SUPPLEMENTARY MATERIAL

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One in Four Patients with Gastrointestinal Bleeding Develops Shock or Hemodynamic Instability: A Systematic Review and Meta-analysis

Obeidat M *et al*. Hemodynamic instability and gastrointestinal bleeding

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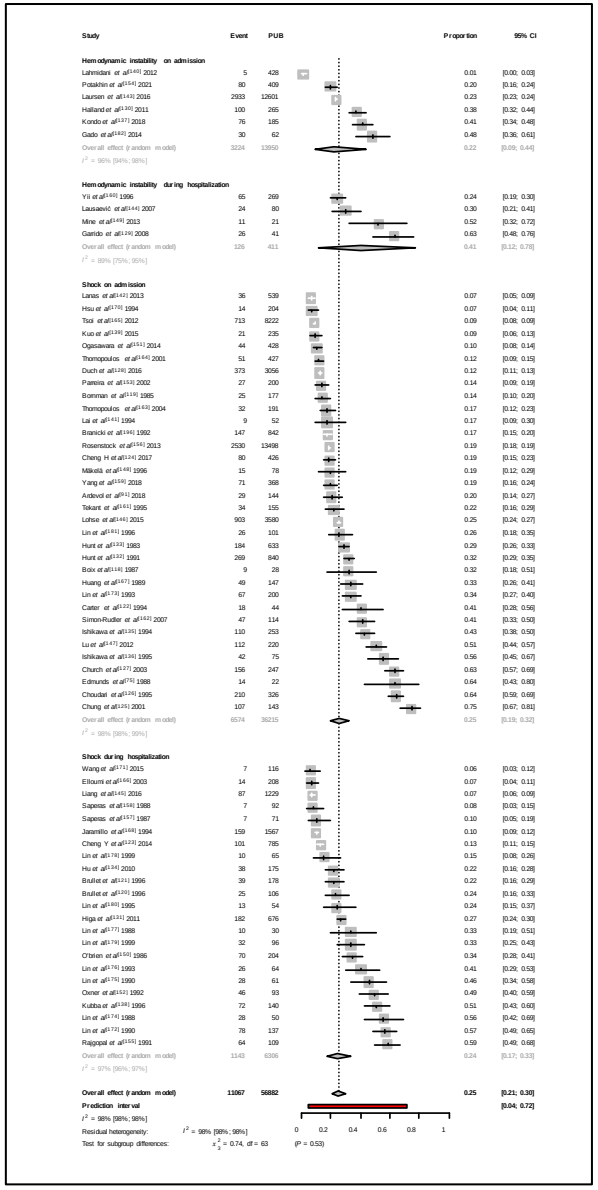
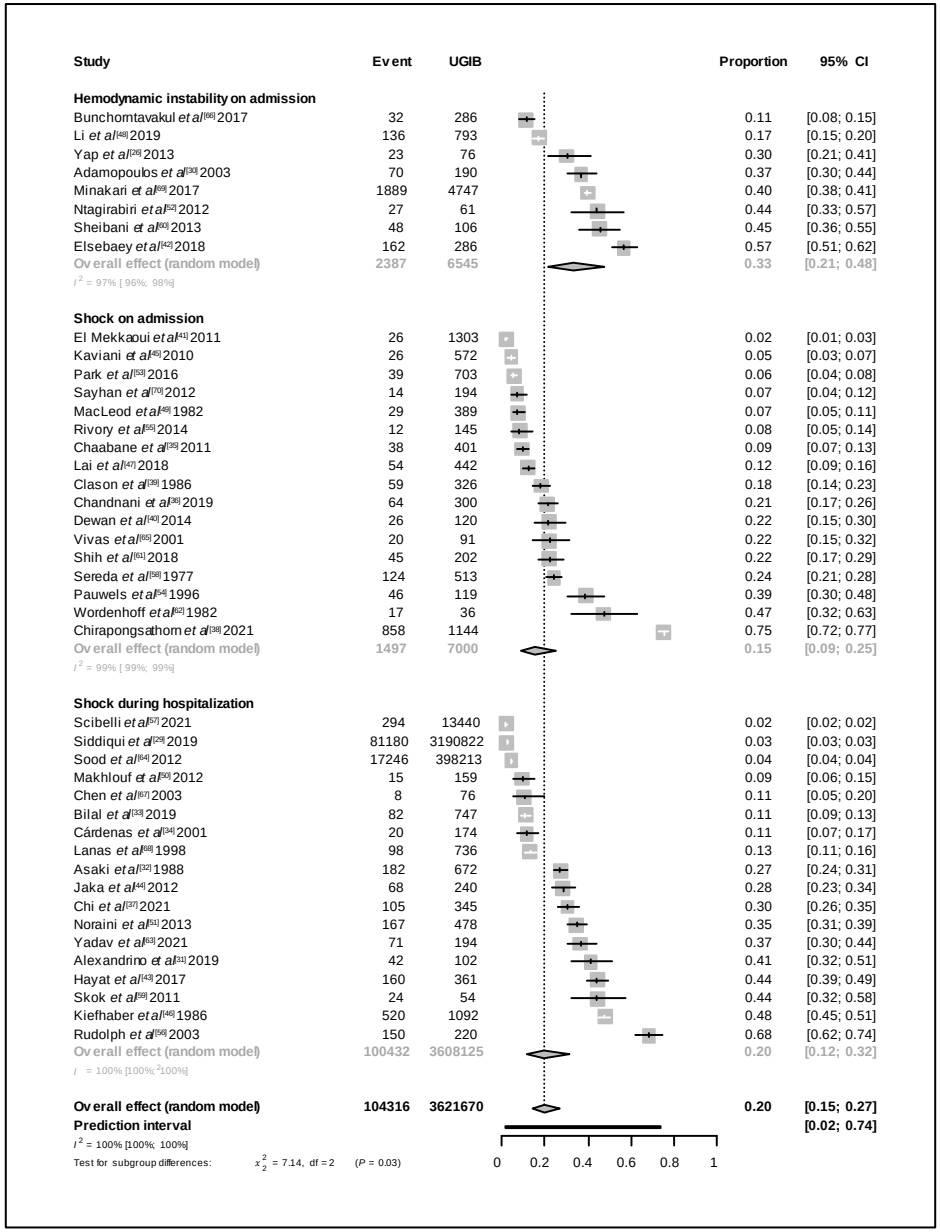
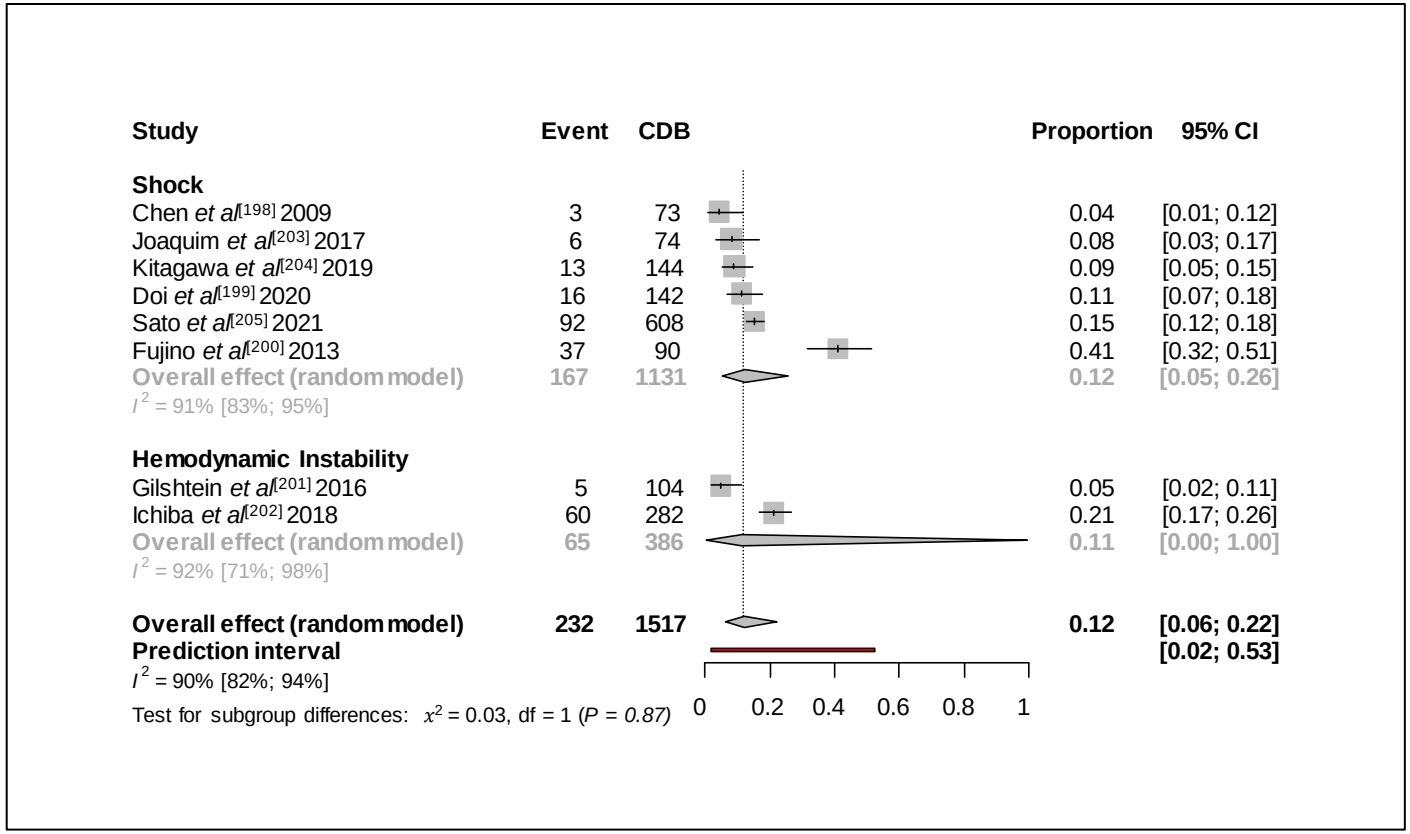


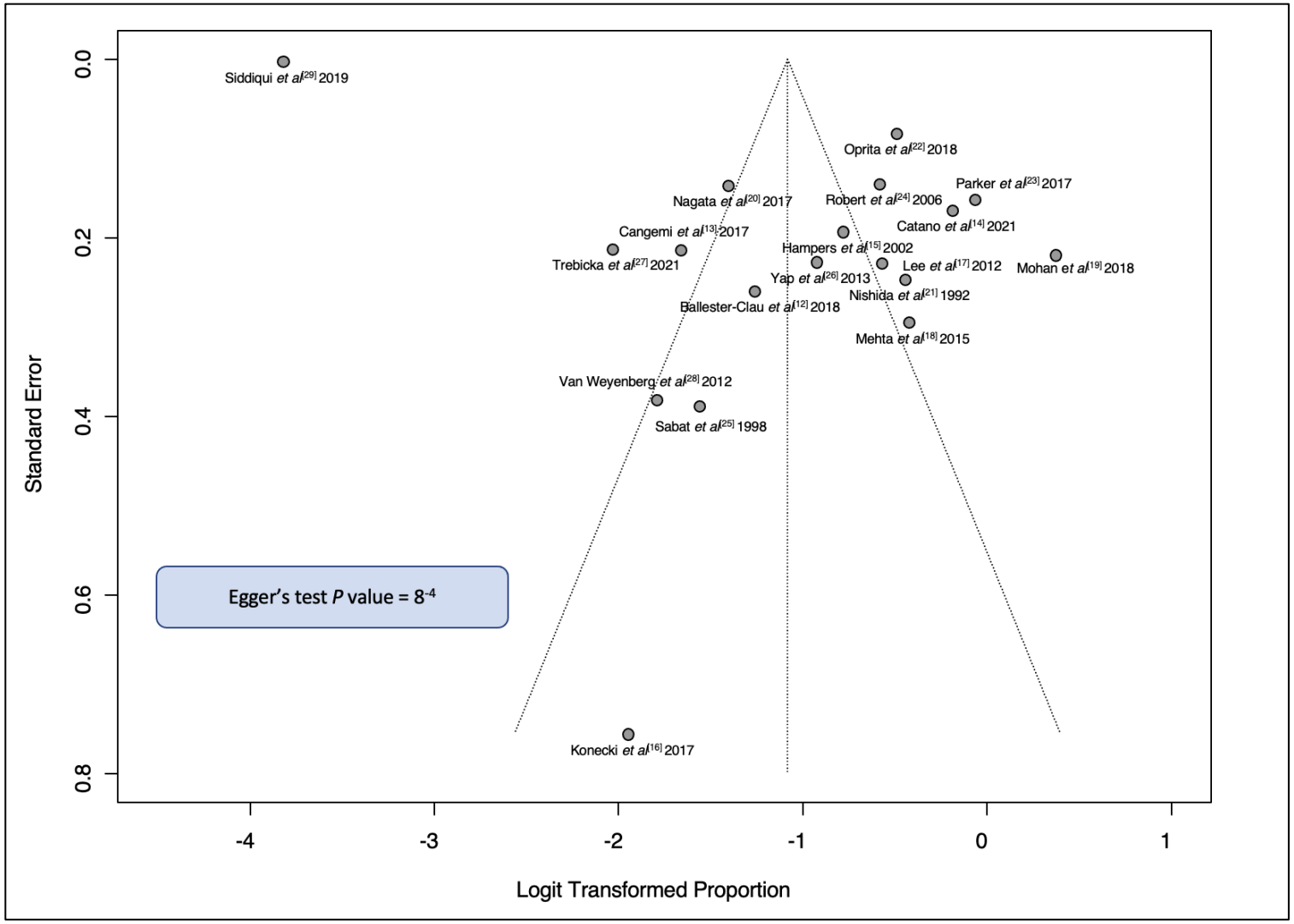
Supplementary Figure 1 Forest plot demonstrating the proportion rates for hemodynamic instability and shock in peptic ulcer bleeding. PUB: Peptic ulcer bleeding; CI: Confidence interval



