lakatos PL. Efficacy of Vonoprazan vs. Intravenous Proton Pump Inhibitor in Prevention of Re-Bleeding of High-Risk Peptic Ulcers: A Randomized Controlled Pilot Study. J Clin Med. 2024 Jun 20;13(12):3606. doi: 10.3390/jcm13123606. PMID: 38930134; PMCID: PMC11204564.

3. Gong EJ, Lee SJ, Jun BG, Seo HI, Park JK, Han KH, Kim YD, Jeong WJ, Cheon GJ, Park SY. Optimal Timing of Feeding After Endoscopic Hemostasis in Patients With Peptic Ulcer Bleeding: A Randomized, Noninferiority Trial (CRIS KCT0001019). Am J Gastroenterol. 2020 Apr;115(4):548-554. doi: 10.14309/ajg.0000000000000584. PMID: 32205642.

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Tables of Evidence for each PICO

PICO 1

Characteristics of the included studies.

Author, year	Country	Study design	No. of subjects	Age (y)	Male sex (%)	Intervention, n	Comparator ,n	Outcome in intervention arm	Outcome in comparator arm	Follow-up
Laursen, 2014 [1]	Denmark	RCT	105	73	69 (66%)	pTAE, 49	Conservative treatment, 56	Hospital stay, mean – 4 days Rebleeding – 2 (4%) Mortality – 2 (4%) Blood transfusions, units – 4,3 Surgery – 1 (2%)	Hospital stay, mean – 6 days (p=0,028) Rebleeding – 8 (14%) (p=0,10) Mortality – 8 (14%) (p=0,10) Blood transfusions, units – 4,9 (p=NS) Surgery – 0 (0%) (p=NS)	30 days
	China	RCT	241	66,0/66,6		pTAE, 118		Intention-to-treat analysis		30 days

Lau, 2019 [2]					87 (73,7%)/94 (76,4%)		Conservative treatment, 123	Rebleeding – 12 (10,2%) 30-day mortality – 3 (2,5%) Patients with blood transfusions – 55 (46,6%) Hospital stay, median – 5 days	Rebleeding – 14 (11,4%) (p=0,745) 30-day mortality – 5 (4,1%) (p=0,519) Patients with blood transfusions – 73 (59,3%)(p=0,048) Hospital stay, median – 5 days (p=0,238)	
								Per-protocol analysis		
								Rebleeding – 6 (6,2%) 30-day mortality – 0 (0,0%) Patients with blood transfusions – 44 (45,8%) Hospital stay, median – 5 days	Rebleeding – 14 (11,4%) (p=0,192) 30-day mortality – 5 (4,1%) (p=0,108) Patients with blood transfusions – 73 (59,3%) (p=0,047) Hospital stay, median – 5 days (p=0,169)	
Lan, 2020 [3]	China	Cohort	102	53,0/57,8	81,5%/85,3%	pTAE, 27	Conservative treatment, 75	Rebleeding – 1 (3,7%) Surgery – 0 (0%) Mortality – 0 (0%)	Rebleeding – 18 (24%) (p=0.02) Surgery – 5 (6,7%) (p=0.32) Mortality – 2 (2,7%) (p>0.99)	30 days
Chang, 2021 [4]	Singapore	Meta-analysis (5 studies)	835 patients	NS	NS	pTAE, 255	Conservative treatment, 580	Rebleeding – 19/255 (OR, 0.35; 95% CI, 0.15–0.85; p=0.02; I^2=50%)	Rebleeding – 94/580	NS

								Re-intervention – 34/255 (OR, 0.68; 95% CI, 0.43–1.08; p=0.10; I^2=0%) Mortality – 11/255 (OR, 0.28; 95% CI, 0.10–0.83; p=0.02; I^2=58%)	Re-intervention – 117/580 Mortality – 78/580	
Boros, 2021 [5]	Hungary	Meta-analysis (12 studies)	1329	NS	NS	pTAE, 486	Conservative treatment, 843	Rebleeding – 72 (14,8%) (OR = 0.48, 95%CI: 0.29–0.78; p=0,003; I^2=33%) Surgery – 17/312 (5,4%) (OR = 0.35, 95% CI: 0.14–0.92, p=0.033; I^2=44,1%) 30-day Mortality – 33/298 (11,1%) (OR = 0.82, 95%CI: 0.39–1.72; p=0.594; I^2=19,6%)	Rebleeding – 171 (20,3%) Surgery – 97/578 (16,8%) 30-day Mortality – 23/250 (9,2%)	NS
Yu, 2021 [6]	China	Meta-analysis (5 studies)	882	NS	NS	pTAE, 265	Conservative treatment, 617	Rebleeding – 18 (6,8%) Surgery – 8 (3%) Mortality – 12 (4,5%)	Rebleeding – 88 (14,3%) (p=0.003) Surgery – 89 (14,4%) (p=0.005) Mortality – 54 (8,8%) (p=0.032)	30 days in 3 studies; NS in 2 studies

Zetner, 2024 [7]	Denmark	Cohort	176	73y	64%	pTAE, 176	NA	Rebleeding – 44 (25%) 30-day mortality – 26 (15%) Surgery – 11 (28%) LOS – median 9 days	NA	Median 19 months
Zetner, 2025 [8]	Denmark	Meta-analysis (2 studies)	346 patients	NS	NS	pTAE, 167	Conservative treatment, 179	Rebleeding – 16/167 (OR 0.58, 95% CI 0.18 to 1.83) Reintervention – 14/167 (OR 0.65, 95% CI 0.25 to 1.69] 30-day mortality – 5/167 (OR 0.41, 95% CI 0.14 to 1.21)	Rebleeding – 24/179 Reintervention – 21/179 30-day mortality – 13/179	30 days
Ozen, 2025 [9]	Denmark	Cohort	74	77y	65%	pTAE, 74	NA	Rebleeding – 9 (12%) 30-day Mortality – 15 (20%) Surgery – 2 (3%) LOS – median 8 days	NA	Median 32,3 months

LOS – length of hospital stay; pTAE – prophylactic transarterial embolization; NA – not applicable; NS – not specified

PICO 2

Characteristics of the included studies.

Author, year	Country	Study design	No. of subjects	Age (y)	Male sex (%)	Intervention, n	Comparator ,n	Outcome in intervention arm	Outcome in comparator arm	Follow-up
Csiki E, 2021 [1]	Hungary	Meta-analysis One RCT included patients with Forrest IIc-III ulcers **One of the included RCTs (Karim et al) was later redrawn due to plagiarism**	14 RCTs 1,951 PUB patients	N/A	N/A	Oral PPI in patients with PUB irrespective of Forrest classification and PPI-dose n=977	IV PPI in patients with PUB irrespective of Forrest classification and PPI-dose n=974	**Recurrent bleeding:** Events: 53/782 (6.8%) OR: 0.96, (95% CI: 0.65-1.44), p= 0.86 **Mortality** Events: 13/704 (1.8%) OR: 0.70, (95% CI: 0.35-1.40), p= 0.31 **Re-endoscopy** Events: 50/603 (8.3%) OR: 0.81, (95% CI: 0.52-1.28), p= 0.37 **Surgery** Events: 8/870 (0.91%) OR: 0.91, (95% CI: 0.40-2.07), p= 0.83	**Recurrent bleeding:** Events: 55/784 (7.0%) **Mortality** Events: 19/720 (2.6%) **Re-endoscopy** Events: 56/578 (9.7%) **Surgery** Events: 9/881 (1.02%)	30 days
Zhu W, 2022 [2]	China	Meta-analysis Only inclusion of studies with performance of endoscopic hemostasis < 24 hrs after admission	9 RCTs 2,329 PUB patients	N/A	N/A	High-dose PPI (≥80mg/day) n=1,144	Low-dose PPI (stated as 40mg/day in the publication, but 7/9 of the included RCTs used higher dosages in their standard regime – up to 160mg /day) n=1,185	**Recurrent bleeding:** Events: 98/1,141 (8.6%) OR: 0.87 (95% CI: 0.65-1.15), p= 0.33 **Mortality** Events: 19/1141 (1.7%) OR: 0.78, (95% CI: 0.43-1.40), p= 0.40 **Surgery** Events: 35/1141 (3.1%) OR: 0.86, (95% CI: 0.55-1.37), p= 0.53	**Recurrent bleeding:** Events: 115/1,180 (9.7%) **Mortality** Events: 25/1180 (2.1%) **Surgery** Events: 42/1180 (3.6%)	Not reported
Chiang HC, 2022 [4]	Taiwan	RCT and cohort study The RCT evaluated two different 36 week PPI-regimens	120 patients with peptic ulcer bleeding requiring endoscopic treatment	≈70yrs	63%	PPI-treatment **after 16 weeks from EGD:** Esomperazol 20mg orally	PPI-treatment **after 16 weeks from EGD:** Esomperazol 20mg orally once daily for 36 weeks	**All-cause Mortality** 3/60 (5%) p=0.62	**All-cause Mortality** 1/60 (1.7%)	1 year (RCT)