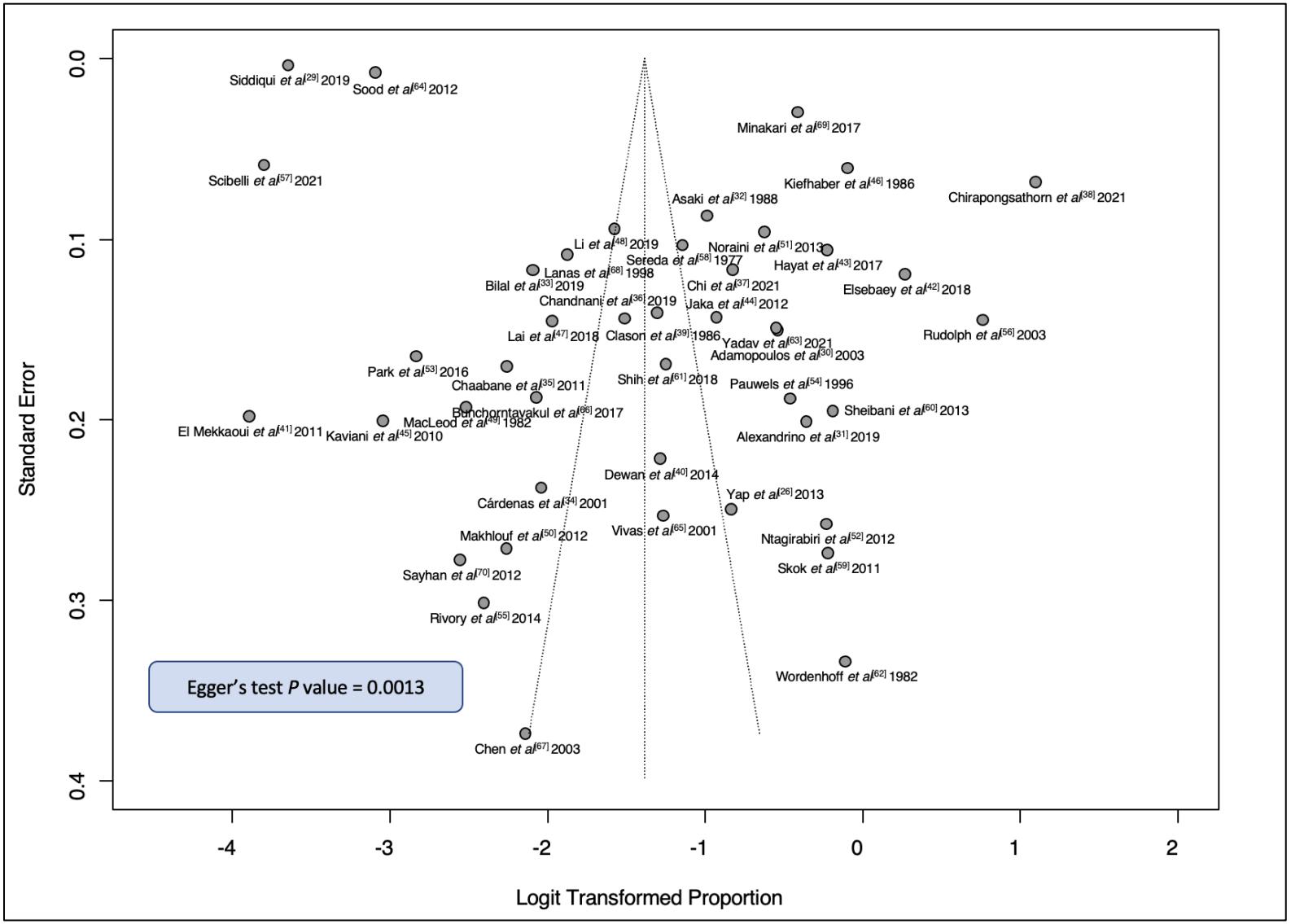
Supplementary Figure 2 Forest plot demonstrating the proportion rates for hemodynamic instability and shock in upper gastrointestinal bleeding. UGIB: Upper gastrointestinal bleeding; CI: Confidence interval



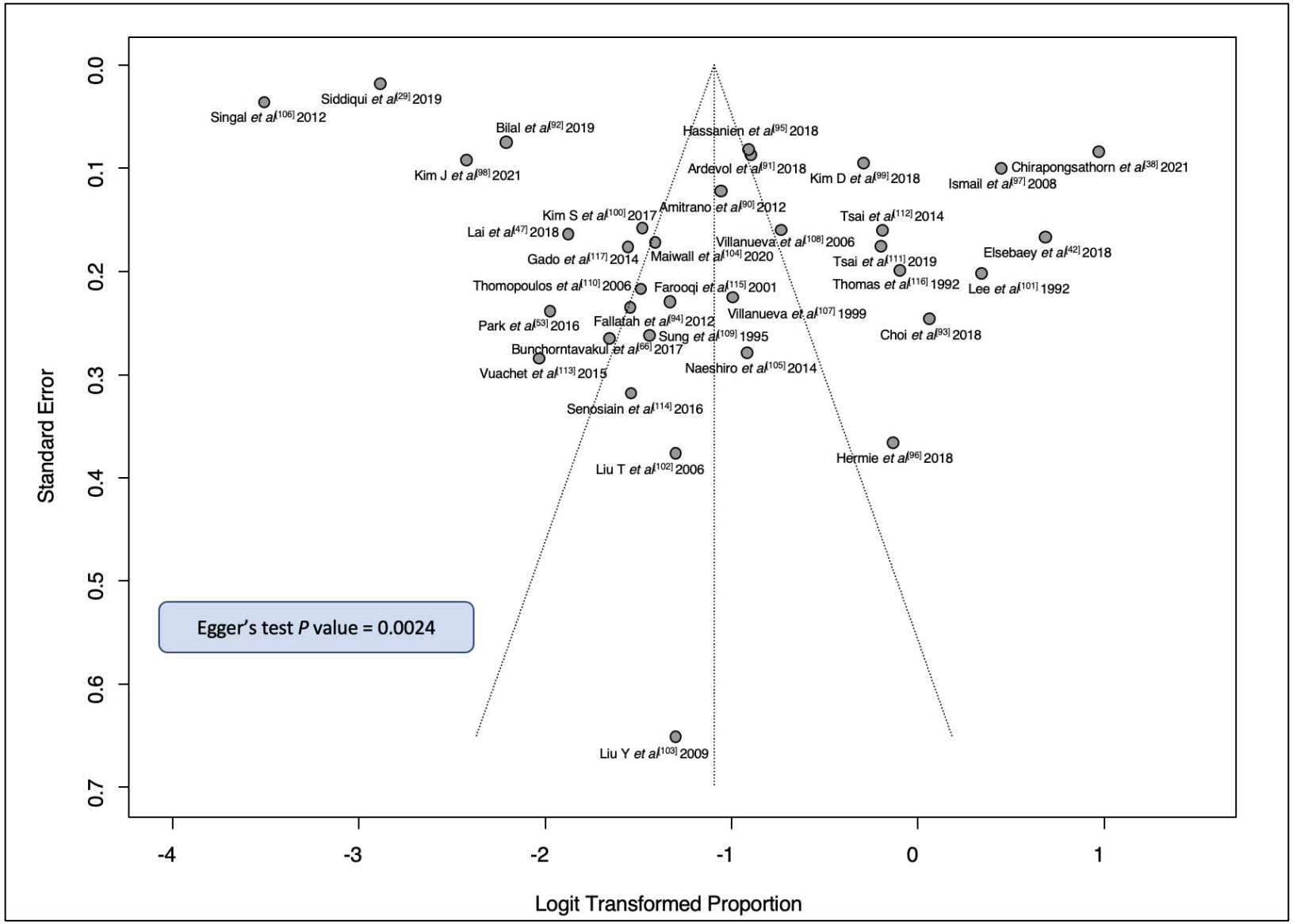
Supplementary Figure 3 Forest plot demonstrating the proportion rates for hemodynamic instability and shock in colonic diverticular bleeding. CDB: Colonic diverticular bleeding; CI: Confidence interval



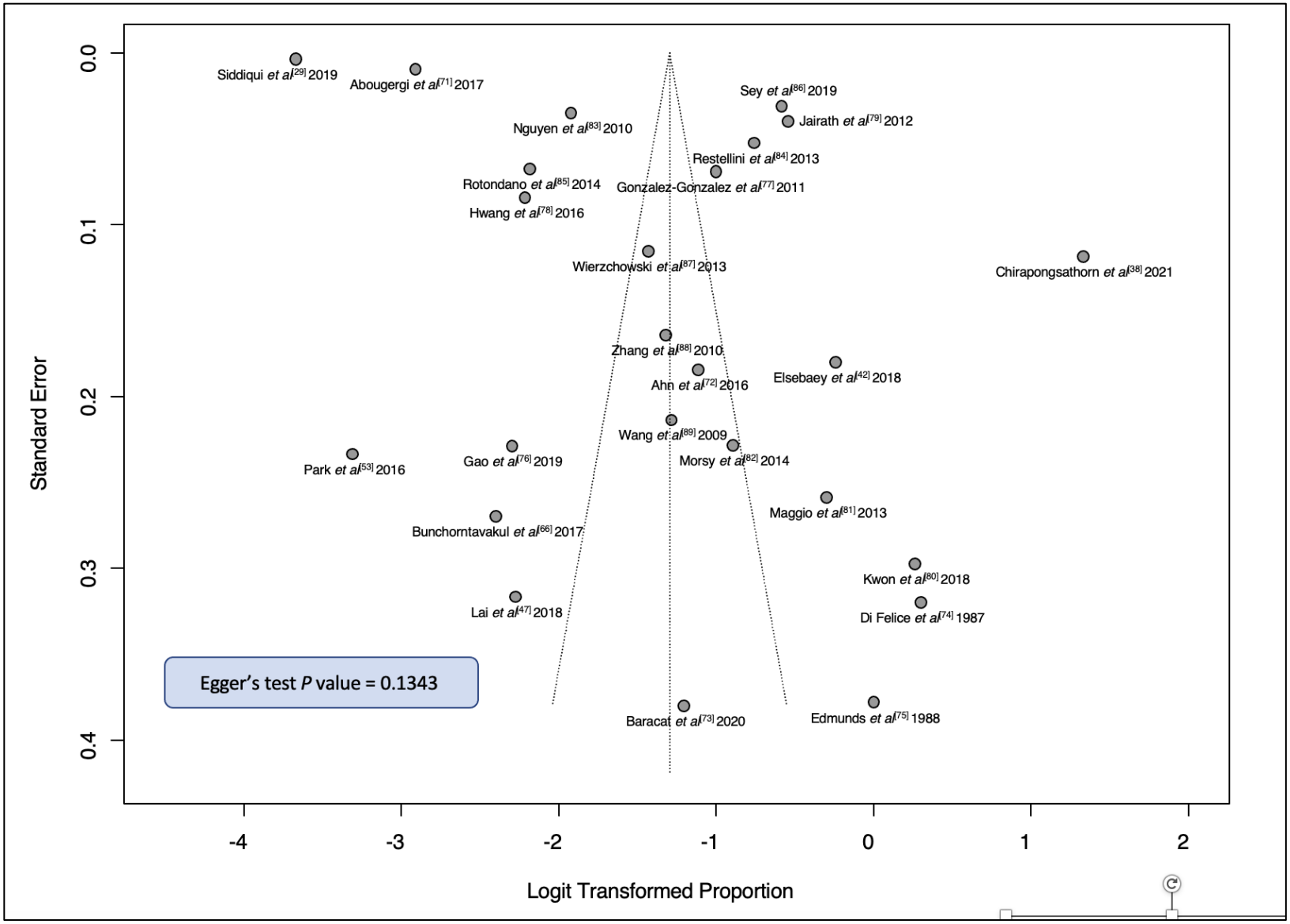
Supplementary Figure 4 Funnel plot for general gastrointestinal bleeding



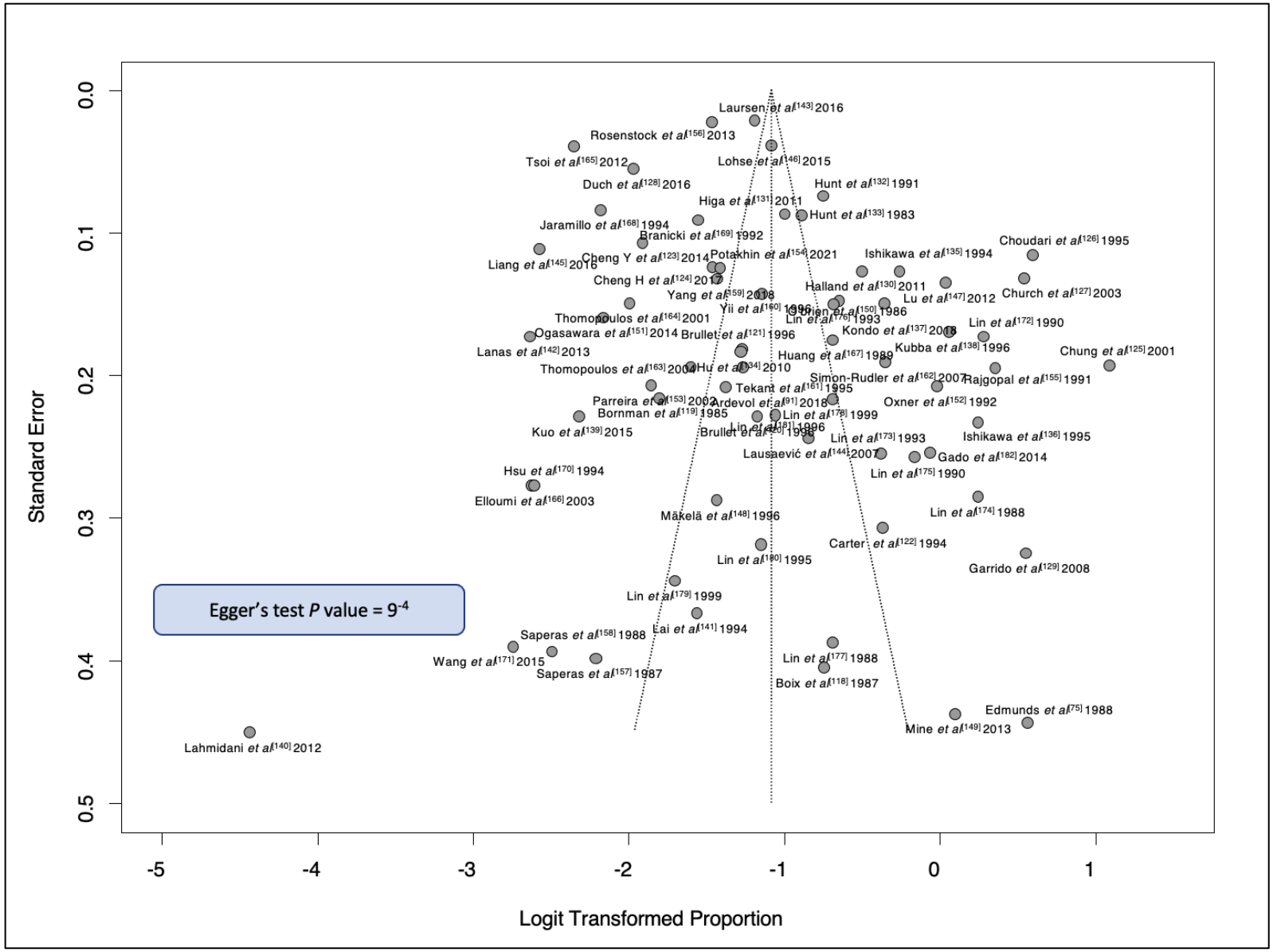
Supplementary Figure 5 Funnel plot for upper gastrointestinal bleeding