		beginning 16 weeks from the index endoscopy. Furthermore, the study evaluated patients long-term outcome depending on PPI-use (on-demand vs discontinued) and compared patient outcomes to a historical cohort (results now shown here).	for Forrest I-IIb ulcers AND were in high risk of rebleeding defined as an Rockall score ≥ 6			twice-daily for 36 weeks (n=60)	(n=60)			
Khan AS, 2020 [8]	US	Retrospective single-center study	130 consecutive patients with peptic ulcer bleeding Forrest I-IIb	62 yrs	60%	Intermittent PPI-bolus: Pantoprazole 40mg iv twice daily for three days (n=79)	Continuous PPI-infusion: Bolus of 80mg Pantoprazole iv followed by infusion of unspecified dose 16hrs/day for three days (n=51)	**Recurrent bleeding:** 16/79 (22%) p=0.18 **Need for IR/surgery** 14/79 (18%) p=0.09 **Mortality** 11/79 (14%) p=0.44 **Any of the outcomes above** 33/79 (42%) p=0.028 Following adjustment for eight covariates using logistic regression, Intermittent PPI-bolus was associated with increased need for IR/surgery: OR 4.12 (95% CI: 1.14-20.0), p= 0.046	**Recurrent bleeding:** 9/51 (15%) **Need for IR/surgery** 3/51 (5.9) **Mortality** 4/51 (7.8%) **Any of the outcomes above** 11/51 (22%)	In-hospital follow-up (mean ≈11 days)
Hsieh HH, 2021 [7]	Taiwan	Retrospective single-center study	335 Patients with peptic ulcer bleeding	69 yrs	67%	Non-high dose, intermittent PPI-infusion	High-dose continuous PPI-infusion (80mg	**Recurrent bleeding:** 20/178 (11%) p=0.021	**Recurrent bleeding:** 32/157 (20%)	7 days