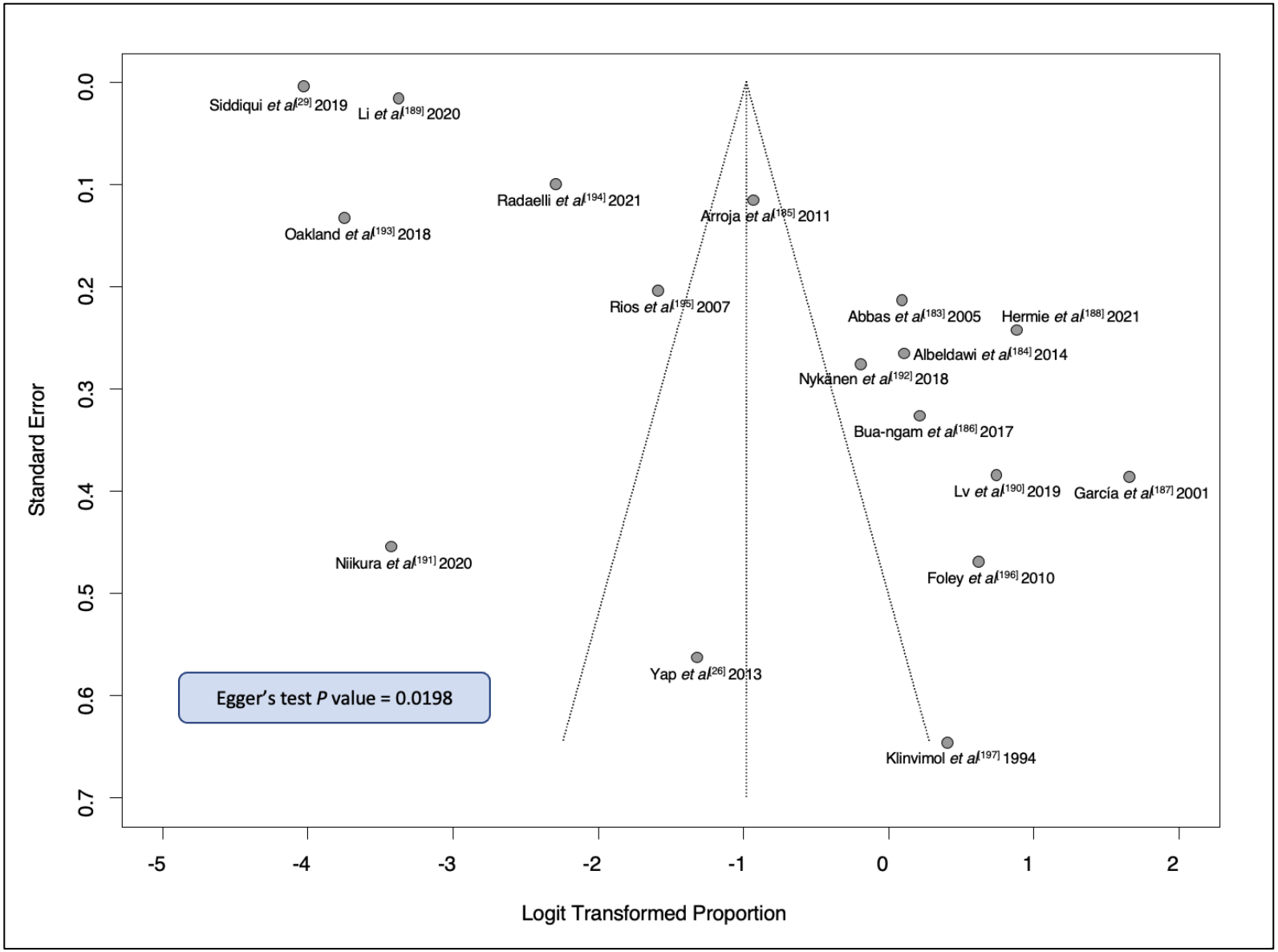
Supplementary Figure 6 Funnel plot for variceal upper gastrointestinal bleeding



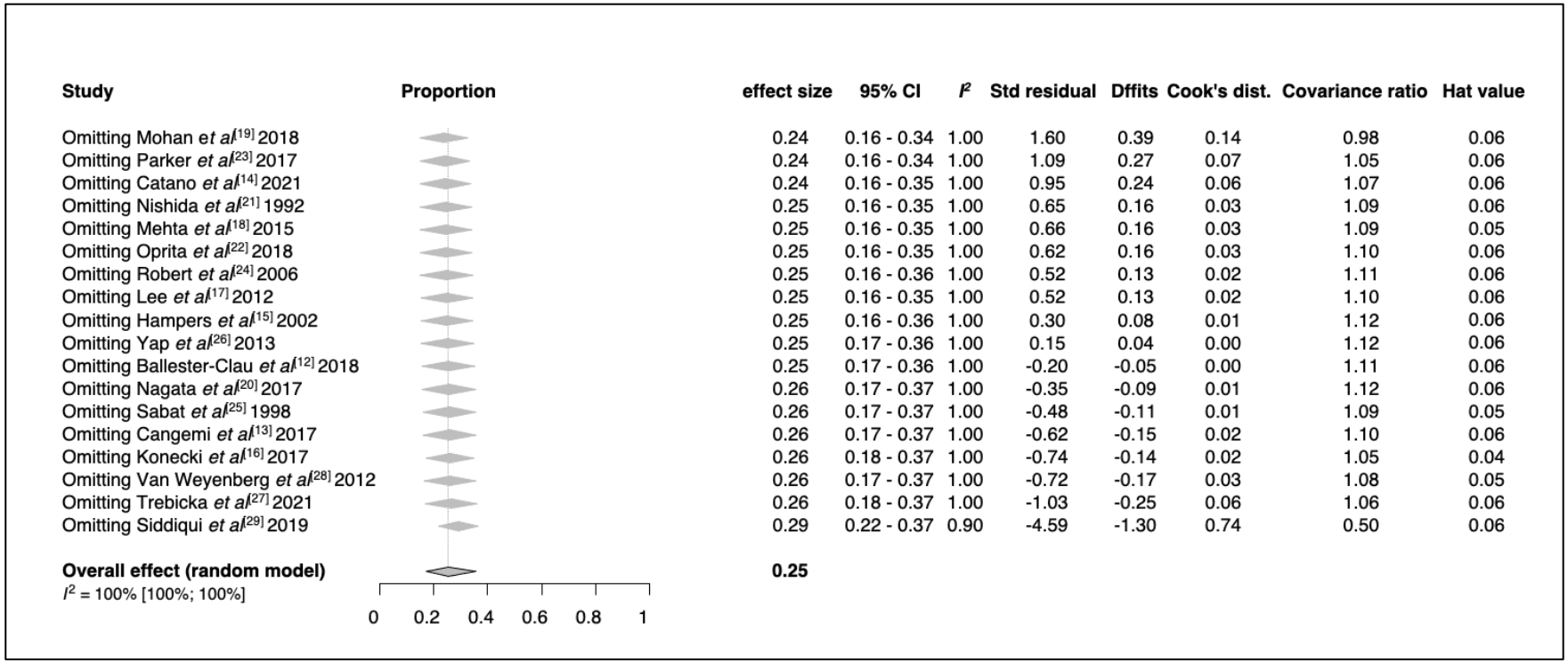
Supplementary Figure 7 Funnel plot for non-variceal upper gastrointestinal bleeding



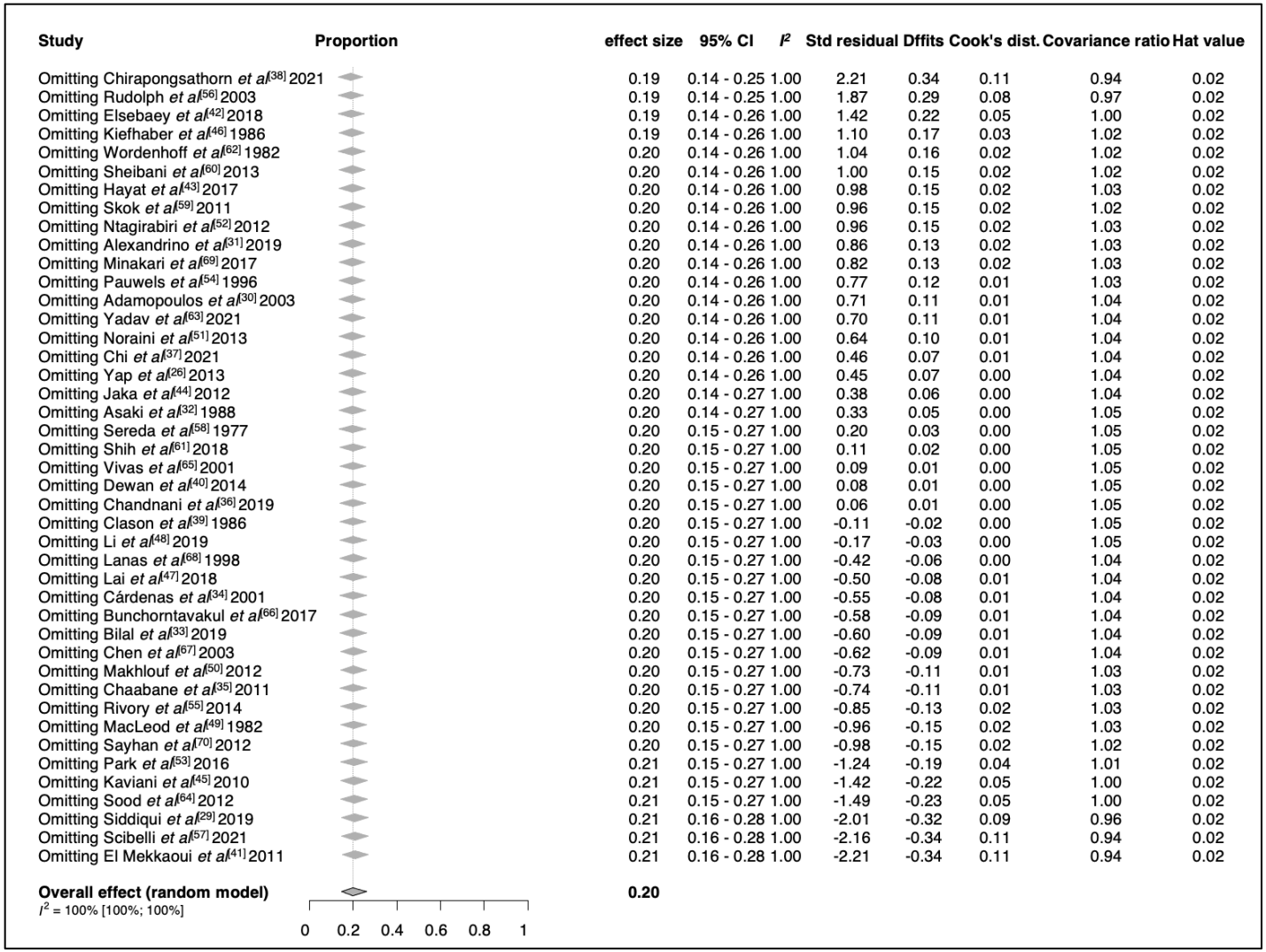
Supplementary Figure 8 Funnel plot for peptic ulcer bleeding



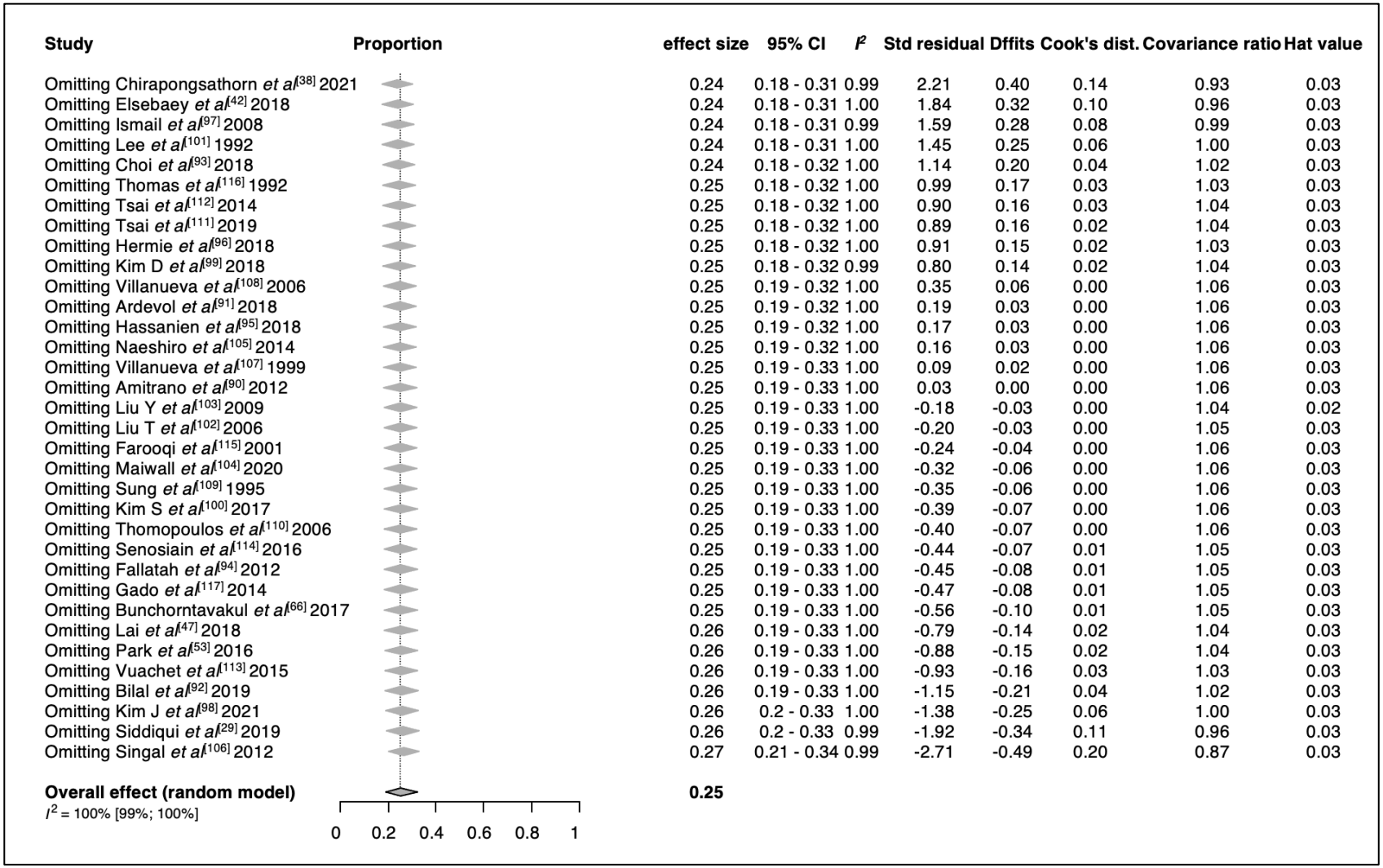
Supplementary Figure 9 Funnel plot for lower gastrointestinal bleeding