		High risk of selection bias with significant differences in stigmata of bleeding between groups with 80% of FIa-patients receiving High-dose PPI-infusion.	requiring endoscopic hemostasis Forrest I-IIb			(40mg 1-2 times daily for 3 days)	bolus followed by 8mg/h for 72 hrs)	**Mortality** 13/178 (7.3%) p=1.36	**Mortality** 19/157 (12%)	
Zhu Z,, 2021 [10]	China	Retrospective single-center study Outcomes were reported for patients in low or high risk of rebleeding defined as a Glasgow Blatchford score of < 8 and ≥ 8, respectively * Results were adjusted using Propensity score-matching	346 Patients with peptic ulcer bleeding requiring endoscopic hemostasis Forrest I-IIb	56 yrs	83%	Standard-dose iv PPI-infusion (40mg two times daily for 3 days)	High-dose continuous PPI-infusion (80mg bolus followed by 8mg/h for 72 hrs)	**For all patients:** **Recurrent bleeding:** 20/104 (19%) p=1.0 p=0.22* **Surgery:** 1/104 (1.0%) p=0.29 p=1.0* **Mortality:** 5/104 (4.8%) p=0.78 p=0.21* **For patients with GBS < 8:** **Recurrent bleeding:** 2/28 (7.1%) p=1* **Surgery:** 0/28 (0.0%) p=0.46* **Mortality:** 0/28 (0.0%) p=0.46* **For patients with GBS ≥ 8:** **Recurrent bleeding:** 17/61 (28%) p=0.015* **Surgery:** 1/61 (1.6%) p=1.0*	**For all patients:** **Recurrent bleeding:** 40/242 (17%) **Surgery:** 9/242 (3.7%) **Mortality:** 10/242 (4.1%) **For patients with GBS < 8:** **Recurrent bleeding:** 2/24 (8.3%) **Surgery:** 1/24 (4.2%) **Mortality:** 1/24 (4.2%) **For patients with GBS ≥ 8:** **Recurrent bleeding:** 7/65 (11%) **Surgery:** 1/65 (1.5%)	30 days

								Mortality: 5/61 (8.2%) p=0.024*	**Mortality:** 0/65 (0.0%)	
Salman AA, 2020 [5]	Egypt	Prospective, observational cohort study. First 100 patients were treated with high-dose continuous PPI-infusion, the last 100 patients were treated with non-high dose intermittent PPI-infusion Patients with in-hospital bleeding were included	200 patients on regular hemodialysis with peptic ulcer bleeding requiring endoscopic hemostasis Forrest I-IIb.	≈54 yrs	60%	Non-high dose, intermittent PPI-infusion (40mg PPI bolus given two times daily for three days)	High-dose continuous PPI-infusion (80mg bolus followed by 8mg/h for 72 hrs)	**Recurrent bleeding:** 17/100 (17%) p=0.70 **Need for surgery** 3/100 (3.0%) p=0.306 **Mortality** 8/100 (8.0%) p=0.80	**Recurrent bleeding:** 15/100 (15%) **Need for surgery** 5/100 (5%) **Mortality** 9/100 (9.0%)	In-hospital follow-up

PICO 4

Characteristics of the included studies.

Author, year	Country	Study design	No. of subjects	Age (y)	Male sex (%)	Intervention, n	Comparator ,n	Outcome in intervention arm	Outcome in comparator arm	Follow-up
Darmon, 2020 [1]	France	Cohort	59 (PUD)	72	71,2 %	TAE, 52	Surgery, 7	Mortality – 8 (15,3%) Rebleeding – 15 (28,8%) LOS – 18,2 days Complications – 16 (30,7%) Number of RBC transfused units per patient – 4,5	Mortality – 1 (14,2%) (p=0,94) Rebleeding – 1 (14,2%) (p=0,37) LOS – 31,2 days (p=0,22) Complications – 4 (57,1%) (p=0,25) Number of RBC transfused units per patient – 5,4 (p=0,71)	NS
Ishak, 2022 [2]	USA	Cohort	10 (PUD in 7 patients)	64,5	90%	TAE, 10	NA	Mortality – 4 (40%) Rebleeding – 0 (0%) Complications – 0 (0%) LOS – NS	NA	NS
Khazi, 2022 [3]	USA	Cohort	70 (PUD)	63	70%	TAE, 70	NA	Length of hospital stay, in days – 9,2 Re-intervention for rebleeding – 12 (17.1) 30 day mortality – 6 (8.6)	NA	30 days