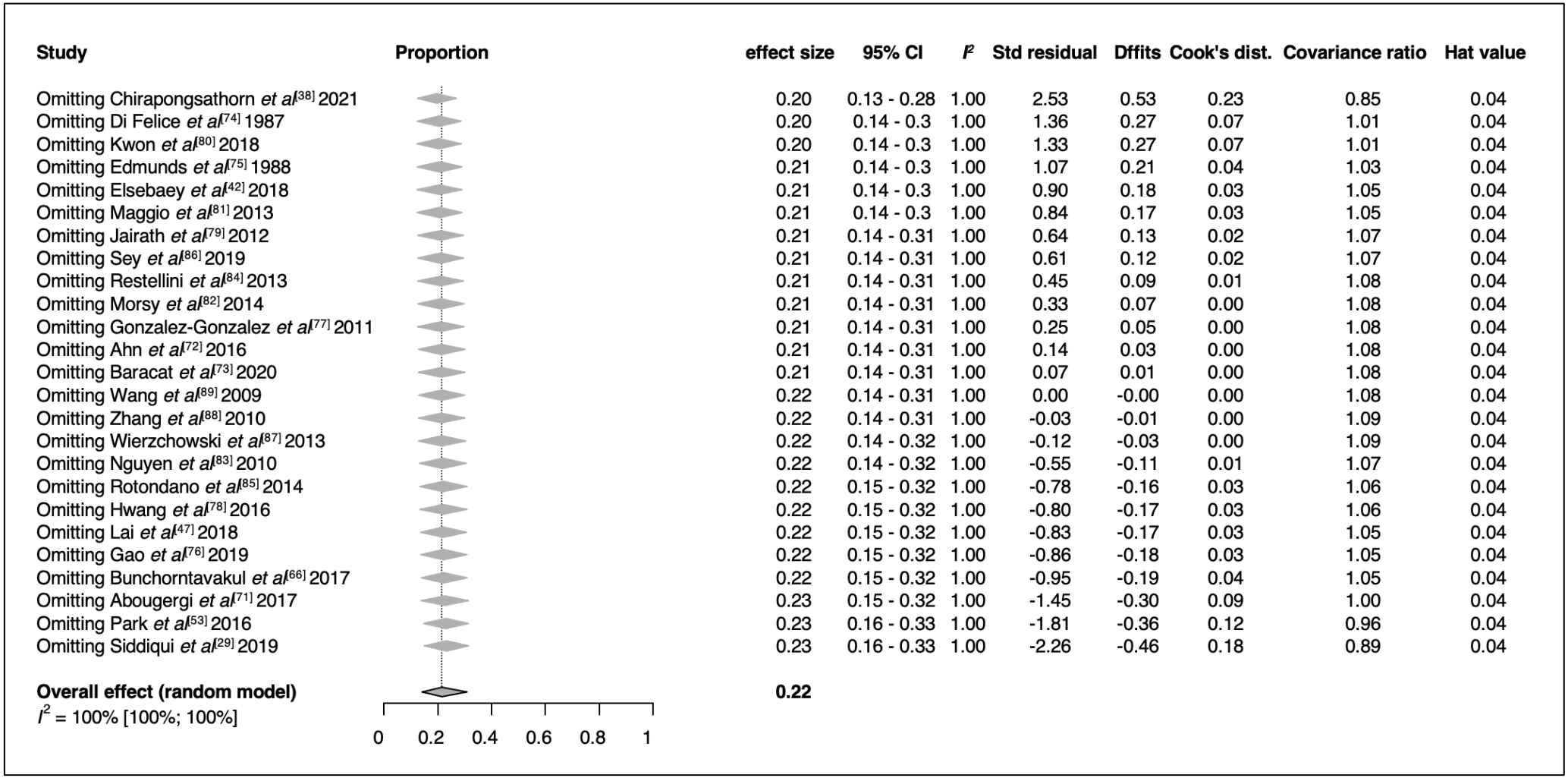
Supplementary Figure 10 Leave-one-out influential analysis for general gastrointestinal bleeding. CI: Confidence interval



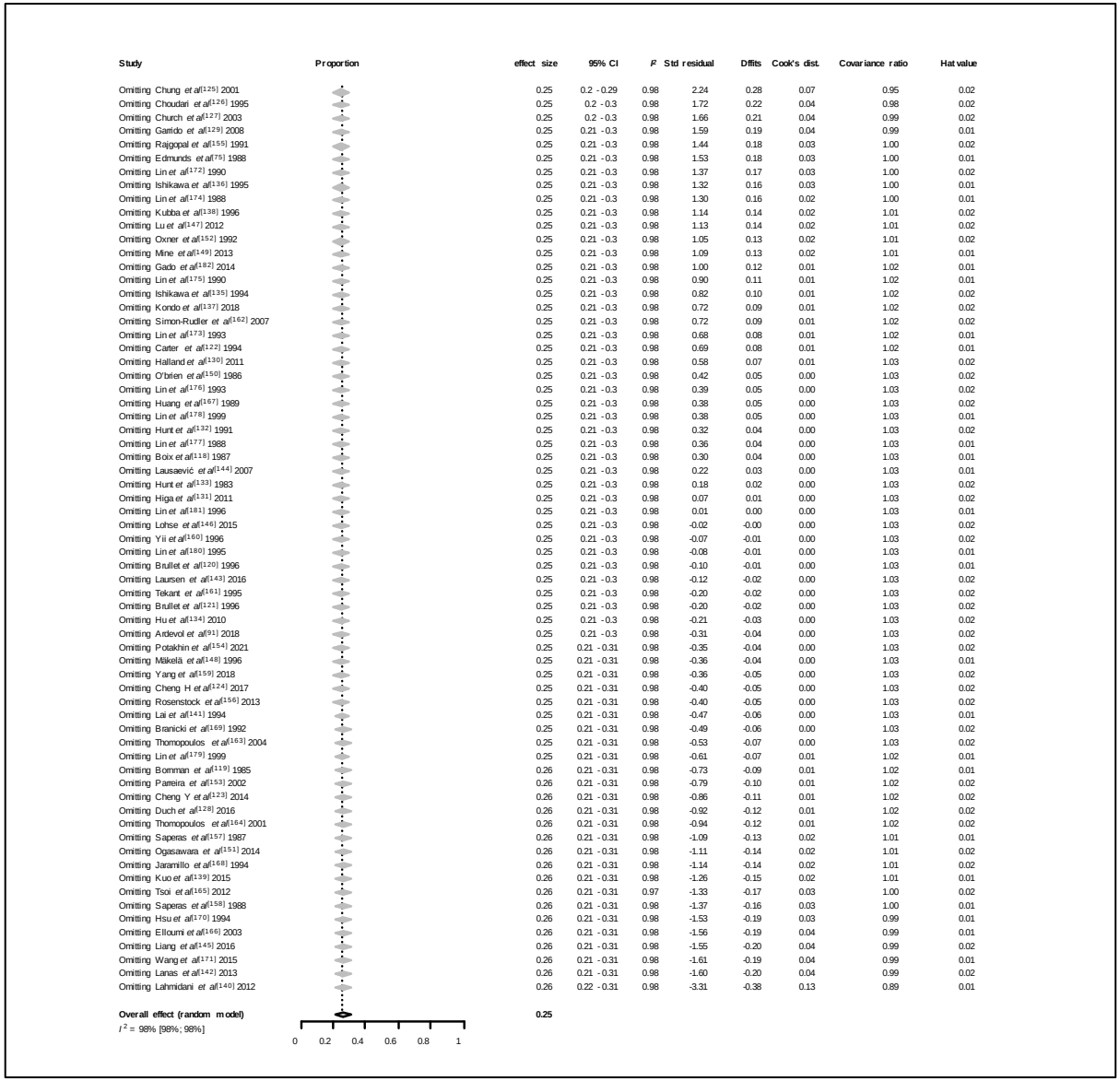
Supplementary Figure 11 Leave-one-out influential analysis for upper gastrointestinal bleeding. CI: Confidence interval



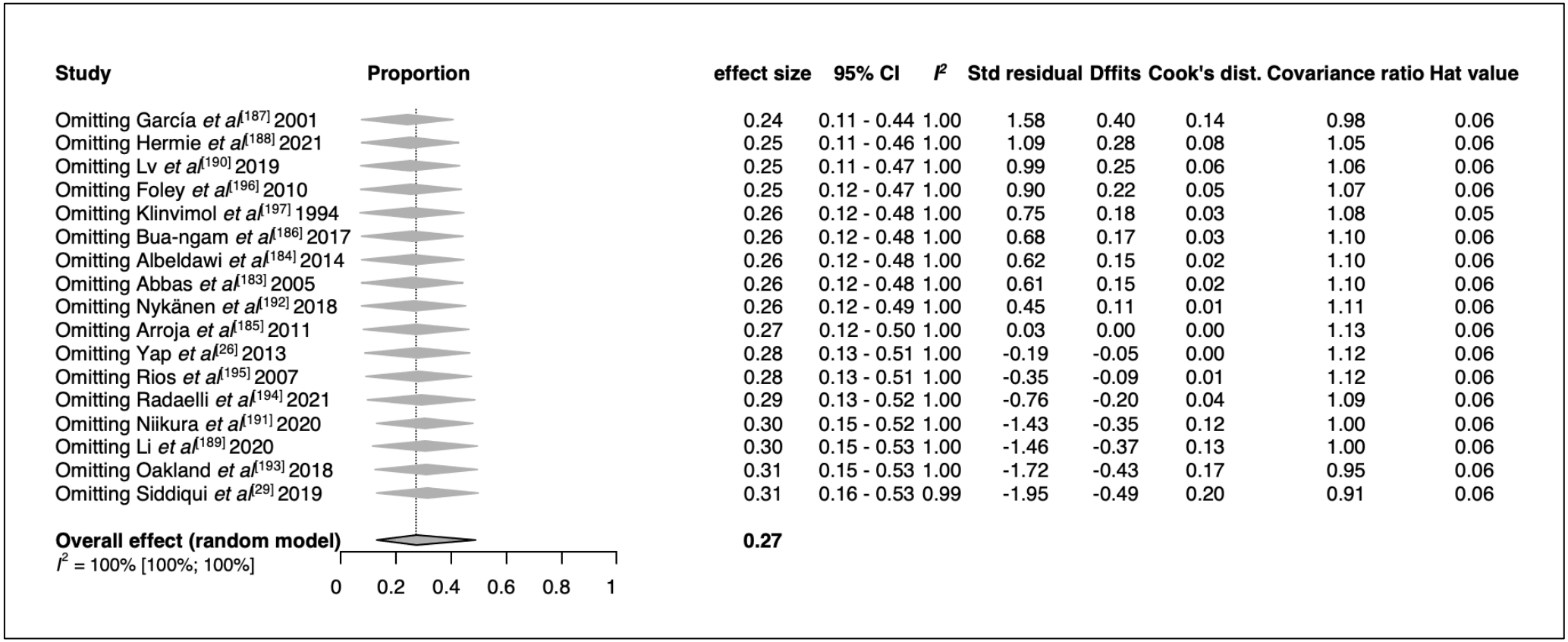
Supplementary Figure 12 Leave-one-out influential analysis for variceal upper gastrointestinal bleeding. CI: Confidence interval



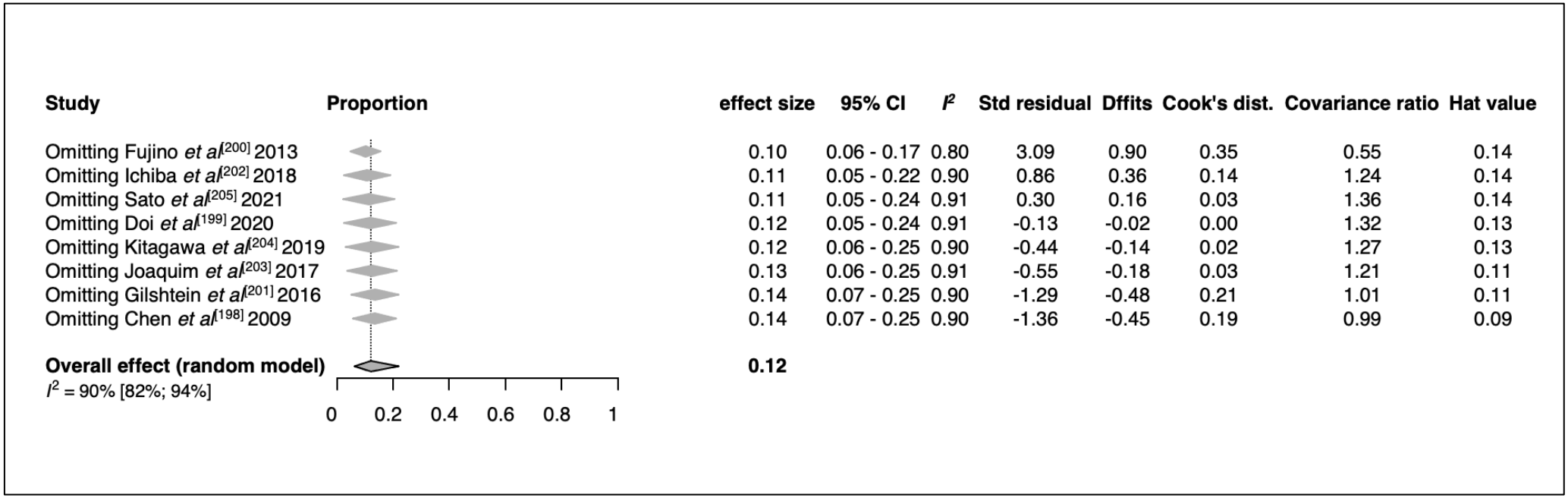
Supplementary Figure 13 Leave-one-out influential analysis for non-variceal upper gastrointestinal bleeding. CI: Confidence interval



Supplementary Figure 14 Leave-one-out influential analysis for peptic ulcer bleeding. CI: Confidence interval



Supplementary Figure 15 Leave-one-out influential analysis for lower gastrointestinal bleeding. CI: Confidence interval



Supplementary Figure 16 Leave-one-out influential analysis for colonic diverticular bleeding. CI: Confidence interval

Supplementary Table 1 Literature search

Database	Search key
Embase	('gastrointestinal haemorrhage' OR 'gastrointestinal hemorrhage' OR 'gastrointestinal bleed*' OR 'GI bleed*' OR GIB OR UGIB OR LGIB OR ((nonvariceal OR 'non variceal' OR variceal OR varix OR ulcer) AND bleeding)) AND ((shock) OR ((hemodynamic* OR haemodynamic*) AND (instability OR unstable OR compromised))
PubMed	(gastrointestinal haemorrhage OR gastrointestinal hemorrhage OR gastrointestinal bleed* OR GI bleed* OR GIB OR UGIB OR LGIB OR ((nonvariceal OR non variceal OR variceal OR varix OR ulcer) AND bleeding)) AND ((shock) OR ((hemodynamic* OR haemodynamic*) AND (instability OR unstable OR compromised)))
CENTRAL	(gastrointestinal haemorrhage OR gastrointestinal hemorrhage OR gastrointestinal bleed* OR GI bleed* OR GIB OR UGIB OR LGIB OR ((nonvariceal OR non variceal OR variceal OR varix OR ulcer) AND bleeding)) AND ((shock) OR ((hemodynamic* OR haemodynamic*) AND (instability OR unstable OR compromised)))

Supplementary Table 2 Studies removed after full text selection

First Author	Year	Reason for exclusion	Title
Abid *et al.*	2015	Condition is not reported	Value of Adjusted Blood Requirement Index in determining failure to control bleed in patients with variceal bleeding
Afessa *et al.*	2000	Condition is not reported	Upper gastrointestinal bleeding in patients with hepatic cirrhosis: clinical course and mortality prediction
Afshar et al.	2018	Ineligible study design	The role of early colonoscopy in patients presenting with acute lower gastrointestinal bleeding: a systematic review and meta-analysis
Ai *et al.*	2020	Ineligible study design	Loop combined endoscopic clip and cyanoacrylate injection to treat severe gastric varices with spleno-renal shunt
Aisenberg *et al.*	2018	Condition is not reported	Gastrointestinal Bleeding With Edoxaban Versus Warfarin: results From the ENGAGE AF-TIMI 48 Trial (Effective Anticoagulation With Factor Xa Next Generation in Atrial Fibrillation-Thrombolysis In Myocardial Infarction)
Albeiruti *et al.*	2019	Not the targeted population	Incidence, Predictors, and Outcomes of Gastrointestinal Bleeding in Patients Admitted With ST-Elevation Myocardial Infarction
Albrecht *et al.*	2016	Condition is not reported	Double-balloon enteroscopy-detected lipid islets in the small bowel are strong predictors of cardiovascular disease when associated with angiectasia and bleeding
Alkhamis *et al.*	2021	Condition is not reported	Prevalence, predictors and outcomes of bleeding events in patients with COVID-19 infection on anticoagulation: Retrospective cohort study
Allescher *et al.*	2010	Condition is not reported	Prophylactic Endotracheal Intubation for Emergency Endoscopy in Critically Ill Patients?
Allison *et al.*	1983	Ineligible study design	The role of injection sclerotherapy in the emergency and definitive management of bleeding esophageal varices
Almeida *et al.*	2009	Condition is not reported	Urgent capsule endoscopy is useful in severe obscure-overt gastrointestinal bleeding: Original article
Almela *et al.*	2004	Condition is not reported	A risk score system for identification of patients with upper-GI bleeding suitable for outpatient management
Alsamman *et al.*	2019	Condition is not reported	Critical Care Utilization in Patients with Diabetic Ketoacidosis, Stroke, and Gastrointestinal Bleed: Two Hospitals Experience
Alzoubaidi *et al.*	2020	Condition is not reported	Outcomes from an international multicenter registry of patients with acute gastrointestinal bleeding undergoing endoscopic treatment with Hemospray
Amorim *et al.*	2012	Not the targeted population	In-hospital nonvariceal upper gastrointestinal bleeding following cardiac surgery: Patient characteristics, endoscopic lesions and prognosis
Arabi *et al.*	2004	Condition is not reported	Outcome predictors of cirrhosis patients admitted to the intensive care unit
Arabi *et al.*	2010	Condition is not reported	Low-dose hydrocortisone in patients with cirrhosis and septic shock: a randomized controlled trial

Archontakis *et al.*	2019	Ineligible study design	Combination of low-dose glucocorticosteroids and mineralocorticoids as adjunct therapy for adult patients with septic shock: A systematic review and meta-analysis of randomized trials and observational studies
Arr *et al.*	2014	Ineligible study design	The treatment of haematemesis and upper gastrointestinal bleeding in United Kingdom Armed Forces and other deployed units
Avgerinos *et al.*	1997	Condition is not reported	Early administration of somatostatin and efficacy of sclerotherapy in acute oesophageal variceal bleeds: the European Acute Bleeding Oesophageal Variceal Episodes (ABOVE) randomised trial
Baares *et al.*	2002	Ineligible study design	Endoscopic treatment versus endoscopic plus pharmacologic treatment for acute variceal bleeding: A meta-analysis
Barletta *et al.*	2014	Condition is not reported	Histamine-2-Receptor Antagonist Administration and Gastrointestinal Bleeding When Used for Stress Ulcer Prophylaxis in Patients With Severe Sepsis or Septic Shock
Becattini *et al.*	2017	Condition is not reported	Major bleeding with vitamin K antagonists or direct oral anticoagulants in real-life
Benhaddouch *et al.*	2007	Condition is not reported	Mortality and prognostic factors of the cirrhotic patients with hepatic encephalopathy admitted to medical intensive care unit
Berns *et al.*	1998	Condition is not reported	Blood usage in rotor-wing transport
Bettinger *et al.*	2015	Condition is not reported	Efficacy and safety of transjugular intrahepatic portosystemic shunt (TIPSS) in 40 patients with hepatocellular carcinoma
Bhattarai *et al.*	2020	Condition is not reported	Complications and Mortality in Hospitalised Patients With Decompensated Cirrhosis of Liver in a Tertiary Care Centre in Nepal
Blair *et al.*	1986	Condition is not reported	Effect of early blood transfusion on gastrointestinal haemorrhage
Bo Lu *et al.*	2015	Condition is not reported	The Use of Limited Fluid Resuscitation and Blood Pressure-Controlling Drugs in the Treatment of Acute Upper Gastrointestinal Hemorrhage Concomitant with Hemorrhagic Shock
Bouget *et al.*	2015	Condition is not reported	Emergency admissions for major haemorrhage associated with antithrombotics: A cohort study
Buddam *et al.*	2021	Condition is not reported	Over-the-scope clip as first-line therapy for ulcers with high-risk bleeding stigmata is efficient compared to standard endoscopic therapy
Bumaschny *et al.*	1988	Condition is not reported	Postoperative acute gastrointestinal tract hemorrhage and multiple-organ failure
Bunt *et al.*	1985	Not the targeted population	Urgent relaparotomy: the high-risk, no-choice operation
Camus *et al.*	2014	Not the targeted population	Epistaxis in end stage liver disease masquerading as severe upper gastrointestinal hemorrhage
Carlin *et al.*	2017	Condition is not reported	Dual antiplatelet therapy and the severity risk of lower intestinal bleeding
Castera *et al.*	1996	Not the targeted population	[Prognostic indicators in patients with liver cirrhosis admitted to an intensive care unit]
Chan *et al.*	2013	Not the targeted population	Can Emergency Medicine Ward shorten hospital length of stay in patients with nasogastric tube related coffee ground aspirate?
Chen *et al.*	2011	Not the targeted population	MELD score can predict early mortality in patients with rebleeding after band ligation for variceal bleeding

Chen *et al.*	2019	Not the targeted population	Massive transfusion in upper gastrointestinal bleeding: a new scoring system
Chen *et al.*	2019	Condition is not reported	A randomized controlled trial of endoscopic ultrasound guided selective variceal devascularization versus standard endoscopic variceal obturation for secondary prophylaxis of gastroesophageal variceal bleeding in a tertiary teaching hospital
Chiu *et al.*	2009	Condition is not reported	Predicting Mortality in Patients With Bleeding Peptic Ulcers After Therapeutic Endoscopy
Choudhury *et al.*	2018	Condition is not reported	Safety and efficacy of bolus versus continuous infusion of terlipressin in acute variceal bleed in patients with cirrhosis "a Randomized trial
Chung *et al.*	1996	Condition is not reported	Epinephrine or epinephrine plus alcohol for injection of bleeding ulcers: a prospective randomized trial
Church *et al.*	2001	Condition is not reported	Relevance of the Rockall score in patients undergoing endoscopic therapy for peptic ulcer haemorrhage
Cook *et al.*	1994	Condition is not reported	Risk factors for gastrointestinal bleeding in critically ill patients. Canadian Critical Care Trials Group
Cook *et al.*	2001	Condition is not reported	The attributable mortality and length of intensive care unit stay of clinically important gastrointestinal bleeding in critically ill patients
Costa *et al.*	2016	Condition is not reported	Antiplatelet agents and/or anticoagulants are not associated with worse outcome following nonvariceal upper gastrointestinal bleeding
Cremone *et al.*	2017	Condition is not reported	Patients' comorbidities reduce the clinical value of emergency colonoscopy: results of a retrospective cohort study
Custovic *et al.*	2020	Condition is not reported	Comparison of Glasgow-Blatchford Score and Rockall Score in Patients with Upper Gastrointestinal Bleeding
Czymek *et al.*	2009	Condition is not reported	Factors predicting the postoperative outcome of lower gastrointestinal hemorrhage
Danne *et al.*	1984	Condition is not reported	Haematemesis and melaena at St. Vincent's Hospital, Melbourne
Defreyne *et al.*	2001	Condition is not reported	Embolization as a first approach with endoscopically unmanageable acute nonvariceal gastrointestinal hemorrhage
Defreyne *et al.*	2003	Not the targeted population	Outcome of acute nonvariceal gastrointestinal haemorrhage after nontherapeutic arteriography compared with embolization
Diakité *et al.*	2016	Condition is not reported	Epidemiological and prognostic factors involved in upper gastrointestinal bleeding in Côte d'Ivoire: results of a prospective observational multicenter study
Dinesen *et al.*	2012	Ineligible study design	Managing acute upper gastrointestinal bleeding in the acute assessment unit
Duan *et al.*	2014	Condition is not reported	Comparison of percutaneous transhepatic variceal embolization (ptve) followed by partial splenic embolization versus ptve alone for the treatment of acute esophagogastric variceal massive hemorrhage
Ebell *et al.*	2004	Ineligible study design	Prognosis in patients with upper GI bleeding

Edelson *et al.*	2020	Not the targeted population	Improving haemodynamics in acute gastrointestinal bleeding: Ketamine for endoscopic sedation in active gastrointestinal bleeding in critically Ill patients
El-Gammal *et al.*	2021	Condition is not reported	Role of lactate clearance in assessment of presence of active bleeding in patients admitted with acute upper gastrointestinal bleeding
Eliana Saffouri *et al.*	2020	Condition is not reported	The Shock Index is not accurate at predicting outcomes in patients with upper gastrointestinal bleeding
Elliot B. Tapper *et al.*	2018	Condition is not reported	A Multicenter Evaluation of Adherence to 4 Major Elements of the Baveno Guidelines and Outcomes for Patients with Acute Variceal Hemorrhage
Enrique Rodríguez de Santiago *et al.*	2019	Condition is not reported	Hemostatic spray powder TC-325 for GI bleeding in a nationwide study: survival and predictors of failure via competing risks analysis
Escorsell *et al.*	2016	Condition is not reported	Esophageal balloon tamponade versus esophageal stent in controlling acute refractory variceal bleeding: a multicenter randomized, controlled trial
Fahrlaender *et al.*	1976	Ineligible study design	Stress ulcer; clinical symptoms, diagnosis and treatment
Faulk *et al.*	2010	Condition is not reported	Critical Gastrointestinal Bleeding at an Inpatient Rehabilitation Center: Incidence, Risk Factors, and the Role of Gastrointestinal Prophylaxis
Feingold *et al.*	2005	Ineligible study design	Does hemodynamic instability predict positive technetium-labeled red blood cell scintigraphy in patients with acute lower gastrointestinal bleeding? A review of 50 patients
Felix *et al.*	1978	Ineligible study design	Perforated peptic ulcer
Felix I. Tellez-Avila *et al.*	2010	Condition is not reported	Utility of a simplified predictive model to predict rebleeding in patients with high-risk stigmata ulcers
Ferman *et al.*	2019	Condition is not reported	Early endoscopic intervention in acute gastrointestinal bleeding may reduce the need for blood transfusion
Fernández *et al.*	2020	Condition is not reported	Recurrent small-bowel bleeding from a Dieulafoy's lesion after combined endoscopic treatment
Fonseca *et al.*	2012	Condition is not reported	Nonvariceal upper gastrointestinal bleeding in Portugal: A multicentric retrospective study in twelve Portuguese hospitals
Fox *et al.*	1993	Ineligible study design	Management of acute bleeding gastric malignancy
Frodsham *et al.*	2009	Condition is not reported	Initial Experience using N-butyl Cyanoacrylate for Embolization of Lower Gastrointestinal Hemorrhage
Fuke *et al.*	1998	Condition is not reported	Endoscopic hemostasis in patients with Dieulafoy ulcer
García-Iglesias *et al.*	2011	Ineligible study design	Meta-analysis: Predictors of rebleeding after endoscopic treatment for bleeding peptic ulcer
García-Mónaco *et al.*	2011	Not the targeted population	Superselective embolization in thetreatment of massive gastrointestinal bleeding
Garlapati *et al.*	2021	Condition is not reported	End-stage renal disease and lower gastrointestinal bleeding-A propensity-matched analysis of nationwide inpatient sample

Głowacki *et al.*	2009	Condition is not reported	Evaluation of the efficiency of treatment of the patients showing the symptoms of bleeding from the upper gastrointestinal tract, hospitalized at the General Surgery Ward of the Provincial Specialistic Hospital in Siedlce
Gölder *et al.*	2019	Condition is not reported	Over-the-scope clip in peptic ulcer bleeding: Clinical success in primary and secondary treatment and factors associated with treatment failure
Goto *et al.*	2002	Not the targeted population	Prospective evaluation of hemoclip application with injection of epinephrine in hypertonic saline solution for hemostasis in unstable patients with shock caused by upper GI bleeding
Guillaume *et al.*	2018	Not the targeted population	Bleeding risk of variceal band ligation in extrahepatic portal vein obstruction is not increased by oral anticoagulation
Gustavo Oliveira Luz *et al.*	2011	Condition is not reported	Comparison between endoscopic sclerotherapy and band ligation for hemostasis of acute variceal bleeding
He *et al.*	2019	Condition is not reported	The prediction value of scoring systems in Mallory-Weiss syndrome patients
Heining-Kruz *et al.*	2015	Condition is not reported	Transcatheter arterial embolisation in upper gastrointestinal bleeding in a sample of 29 patients in a gastrointestinal referral center in Germany
Henriksson *et al.*	1991	Condition is not reported	Upper gastrointestinal bleeding. With special reference to blood transfusion
Henry *et al.*	1989	Ineligible study design	Effects of fibrinolytic inhibitors on mortality from upper gastrointestinal haemorrhage
Horibe *et al.*	2020	Not the targeted population	Horibe GI bleeding prediction score: a simple score for triage decision-making in patients with suspected upper GI bleeding
Horibe *et al.*	2016	Condition is not reported	A simple scoring system to assess the need for an endoscopic intervention in suspected upper gastrointestinal bleeding: A prospective cohort study
Horibe *et al.*	2018	Condition is not reported	Absence of high-risk stigmata predicts good prognosis even in severely anemic patients with suspected acute upper gastrointestinal bleeding
Hreinsson *et al.*	2016	Condition is not reported	The association of drugs with severity and specific causes of acute lower gastrointestinal bleeding: A prospective study
Huang *et al.*	2014	Not the targeted population	Transcatheter arterial embolization with n-butyl cyanoacrylate for nonvariceal upper gastrointestinal bleeding in hemodynamically unstable patients: Results and predictors of clinical outcomes
Hussein *et al.*	2020	Not the targeted population	Outcomes of Hemospray therapy in the treatment of intraprocedural upper gastrointestinal bleeding post-endoscopic therapy
Hussein *et al.*	2015	Condition is not reported	The value of U/S to determine priority for upper gastrointestinal endoscopy in emergency room
Ichita *et al.*	2021	Not the targeted population	Clinical and endoscopic features of aorto-duodenal fistula resulting in its definitive diagnosis: an observational study
Ienghong *et al.*	2020	Ineligible study design	Factors associated with transfusion of uncross-matched type-O packed red cells for acute upper gastrointestinal hemorrhage