Kim, 2023 [4]	South Korea	Cohort	92 (PUD 81/92 patients)	66,1	78,3 %	TAE, 92	NA	30 day rebleeding – 19/86 (22,1%) 30 day mortality – 5/86 (5,8%) LOS – 16,2 days Complications – 3/86 (3,5%)	NA	NS
McGraw, 2023 [5]	USA	Cohort	282 (132 PUD)	64	63,5 %	TAE, 282	NA	Rebleeding – 68 (24,1%) 30 days Mortality – 73 (25,9%)	NA	NS
Rifatbegovic, 2024 [6]	Bosnia and Hercegovina	Cohort	49 (all PUD)	69,7	63,3 %	NA	Surgery, 49	NA	Mortality – 30 (61,2%)	NA

LOS – length of hospital stay; NA – not applicable; NS – not specified; PUD – peptic ulcer disease; RBC – red blood cells; TAE – transcatheter arterial embolization; UGIB – upper gastrointestinal bleeding

PICO 5

Characteristics of the included studies.

Author, year	Patient characteristics	No. of subjects	Intervention, n	Comparator ,n	Outcome in intervention arm	Outcome in comparator arm	Follow-up
Causada-Calo N, 2020 [1]	Retrospective cohort ; Patients on chronic anticoagulation	70	resumed anticoagulation, 40 ((57.1%) at median of 15 d	Did not resume anticoagulation	Restarting anticoagulation associated with lower risk of thrombosis or death (HR 0.14; 95%CI 0.05-0.43) and did not increase the risk of recurrent bleeding significantly (HR 1.42; 95% CI 0.10-19.8).		1 year
Peng D, 2022 [2]	Retrospective , 1514 patients with NVUGIB	163 with aspirin history	Continued aspirin after NVUGIB,76	Did not continue ASS	better survival than those who did not, but it was not an independent risk factor		In-hospital
Yamaguchi D, 2021 [3]	multicenter, prospective, pilot study, NVUGIB historical cohort, Rebleeding < 1 month	40 (of 43) vs. 40 (of 154)	Continued Anticoagulation (type cf*), 43 (95.4% PUB – 79.1% gastric ulcers) thromboembolic event rate (n=0)	discontinued anticoagulation 6.5 (3.3–10) days (previous cohort, propensity score matching for 40 pts) 2/154 pts.: thromboembolic event	5.0% (2/40) – not inferior to cessation All patients 7%	15.0% (6/40) pts (prop. score matching); 9.7% (15/154 patients) in previous study; Neither the rebleeding rate within a month nor thromboembolic event rate was	1 month

						different between the two groups. mean duration of hospitalization significantly shorter in group A than in group B (8.6 +/- 5.2 d versus 14.4 +/- 7.1 d, P < 0.001).	
Yang SC, 2021 [4]	F/U after ASS-associated UGIB, 947		653 reused aspirin (+PPI), after discharge for UGIB	294 treated with clopidogrel (+PPI) after discharge for UGIB	Compared with aspirin, clopidogrel showed an increased risk of MACE ([aHR] 1.65; 95% [CI] 0.87-3.12) and UGIB (aHR 1.25; 95% CI 0.66-2.36), n.s.	Clopidogrel associated with greater risk of any cause of mortality (aHR 4.84; 95% CI 1.59-14.75), but n.s. in propensity score-matched cohort analysis (P = 0.06).	90d

PICO 6

Characteristics of the included studies.

Author, year	Patient characteristics	No. of subjects	Intervention, n	Comparator ,n	Outcome in intervention arm	Outcome in comparator arm	Follow-up
Chang A, 2023 [1]	RCT, NVUGIB, anemia at discharge	151	6 weeks of 600 mg/d oral ferrous fumarate (n=77)	No iron suppl., (n=74)	hemoglobin elevation >2 g/dL or no anemia at the end of treatment 72.7%	hemoglobin elevation >2 g/dL or no anemia at the end of treatment 45.9%; p0.004	6 weeks
Bager P, 2014 [2]	Double-blind, placebo-controlled, RCT Patients with NVUGIB (70% PUB) and anemia	97	Intervention 1: Single-dose iv administration of 1000mg of iron (n=42) OR Intervention 2: Oral iron treatment 200mg daily for 3 months (n=41)	Placebo (n=14)	After 3 months, patients treated with iron had significantly higher levels of hemoglobin (13.9, 13.5 and 11.5 respectively; p<0.01). The frequency of full iron stores after 3 months (P-ferritin > 100µg/L) was 41%, 24% and 10%, respectively (p=0.11). Follow-up (separate publication [4]): Patients with normalized hemoglobin at EOT had higher QoL after 6months		6 months