Irct201306105330N *et al.*	2014	Not the targeted population	TOPICAL TRANEXAMIC ACID FOR GASTRIC ULCER
Iser *et al.*	2008	Condition is not reported	Prospective study of cardiac troponin I release in patients with upper gastrointestinal bleeding
Isrctn *et al.*	2008	Ineligible study design	The dissemination of consensus recommendations on the management of Canadian patients with non-variceal upper gastrointestinal bleeding
Jayaraman *et al.*	2021	Condition is not reported	Outcomes of Laparoscopic vs Open Repair of Perforated Peptic Ulcers: An ACS-NSQIP Study
Jean-Baptiste *et al.*	2018	Not the targeted population	Clinical impact of upper gastrointestinal endoscopy in critically ill patients with suspected bleeding
Jiménez-Rosales *et al.*	2018	Condition is not reported	Inhospital and delayed mortality after upper gastrointestinal bleeding: an analysis of risk factors in a prospective series
John *et al.*	2011	Condition is not reported	Antiplatelet agents do not impact the hospital course in patients with gastrointestinal bleeding
Jprn *et al.*	2017	Ineligible study design	Validity of conservative treatment without urgent endoscopy for colonic diverticular hemorrhage
Jung *et al.*	2019	Not the targeted population	Comparison of risk scores and shock index in hemodynamically stable patients presenting to the emergency department with nonvariceal upper gastrointestinal bleeding
Jung *et al.*	2021	Not the targeted population	Minimal and Maximal Extent of Band Ligation for Acute Variceal Bleeding during the First Endoscopic Session
Kamada *et al.*	1996	Ineligible study design	An Early Phase II Study of Lansoprazole (AG-1749) Injection on Upper Gastrointestinal Bleeding: a Randomized Pilot Study on Clinical Dosages
Kaminskis *et al.*	2017	Condition is not reported	Preventive transarterial embolization in upper nonvariceal gastrointestinal bleeding
Karim *et al.*	2016	Not the targeted population	Assessment of safety of performing percutaneous coronary intervention after a recent episode of gastrointestinal bleeding
Kherad *et al.*	2019	Condition is not reported	Outcomes following restrictive or liberal red blood cell transfusion in patients with lower gastrointestinal bleeding
Kikkert *et al.*	2015	Not the targeted population	Predictors and prognostic consequence of gastrointestinal bleeding in patients with ST-segment elevation myocardial infarction
Kind *et al.*	2000	Condition is not reported	Bucrylate treatment of bleeding gastric varices: 12 years' experience
Kitamoto *et al.*	2002	Ineligible study design	Balloon-occluded retrograde transvenous obliteration of gastric fundal varices with hemorrhage
Kılıç *et al.*	2011	Ineligible study design	Resuscitation and monitoring in gastrointestinal bleeding
Kocaoğlu *et al.*	2021	Condition is not reported	Use of age shock index in determining severity of illness in patients presenting to the emergency department with gastrointestinal bleeding
Koch *et al.*	2013	Condition is not reported	Bleeding origin, patient-related risk factors, and prognostic indicators in patients with acute gastrointestinal hemorrhages requiring intensive care treatment: A retrospective analysis from 1999 to 2010

Kong *et al.*	2017	Condition is not reported	Usefulness of the delta neutrophil index to predict 30-day mortality in patients with upper gastrointestinal bleeding
Kubota *et al.*	2021	Not the targeted population	Factors for unsuccessful endoscopic hemostasis in patients with severe peptic ulcer bleeding
Labenz *et al.*	1992	Condition is not reported	Bleeding gastric and duodenal varices: Endoscopic embolisation by sclerotherapy (tissue glue)
Lai *et al.*	2000	Condition is not reported	Endoscopic hemoclip treatment for bleeding peptic ulcer
Lai *et al.*	2020	Condition is not reported	Risk Factors for Rebleeding after Emergency Endoscopic Treatment of Dieulafoy Lesion
Laine *et al.*	2020	Condition is not reported	Timing of endoscopy in patients hospitalized with upper gastrointestinal bleeding
Lakatos *et al.*	2021	Condition is not reported	Incidence, Predictive Factors, Clinical Characteristics and Outcome of Non-variceal Upper Gastrointestinal Bleeding - A Prospective Population-based Study from Hungary
Langner *et al.*	2008	Condition is not reported	Acute upper gastrointestinal hemorrhage: Is a radiological interventional approach an alternative to emergency surgery?
Lau *et al.*	2019	Condition is not reported	Prophylactic angiographic embolisation afterendoscopic control of bleeding to high-risk peptic ulcers: a randomised controlled trial
Laursen el at.	2014	Condition is not reported	Transcatheter arterial embolization is the first-line therapy of choice in peptic ulcer bleeding not responding to endoscopic therapy
Lecleire *et al.*	2012	Condition is not reported	Yield and impact of emergency capsule enteroscopy in severe obscure-overt gastrointestinal bleeding
Lee *et al.*	2014	Condition is not reported	Frequency, CT findings, and fate of multiple infarcted regenerative nodules in liver cirrhosis after variceal bleeding or septic shock
Lee *et al.*	2015	Condition is not reported	Frequency, CT findings, and fate of multiple infarcted regenerative nodules in liver cirrhosis after variceal bleeding or septic shock
Lee *et al.*	2013	Condition is not reported	Chronic kidney disease, hemodynamic instability, and endoscopic high-risk appearance are associated with 30-day rebleeding in patients with non-variceal upper gastrointestinal bleeding
Lee *et al.*	2016	Condition is not reported	Predictive factors of mortality within 30 days in patients with nonvariceal upper gastrointestinal bleeding
Lenjani *et al.*	2012	Ineligible study design	Monitoring and treatment of acute gastrointestinal bleeding
Li *et al.*	2017	Ineligible study design	Left Ventricular Assist Devices Impact Hospital Resource Utilization Without Affecting Patient Mortality in Gastrointestinal Bleeding
Lim *et al.*	2009	Condition is not reported	Endoscopic Treatment of Dieulafoy Lesions and Risk Factors for Rebleeding
Lin *et al.*	1988	Not the targeted population	Heater probe in massive peptic ulcer hemorrhage and shock
Lin *et al.*	2006	Condition is not reported	The Utility of Upper Endoscopy in Patients with Concomitant Upper Gastrointestinal Bleeding and Acute Myocardial Infarction
Ljungdahl *et al.*	2002	Not the targeted population	Arterial Embolisation in Management of Massive Bleeding from Gastric and Duodenal Ulcers

Loffroy *et al.*	2009	Not the targeted population	Arterial Embolotherapy for Endoscopically Unmanageable Acute Gastroduodenal Hemorrhage: Predictors of Early Rebleeding
Loffroy *et al.*	2009	Not the targeted population	Short- and long-term results of transcatheter embolization for massive arterial hemorrhage from gastroduodenal ulcers not controlled by endoscopic hemostasis
Loffroy *et al.*	2008	Not the targeted population	Refractory bleeding from gastroduodenal ulcers: Arterial embolization in high-operative-risk patients
Lou *et al.*	2018	Not the targeted population	Prevention of upper gastrointestinal bleeding in critically ill Chinese patients: a randomized, double-blind study evaluating esomeprazole and cimetidine
Louw *et al.*	2007	Condition is not reported	Reliability of HemoCue in patients with gastrointestinal bleeding
Luo *et al.*	2018	Condition is not reported	Short-Term Outcome of Patients with Cirrhosis and Concurrent Portal Cavernoma Presenting with Acute Variceal Bleeding
Maher *et al.*	2020	Condition is not reported	Determinants of empiric transfusion in gastrointestinal bleeding in the emergency department
Maiden *et al.*	1998	Not the targeted population	Recurrent gastrointestinal bleeding: Use of thrombolysis with anticoagulation in diagnosis
Maldonado *et al.*	2013	Not the targeted population	[Risk factors associated to mortality by upper GI bleeding in patients from a public hospital. A case control study]
Manta *et al.*	2018	Condition is not reported	First-line endoscopic treatment with over-the-scope clipsin patients with either upper or lower gastrointestinal bleeding: a multicenter study
Marques *et al.*	2016	Ineligible study design	Endoscopic Band Ligation: A Safe And Effective Treatment For Active Diverticular Bleeding
Matsuda *et al.*	2020	Condition is not reported	Daily Usage of Proton Pump Inhibitors May Reduce the Severity of Critical Upper Gastrointestinal Bleeding in Elderly Patients
Mbambo *et al.*	2020	Condition is not reported	Predictors of the need for surgery in upper gastrointestinal bleeding in a resource constrained setting: the Pietermaritzburg experience
McPherson *et al.*	2017	Ineligible study design	Severe Gastrointestinal Haemorrhage: summary of a National Quality of Care Study with Focus on Radiological Services
Mejaddam *et al.*	2013	Not the targeted population	Outcomes following "Rescue" superselective angioembolization for gastrointestinal hemorrhage in hemodynamically unstable patients
Mekaroonkamol *et al.*	2013	Condition is not reported	Repeat colonoscopy's value in gastrointestinal bleeding
Miyakuni *et al.*	2020	Condition is not reported	Angiography versus colonoscopy in patients with severe lower gastrointestinal bleeding: a nation-wide observational study
Moreau *et al.*	2015	Ineligible study design	Should Patients With Cirrhosis and Variceal Hemorrhage Receive Glucocorticoid Therapy?
Mueller *et al.*	1994	Ineligible study design	Bleeding peptic ulcer: An audit of conservative management
Mungan *et al.*	2012	Ineligible study design	An observational European study on clinical outcomes associated with current management strategies for non-variceal upper gastrointestinal bleeding (ENERGIB-Turkey)

Nakasone *et al.*	2007	Condition is not reported	Shock Index Correlates with Extravasation on Angiographs of Gastrointestinal Hemorrhage: A Logistics Regression Analysis
Navaneethan *et al.*	2014	Ineligible study design	Timing of colonoscopy and outcomes in patients with lower GI bleeding: A nationwide population-based study
Nct *et al.*	2009	Ineligible study design	Different Dose of Intravenous Omeprazole to Treat Bleeding Ulcer With Adherent Clot
Nct *et al.*	2009	Ineligible study design	Effect of Tranexamic Acid in Upper Gastrointestinal Bleeding
Nct *et al.*	2014	Ineligible study design	Argon Plasma Coagulation for Bleeding Peptic Ulcers
Nct *et al.*	2016	Ineligible study design	Effect of Second-look Endoscopy on Peptic Ulcer Rebleeding in Patients With Early Resumption of Antiplatelet Agents
Nct *et al.*	2018	Ineligible study design	HVPG-guided Laparoscopic Versus Endoscopic Therapy for Variceal Rebleeding in Portal Hypertension: a Multicenter Randomized Controlled Trial (CHESS1803)
Nct *et al.*	2020	Ineligible study design	Tranexamic Acid for Acute Upper Gastrointestinal Bleed in Cirrhosis
Nct *et al.*	2021	Ineligible study design	Timing of Endoscopic Intervention for Acute Variceal Hemorrhage: an RCT
Ng Daniel *et al.*	1997	Condition is not reported	Predictive Value of Technetium Tc 99m-Labeled Red Blood Cell Scintigraphy for Positive Angiogram in Massive Lower Gastrointestinal Hemorrhage
Ng *et al.*	2019	Ineligible study design	Topical haemostatic powder as a novel endoscopic therapy for severe colonic diverticular bleeding
Nishida *et al.*	2020	Ineligible study design	Is lower GI bleeding on weekend admissions associated with worse outcomes?
Okamoto *et al.*	2021	Condition is not reported	Safety and Effectiveness of Endoscopic Band Ligation for Colonic Diverticular Bleeding in Elderly Patients
Okon *et al.*	2015	Ineligible study design	Outcomes and predictors of mortality of upper gastrointestinal bleeding in hospitals: Multicenter study in Côte-d'Ivoire
Ong *et al.*	2014	Condition is not reported	The syndrome of a large drop in hematocrit in hospitalized patients: Clinical features and gastrointestinal bleeding outcomes
Onozato *et al.*	2007	Not the targeted population	Endoscopic management of duodenal diverticular bleeding
Papatheodoridis *et al.*	2012	Ineligible study design	Greek results of the "ENERGIB" European study on non-variceal upper gastrointestinal bleeding
Park *et al.*	2020	Not the targeted population	Clinical outcomes of sedation during emergency endoscopic band ligation for variceal bleeding: Multicenter cohort study
Patel *et al.*	2016	Condition is not reported	Temporal Trends, Predictors, and Outcomes of In-Hospital Gastrointestinal Bleeding Associated With Percutaneous Coronary Intervention
Patnaik *et al.*	2014	Not the targeted population	Haemorrhage in severe acute pancreatitis: Management and outcome at a tertiary care centre
Pfeifer *et al.*	2011	Condition is not reported	Surgical management of lower gastrointestinal bleeding
Pimentel *et al.*	2000	Condition is not reported	Clinically significant gastrointestinal bleeding in critically ill patients in an era of prophylaxis