Ferrer-Barceló, 2019 [3]	RCT Patients with NVUGIB (52% PUB) and anemia	61	Intravenous iron - 1000mg at discharge and 500-1000mg at day 7	Oral ferrous sulfate- 325mg twice daily for 6 weeks	A higher proportion of patients receiving intravenous iron had normalization of B-hemoglobin (100% vs 61%; p<0.001). Better subjective state of health among patients receiving iv. Iron compared to oral treatment (p=002). High risk of bias for that outcome (unblinded design)		6 weeks

PICO 8

Characteristics of the included studies.

Author, year	Study and Patient characteristics	No. of subjects	Intervention, n	Comparator ,n	Outcome in intervention arm	Outcome in comparator arm	Follow-up
Geeratragool T, 2024 [1]	Randomized, open-label, multicenter, non-inferiority trial; peptic ulcer (F. Ia, Ib, IIa, and Iib) rebleeding prevention	194	Vonoprazan (20 mg twice daily orally for 3 days, then 20 mg once daily for 28d) (n=98)	Pantoprazole 80 mg IV bolus followed by an 8 mg/h infusion over 72h, then omeprazole 20 mg twice daily for 28d (n=96)	30d Rebleeding 7.1% (7/98) Non-inferiority P < .001	30d-Rebleeding 10.4% (10/96)	30 days
Pattarapuntakul T, 2024 [2]	Randomized, double-blind, controlled, double-dummy ; peptic ulcer bleeding (F IA/IB or IIA/IIB after endoscopic hemostasis	N=20	PPI, (n=11)	Vonoprazan, (n=9)	No sig. difference in Re-bleeding within 72 h, 7 days and 30 days (9.1% vs 0%;p = 1.000)		30 days
Gong EJ, 2020 [3]	Randomized, single center, noninferiority trial	209 (IIT), 200 (PP)	Resume feeding 24 hours after successful endoscopic hemostasis	Resume feeding 48 hours after successful endoscopic hemostasis	Recurrent bleeding within 7 days (7.9% vs 4.0% in the PP analysis, P value for noninferiority = 0.034) 30-day mortality rates were 5.9% and 14.1%, respectively (difference:-8.2%, 95% CI:-16.5 to 0.1) in the PP analysis.		30 days

Nielsen MM, 2023 [4]	Non-blinded, parallel group, RCT, PUB from F Ia-IIb ulcers, controlled by endoscopic therapy	62	second-look endoscopy <24 h with doppler probe and repeated treatment in cases with doppler-flow (n=32)	standard treatment (n=30)	91% (29/32) had positive DEP signal at ulcer base (contact thermal therapy (n = 29), injection of diluted adrenaline (n = 23), and haemoclips (n = 7)) Rebleedingrate 1/32	Rebleedingrate 4/30, n.s.	30 days
Abrishami M, 2020 [5]	Randomized, double-blind, placebo-controlled trial	116	100 mcg octreotide s.c. q8h for 72 h + Pantoprazole 40 mg bolus, 40 mg every 12 h i.v. (n=58)	Placebo + Pantoprazole 40 mg bolus, 40 mg every 12 h i.v. (n=58)	No statistically significant differences between Groups: mortality (0 vs. 5.17%; P = 0.21,) rebleeding rate (5.17% vs. 1.72%; P = 0.5), blood transfusion requirement (1.65 ± 0.47 units vs. 1.70 ± 0.45 units; P = 0.45), length of hospital stay (1.96 ± 1.00 days vs. 1.65 ± 0.84 days; P = 0.44), and need for surgery (1.72% vs. 1.72%; P = 0.7).		1 month