Pinto *et al.*	1983	Condition is not reported	Upper gastrointestinal bleeding in liver cirrhosis
Ponthus *et al.*	2020	Condition is not reported	Safety of variceal band ligation in patients with cirrhosis and portal vein thrombosis treated with anticoagulant therapy: A retrospective study
Poraicu *et al.*	1984	Condition is not reported	The efficiency of intragastric norepinephrine administration in gastrointestinal bleeding in 50 patients
Powerski *et al.*	2018	Condition is not reported	Transcatheter arterial embolization of acute bleeding as 24/7 service: predictors of outcome and mortality
Puymirat *et al.*	2013	Condition is not reported	Predictive factors of organ failure in patients admitted in intensive care unit for acute gastrointestinal bleeding
Rantanen *et al.*	2014	Condition is not reported	Effect of Omeprazole Dose, Nonsteroidal Anti-inflammatory Agents, and Smoking on Repair Mechanisms in Acute Peptic Ulcer Bleeding
Rassameehiran *et al.*	2017	Condition is not reported	Utility of the Shock Index for Risk Stratification in Patients with Acute Upper Gastrointestinal Bleeding
Read *et al.*	1965	Not the targeted population	Randomized Study of Massive Bleeding from Peptic Ulceration
Rockall *et al.*	1996	Condition is not reported	Selection of patients for early discharge or outpatient care after acute upper gastrointestinal haemorrhage
Rockall *et al.*	1996	Condition is not reported	Risk assessment after acute upper gastrointestinal haemorrhage
Rockall *et al.*	1995	Condition is not reported	Variation in outcome after acute upper gastrointestinal haemorrhage. The National Audit of Acute Upper Gastrointestinal Haemorrhage
Rockall *et al.*	1996	Condition is not reported	Selection of patients for early discharge or outpatient care after acute upper gastrointestinal haemorrhage. National Audit of Acute Upper Gastrointestinal Haemorrhage
Rockall *et al.*	1995	Condition is not reported	Variation in outcome after acute upper gastrointestinal haemorrhage
Rockall *et al.*	1997	Condition is not reported	Influencing the practice and outcome in acute upper gastrointestinal haemorrhage. Steering Committee of the National Audit of Acute Upper Gastrointestinal Haemorrhage
Romagnuolo *et al.*	2007	Condition is not reported	Simple Clinical Predictors May Obviate Urgent Endoscopy in Selected Patients With Nonvariceal Upper Gastrointestinal Tract Bleeding
Rosseti *et al.*	2013	Not the targeted population	Transarterial embolization in acute colonic bleeding: Review of 11 years of experience and long-term results
Roussomoustakaki *et al.*	2000	Condition is not reported	Low mortality and morbidity of upper gastrointestinal bleeding in Crete. The role of individual non steroidal anti-inflammatory drugs (NSAIDs
Sakaki *et al.*	1998	Condition is not reported	Prognostic factors in cirrhotic patients receiving long-term sclerotherapy for the first bleeding from oesophageal varices
Samoilenko *et al.*	2020	Condition is not reported	THE CAUSES OF ADVERSE TREATMENT RESULTS AND THE WAYS OF THEIR ELIMINATION IN BLEEDING FROM CHRONIC GASTRODUODENAL ULCERS

Sano *et al.*	2016	Ineligible study design	Resuscitative endovascular balloon occlusion of the aorta for uncontrollable nonvariceal upper gastrointestinal bleeding
Schlag *et al.*	2015	Not the targeted population	Emergency video capsule endoscopy in patients with acute severe GI bleeding and negative upper endoscopy results
Schroder *et al.*	2014	Condition is not reported	Vagotomy/drainage is superior to local oversew in patients who require emergency surgery for bleeding peptic ulcers
Sengupta *et al.*	2015	Condition is not reported	Risk Factors for Adverse Outcomes in Patients Hospitalized With Lower Gastrointestinal Bleeding
Seo *et al.*	2020	Condition is not reported	Prediction of Adverse Events in Stable Non-Variceal Gastrointestinal Bleeding Using Machine Learning
Sharma *et al.*	2008	Condition is not reported	Hemorrhage in acute pancreatitis: should gastrointestinal bleeding be considered an organ failure?
Shi *et al.*	2017	Condition is not reported	Risk factors for predicting in-hospital rebleeding following endoscopic variceal sclerotherapy
Shimamura *et al.*	2016	Condition is not reported	Endoscopic band ligation for colonic diverticular bleeding: possibility of standardization
Siau *et al.*	2019	Not the targeted population	Time to endoscopy for acute upper gastrointestinal bleeding: Results from a prospective multicentre trainee-led audit
Siddiqui *et al.*	2020	Condition is not reported	Trends and Outcomes of Gastrointestinal Bleeding Among Septic Shock Patients of the United States: A 10-Year Analysis of a Nationwide Inpatient Sample
Siddiqui *et al.*	2019	Not the targeted population	Endoscopy Is Relatively Safe in Patients with Acute Ischemic Stroke and Gastrointestinal Hemorrhage
Simon *et al.*	1984	Not the targeted population	Ranitidine versus cimetidine in preventing acute gastroduodenal bleeding: a randomized trial in 193 critically ill patients - A multicentre study in Germany
Siva *et al.*	2002	Condition is not reported	Predictive factors for failure of endoscopic management therapy in peptic ulcer bleeding
Skinner *et al.*	2014	Ineligible study design	Over-the-scope clip placement is effective rescue therapy for severe acute upper gastrointestinal bleeding
Soh *et al.*	2017	Ineligible study design	The use of super-selective mesenteric embolisation as a first-line management of acute lower gastrointestinal bleeding
Sombie *et al.*	2015	Not the targeted population	Upper gastrointestinal bleeding: epidemiological aspects and prognostic factors in Burkina Faso (Western Africa)
Soplepmann *et al.*	1997	Condition is not reported	Peptic ulcer haemorrhage in Tartu county, Estonia: Epidemiology and mortality risk factors
Sorbi *et al.*	2003	Ineligible study design	An Assessment of the Management of Acute Bleeding Varices: A Multicenter Prospective Member-Based Study
Speir *et al.*	2019	Condition is not reported	Correlation of CT Angiography and 99mTechnetium-Labeled Red Blood Cell Scintigraphy to Catheter Angiography for Lower Gastrointestinal Bleeding: A Single-Institution Experience
Stanley *et al.*	1973	Not the targeted population	Arteriography in diagnosis of acute gastrointestinal tract bleeding

Stassen *et al.*	2013	Ineligible study design	[Transfusions in the acutely bleeding patient: the borders between too little too late and too much too early]
Sugawa *et al.*	1990	Ineligible study design	Upper GI bleeding in an urban hospital: Etiology, recurrence, and prognosis
Sung *et al.*	2015	Ineligible study design	Capsule Endoscopy in Emergency Room Can Reduce Unnecessary Admission for Upper Gastrointestinal Bleeding
Supe *et al.*	1989	Condition is not reported	Prognostic markers in upper gastrointestinal hemorrhage
Suzuki *et al.*	2020	Condition is not reported	Histamine-2 receptor antagonists versus proton pump inhibitors for septic shock after lower gastrointestinal tract perforation: a retrospective cohort study using a national inpatient database
Tan *et al.*	2009	Condition is not reported	Can Superselective Embolization be Definitive for Colonic Diverticular Hemorrhage? An Institution's Experience over 9 Years
Tarasov *et al.*	2019	Condition is not reported	Epidemiology and risk factors of adverse outcome in nonvariceal upper gastrointestinal bleeding
Terres *et al.*	2021	Condition is not reported	Predicting mortality for cirrhotic patients with acute oesophageal variceal haemorrhage using liver-specific scores
Terribile *et al.*	1980	Not the targeted population	Hemorrhages of the gastroenteric tract (in cirrhotic patients) and myocardial infarction
Trivedi *et al.*	2021	Ineligible study design	Ethnoracial Disparity in Hospital Survival following Transjugular Intrahepatic Portosystemic Shunt Creation for Acute Variceal Bleeding in the United States
Turner *et al.*	1991	Condition is not reported	Factors influencing mortality from bleeding peptic ulcers
Wada *et al.*	2019	Condition is not reported	Colonic diverticular bleeding and predictors of the length of hospitalization: An observational study
Wadaa *et al.*	2013	Ineligible study design	33rd International Symposium on Intensive Care and Emergency Medicine
Wang *et al.*	1991	Condition is not reported	Aggressive colonoscopic approaches to lower intestinal bleeding
Wang *et al.*	2011	Condition is not reported	Comparison between laparoscopic and open repair of perforated peptic ulcer disease in the elderly
War *et al.*	2009	Not the targeted population	Adverse events after outpatient colonoscopy in the Medicare population
Werner *et al.*	2021	Condition is not reported	Endoscopic hemostasis makes the difference: Angiographic treatment in patients with lower gastrointestinal bleeding
Whelan *et al.*	2010	Condition is not reported	Upper versus lower gastrointestinal bleeding: A direct comparison of clinical presentation, outcomes, and resource utilization
Xing *et al.*	2019	Condition is not reported	Decreased Serum Monocyte Chemoattractant Protein-1 (MCP-1) Expression in Patients with Upper Gastrointestinal Bleeding
Xu *et al.*	2020	Condition is not reported	Terlipressin May Decrease In-Hospital Mortality of Cirrhotic Patients with Acute Gastrointestinal Bleeding and Renal Dysfunction: A Retrospective Multicenter Observational Study
Yamaguchi *et al.*	2003	Not the targeted population	Enhanced CT for initial localization of active lower gastrointestinal bleeding

Yang *et al.*	2020	Condition is not reported	Correlation between the Glasgow-Blatchford score, shock index, and Forrest classification in patients with peptic ulcer bleeding
Yata Shinsaku *et al.*	2013	Condition is not reported	Transcatheter arterial embolization of acute arterial bleeding in the upper and lower gastrointestinal tract with N-Butyl-2-cyanoacrylate
Yen *et al.*	2018	Ineligible study design	Blood transfusion strategies for acute upper gastrointestinal bleeding: Are we back where we started?
Yuasa *et al.*	1997	Condition is not reported	Clinical study of the application of the concepts of systemic inflammatory response syndrome (SIRS) in liver cirrhosis with or without hepatocellular carcinoma with upper gastrointestinal hemorrhage--a retrospective study]
Zaragoza *et al.*	2002	Condition is not reported	Pre-endoscopic prognostic factors in non-varicose upper gastrointestinal bleeding. Development of a predictive algorithm
Zhan *et al.*	2015	Not the targeted population	Prevalence and risk factors for clinically significant upper gastrointestinal bleeding in patients with severe acute pancreatitis
Zhao *et al.*	2017	Ineligible study design	BEST POSTER PRIZE IN ADULT MEDICINE – FELLOW AND TRAINEE
Zimmerman *et al.*	1995	Not the targeted population	Predictors of mortality in hospitalized patients with secondary upper gastrointestinal haemorrhage

Supplementary Table 3 Studies removed for overlapping population

Number	First Author and year	Title
1	Abougergi *et al*[1] 2018	Thirty-Day Readmission Among Patients With Non-Variceal Upper Gastrointestinal Hemorrhage and Effects on Outcomes
2	Asaki *et al*[2] 1985	Multiinstitutional evaluation of local injection of absolute ethanol as the new hemostatic method for upper G-I tract bleeding
3	Branicki *et al*[3] 1990	Bleeding peptic ulcer: A prospective evaluation of risk factors for rebleeding and mortality
4	Choudari *et al*[4] 1992	Comparison of endoscopic injection therapy versus the heater probe in major peptic ulcer haemorrhage
5	Choudari *et al*[5] 1994	The outcome of peptic ulcer haemorrhage in relation to consumption of nonsteroidal anti-inflammatory drugs or aspirin
6	González-González *et al*[6] 2011	Nonvariceal upper gastrointestinal bleeding in patients with liver cirrhosis. Clinical features, outcomes and predictors of in-hospital mortality. A prospective study.
7	Lin *et al*[7] 1990	What kind of non-bleeding visible vessel in a peptic ulcer needs aggressive therapy? Long-term clinical observation
8	Marmo *et al*[8] 2014	Predicting mortality in patients with in-hospital nonvariceal upper GI bleeding: A prospective, multicenter database study.
9	Nishida *et al*[9] 2021	Feasibility and safety of colonoscopy performed by nonexperts for acute lower gastrointestinal bleeding: Post hoc analysis
10	Ríos *et al*[10] 2005	Acute lower gastrointestinal hemorrhages in geriatric patients
11	Wierzchowski *et al*[11] 2012	Urgent endoscopy in elderly patients with non-variceal upper gastrointestinal bleeding

Supplementary Table 4 Main characteristics of the included studies

First author and year	Study design	Country	*n* of centers	*n* of GIB patients	Female percentage (%)	*n* of hemodynamic instability	*n* of shock	Age, mean ± SD or median (ranges)	Bleeding source
Ballester-Clau *et al*[12] 2018	Retrospective cohort	Spain	1	86	31	19	N/A	68 ± 16.9	GIB
Cangemi *et al*[13] 2017	Retrospective cohort	USA	VA database	163	1.8	26	N/A	For subgroups only	GIB
Catano *et al*[14] 2021	Retrospective cohort	France	3	141	37	N/A	64	60 (48-69) †	GIB
Hampers *et a*[15] 2002	Retrospective cohort	USA	1	124	56.7	39	N/A	For subgroups only	GIB
Konecki *et al*[16] 2017	Retrospective descriptive	Poland	1	16	50	N/A	2	65 (24-93)	GIB
Lee *et al*[17] 2012	Retrospective cohort	Canada	2	83	32	30	N/A	67.8 (21-96) ‡	GIB
Mehta *et al*[18] 2015	Retrospective cohort	USA	1	48	37.5	19	N/A	For subgroups only	GIB
Mohan *et al*[19] 2018	Retrospective descriptive	USA	2	86	52	51	N/A	63 ± 17.1	GIB
Nagata *et al*[20] 2017	Retrospective cohort	Japan	1	314	38.8	N/A	62	For subgroups only	GIB
Nishida *et al*[21] 1992	Retrospective descriptive	Japan	1	69	22.1	N/A	27	77.7 (mean)	GIB
Oprita *et al*[22] 2018	Retrospective descriptive	Romania	1	610	25.4	N/A	232	58.35 ± 18.27	GIB

Parker *et al*[23] 2017	Retrospective cohort	USA	1	161	41.6	78	N/A	For subgroups only	GIB
Robert *et al*[24] 2006	Prospective cohort	France	12	223	31.8	N/A	80	61.2 (mean)	GIB
Sabat *et al*[25] 1998	RCT	Spain	1	46	45.6	N/A	8	For subgroups only	GIB
Yap *et al*[26] 2013	Retrospective cohort	USA	1	95	44.2	27	N/A	62 (27-91) †	GIB
Trebicka *et al*[27] 2021	Prospective cohort	Spain	48	216	N/A	N/A	25	N/A	GIB
Van Weyenberg *et al*[28] 2012	Retrospective cohort	Netherlands	1	56	29	8	N/A	72 ± 12	GIB
Siddiqui *et al*[29] 2019	Retrospective cohort	USA	NIS database	6411838	50.8	N/A	137406	N/A	GIB
Adamopoulos *et al*[30] 2003	Prospective cohort	Greece	1	190	35.3	70	N/A	63.7 ± 16	UGIB
Alexandrino *et al*[31] 2019	Retrospective cohort	Portugal	1	102	24.5	N/A	42	67.18 ± 14.17	UGIB
Asaki *et al*[32] 1988	Interventional, non-randomised	Japan	6	672	20.9	N/A	182	57.3 (19-92) ‡	UGIB
Bilal *et al*[33] 2019	Retrospective cohort	USA	NIS database	747	48.1	N/A	82	59.7 (56.3-63.0) §	UGIB
Cárdenas *et al*[34] 2001	Retrospective cohort	Spain	1	174	30	N/A	20	59 ± 1 (18 – 85)	UGIB
Chaabane *et al*[35] 2011	Retrospective cohort	Tunisia	1	401	42.1	N/A	38	For subgroups only	UGIB
Chandnani *et al*[36] 2019	Prospective cohort	Western India	1	300	31	N/A	64	43.5 ± 17.2	UGIB

Chi *et al*[37] 2021	Retrospective cohort	China	1	345	24.3	N/A	105	For subgroups only	UGIB
Chirapongsathorn *et al*[38] 2021	Retrospective cohort	Thailand	2	1144	12	N/A	858	53.3 ± 12	UGIB
Clason *et al*[39] 1986	Prospective cohort	UK	1	326	N/A	N/A	59	N/A	UGIB
Dewan *et al*[40] 2014	Prospective descriptive	Nepal	1	120	25	N/A	26	48.76 ± 17.19	UGIB
El Mekkaoui *et al*[41] 2011	Retrospective and prospective cohort	Morocco	1	1303	36.5	N/A	26	47.6 ± 17.7 48 (16 – 110)	UGIB
Elsebaey *et al*[42] 2018	Prospective cohort	Egypt	2	286	39.4	162	N/A	68 ± 5.65 (60-86)	UGIB
Hayat *et al*[43] 2017	Retrospective cohort	Ohio	1	361	39.5	N/A	160	60.8 ± 14.6	UGIB
Jaka *et al*[44] 2012	Retrospective cohort	Tanzania	1	240	32.1	N/A	68	39.8 ± 16 37 (11-85)	UGIB
Kaviani *et al*[45] 2010	Prospective cohort	Iran	1	572	34	N/A	26	54.9 ± 18.7	UGIB
Kiefhaber *et al*[46] 1986	Retrospective descriptive	Germany	30	1092	N/A	N/A	520	N/A	UGIB
Lai *et al*[47] 2018	Retrospective cohort	Taiwan	2	442	48.4	N/A	54	N/A	UGIB
Li *et al*[48] 2019	Retrospective cohort	China	2	793	31.7	136	N/A	56.20 ± 12.24	UGIB
MacLeod *et al*[49] 1982	Retrospective cohort	Scotland	1	389	31.6	N/A	29	N/A	UGIB

Makhlouf *et al*[50] 2012	Prospective cohort	Egypt	1	159	23.3	N/A	15	55.18 + 0.88 (SE)	UGIB
Noraini *et al*[51] 2013	Retrospective cohort	Malaysia	1	478	N/A	N/A	167	N/A	UGIB
Ntagirabiri *et al*[52] 2012	Prospective cohort	Burundi	3	61	39.3	27	N/A	49.2 ± 8	UGIB
Park *et al*[53] 2016	Retrospective cohort	Korea	1	703	24.5	N/A	39	N/A	UGIB
Pauwels *et al*[54] 1996	RCT and Prospective cohort	France	1	119	40.3	N/A	46	For subgroups only	UGIB
Rivory *et al*[55] 2014	Prospective cohort	France	1	145	35.9	N/A	12	For subgroups only	UGIB
Rudolph *et al*[56] 2003	Retrospective cohort	USA	1	220	31.4	N/A	150	For subgroups only	UGIB
Scibelli *et al*[57] 2021	Retrospective cohort	USA	15	13440	52	N/A	294	For subgroups only	UGIB
Sereda *et al*[58] 1977	Prospective descriptive	Australia	1	513	26.3	N/A	124	(16 – 90) ¶	UGIB
Skok *et al*[59] 2011	Prospective cohort	Slovenia	1	54	13	N/A	24	61.6 ± 14.2	UGIB
Sheibani *et al*[60] 2013	Retrospective cohort	USA	1	106	37	48	N/A	57 ± 12	UGIB
Shih *et al*[61] 2018	Retrospective cohort	Taiwan	1	202	19.8	N/A	45	55.7 ± 13.3	UGIB
Yap *et al*[26] 2013	Retrospective cohort	USA	1	76	44.7	23	N/A	60 (27 – 91) ‡	UGIB
Wordenhoff *et al*[62] 1982	Retrospective descriptive	Germany	1	36	33.3	N/A	17	(65 – 82) ¶	UGIB

Yadav *et al*[63] 2021	Prospective cohort	India	1	194	18	N/A	71	For subgroups only	UGIB
Sood *et al*[64] 2012	Retrospective cohort	USA	NIS database	398213	50	N/A	17246	N/A	UGIB
Vivas *et al*[65] 2001	Prospective cohort	Greece	1	91	18.7	N/A	20	For subgroups only	UGIB
Siddiqui *et al*[29] 2019	Retrospective cohort	USA	NIS database	3190822	47	N/A	81180	N/A	UGIB
Bunchorntavakul *et al*[66] 2017	Retrospective cohort	Thailand	1	286	28.3	32	N/A	53.59 ± 15.17	UGIB
Chen *et al*[67] 2003	Prospective cohort	Taiwan	1	76	21.1	N/A	8	57 ± 13	UGIB
Lanas *et al*[68] 1998	Case-control	Spain	2	736	27.3	N/A	98	62.1 ± 16.7	UGIB
Minakari *et al*[69] 2017	Cross-sectional	Iran	1	4747	30.8	1889	N/A	55.46 ± 21.98 (65 – 97)	UGIB
Sayhan *et al*[70] 2012	Cross-sectional	Turkey	1	194	38.1	N/A	14	76.34 ± 7.91 (65 – 79)	UGIB
Abougergi *et al*[71] 2017	Retrospective cohort	USA	NIS database	227480	45.2	N/A	11761	N/A	NVUGIB
Ahn *et al*[72] 2016	Retrospective cohort	Korea	1	158	27.8	39	N/A	60.5 ± 16.6 (18 – 101)	NVUGIB
Baracat *et al*[73] 2020	Pilot RCT	Brazil	1	39	33.3	9	N/A	56.8 ± 15.7	NVUGIB
Chirapongsathorn *et al*[38] 2021	Retrospective cohort	Thailand	2	431	12.8	N/A	341	53.3 ± 11.6	NVUGIB
Di Felice *et al*[74] 1987	Interventional, one arm	Italy	1	40	N/A	N/A	23	(41 – 76) ¶	NVUGIB

Edmunds *et al*[75] 1988	Prospective descriptive	Australia	1	28	39.3	N/A	14	N/A	NVUGIB
Elsebaey *et al*[42] 2018	Prospective cohort	Egypt	2	125	33.6	55	N/A	68.55 ± 6.03 (60 – 86)	NVUGIB
Gao *et al*[76] 2019	Retrospective cohort	China	1	230	23.5	21	N/A	For subgroups only	NVUGIB
González *et al*[77] 2011	Prospective cohort	Mexico	1	1067	35	287	N/A	58.8 ± 18.9 60 (45 – 74) IQR	NVUGIB
Hwang *et al*[78] 2016	Prospective cohort	Korea	8	1584	26.4	156	N/A	63 ± 16 65 (52 – 76)	NVUGIB
Jairath *et al*[79] 2012	Prospective national audit	UK	212	2709	58.9	N/A	996	For subgroups only	NVUGIB
Kwon *et al*[80] 2018	Retrospective descriptive	Korea	1	46	54.4	26	N/A	For subgroups only	NVUGIB
Lai *et al*[47] 2018	Retrospective cohort	Taiwan	2	118	35.6	N/A	11	N/A	NVUGIB
Maggio *et al*[81] 2013	Retrospective cohort	Canada	21	61	34.4	26	N/A	For subgroups only	NVUGIB
Morsy *et al*[82] 2014	Prospective cohort	Egypt	1	93	34.4	27	N/A	53.3 ± 11.2	NVUGIB
Nguyen *et al*[83] 2010	Retrospective cohort	USA	NIS database	7260	100	N/A	927	For subgroups only	NVUGIB
Park *et al*[53] 2016	Retrospective cohort	Korea	1	539	25.7	N/A	19	60.8 ± 15.6	NVUGIB
Restellini *et al*[84] 2013	Retrospective cohort	Canada	18	1677	38.3	N/A	535	66.2 ± 16.8	NVUGIB

Rotondano *et al*[85] 2014	Prospective analysis	Italy	PNED databases	2398	34.2	243	N/A	For subgroups only	NVUGIB
Sey *et al*[86] 2019	Retrospective cohort	UK	212	4474	40	N/A	1602	71 (54 – 81) †	NVUGIB
Wierzchowski *et al*[87] 2013	Retrospective and prospective cohort	Poland	1	482	40.9	N/A	93	62.7 ± 15.6	NVUGIB
Zhang *et al*[88] 2010	Retrospective cohort	China	1	223	16.1	N/A	47	For subgroups only	NVUGIB
Siddiqui *et al*[29] 2019	Retrospective cohort	USA	NIS database	3127786	47.3	N/A	77850	N/A	NVUGIB
Bunchorntavakul *et al*[66] 2017	Retrospective cohort	Thailand	1	180	34.4	15	N/A	54.68 ± 17.06	NVUGIB
Wang *et al*[89] 2009	Interventional, non-randomised	Taiwan	1	129	28.7	N/A	28	For subgroups only	NVUGIB
Amitrano *et al*[90] 2012	Retrospective cohort	Italy	1	349	34.4	N/A	90	For subgroups only	VUGIB
Ardevol *et al*[91] 2018	cohort analysis	Spain	5	646	33	N/A	187	59 ± 13.2	VUGIB
Bilal *et al*[92] 2020	Retrospective cohort	USA	2048	2003	29.3	N/A	198	57 (56 – 57.6) §	VUGIB
Chirapongsathorn *et al*[38] 2021	Retrospective cohort	Thailand	2	713	10.5	N/A	517	53.3 ± 12.2	VUGIB
Choi *et al*[93] 2018	Retrospective descriptive	Korea	1	66	6.1	34	N/A	53 (46.8 – 59.5) †	VUGIB
Elsebaey *et al*[42] 2018	Prospective cohort	Egypt	2	161	26.1	107	N/A	67.58 ± 5.32 (60 – 83)	VUGIB
Fallatah *et al*[94] 2012	Retrospective cohort	Saudi Arabia	1	125	N/A	N/A	22	N/A	VUGIB

Hassanien *et al*[95] 2018	Retrospective cohort	Egypt	1	725	31	N/A	208	For subgroups only	VUGIB
Hermie *et al*[96] 2018	Retrospective cohort	Belgium	1	30	31.3	N/A	14	55.3 ± 9.1	VUGIB
Ismail *et al*[97] 2008	Retrospective cohort	Pakistan	1	420	37.1	256	N/A	For subgroups only	VUGIB
Kim J *et al*[98] 2021	Retrospective cohort	Korea	6	1573	19.5	N/A	128	For subgroups only	VUGIB
Kim D *et al*[99] 2018	Retrospective case-control	Korea	1	454	15	N/A	194	59 ± 11.3	VUGIB
Kim S *et al*[100] 2017	Retrospective case-control	Korea	1	264	17.1	N/A	49	For subgroups only	VUGIB
Lai *et al*[47] 2018	Retrospective cohort	Taiwan	2	324	53.1	N/A	43	N/A	VUGIB
Lee H *et al*[101] 1992	Retrospective cohort	Australia	1	101	38.6	N/A	59	50 ± 13.5	VUGIB
Liu T *et al*[102] 2006	Retrospective cohort	Taiwan	1	42	23.8	N/A	9	59.8 ± 15	VUGIB
Liu Y *et al*[103] 2009	Retrospective descriptive	China	1	14	14.3	N/A	3	50.92 ± 15.44	VUGIB
Maiwall *et al*[104] 2020	RCT	India	1	214	4.2	N/A	42	For subgroups only	VUGIB
Naeshiro *et al*[105] 2014	Retrospective cohort	Japan	1	63	32.8	N/A	18	70 (median)	VUGIB
Park et al[53] 2016	Retrospective cohort	Korea	1	164	19.5	N/A	20	55 ± 11.5	VUGIB
Singal *et al*[106] 2012	Retrospective cohort	USA	1050	27422	31	N/A	798	N/A	VUGIB
Villanueva *et al*[107] 1999	RCT	Spain	1	100	34	N/A	27	For subgroups only	VUGIB

Villanueva *et al*[108] 2006	RCT	Spain	1	179	26.9	N/A	58	For subgroups only	VUGIB
Sung *et al*[109] 1995	RCT	Hongkong	1	94	28.8	N/A	18	(17 – 78) ¶	VUGIB
Thomopoulos *et al*[110] 2006	Retrospective cohort	Greece	2	141	19.2	N/A	26	60.5 ± 13.5	VUGIB
Tsai *et al*[111] 2019	Prospective retrospective cohort analysis	Taiwan	1	131	16.8	N/A	59	54.45 ± 14.2	VUGIB
Tsai *et al*[112] 2014	Prospective cohort	Taiwan	1	157	15.9	N/A	71	53.66 ± 13.6	VUGIB
Vuachet *et al*[113] 2015	Retrospective cohort	France	1	121	22.3	N/A	14	60.9 ± 10.4	VUGIB
Senosiain *et al*[114] 2016	Retrospective cohort	Spain	1	68	23.5	N/A	12	For subgroups only	VUGIB
Siddiqui *et al*[29] 2019	Retrospective cohort	USA	NIS database	63036	31.8	N/A	3330	N/A	VUGIB
Bunchorntavakul *et al*[66] 2017	Retrospective cohort	Thailand	1	106	17.9	17	N/A	51.75 ± 11.08	VUGIB
Farooqi *et al*[115] 2001	Retrospective cohort	Pakistan	1	115	23.5	24	N/A	52.4 ± 5.4	VUGIB
Thomas *et al*[116] 1992	Retrospective cohort	USA	1	101	30.7	N/A	48	44.2 (mean)	VUGIB
Gado *et al*[117] 2014	Cross-sectional	Egypt	1	224	37	39	N/A	53 ± 10 (20 – 87)	VUGIB
Ardevol *et al*[91] 2018	Prospective Retrospective cohort analysis	Spain	5	144	28	N/A	29	63 ± 12.6	PUB
Boix *et al*[118] 1987	Interventional, non-randomised	Spain	1	28	28.6	N/A	9	67 (50 – 94) ‡	PUB

Bornman *et al*[119] 1985	Prospective cohort	South Africa	1	177	N/A	N/A	25	51.2 ± 16.5 (23 – 80)	PUB
Brullet *et al*[120] 1996	Prospective cohort	Spain	1	106	21.7	N/A	25	For subgroups only	PUB
Brullet *et al*[121] 1996	Prospective cohort	Spain	1	178	32	N/A	39	For subgroups only	PUB
Carter *et al*[122] 1994	RCT	UK	1	44	38.6	N/A	18	63 (19 – 89)	PUB
Cheng Y *et al*[123] 2014	Retrospective cohort	China	1	785	50.6	N/A	101	57.6 ± 4.8 (18 – 78)	PUB
Cheng H *et al*[124] 2017	Prospective cohort	Taiwan	1	426	29.1	N/A	80	N/A	PUB
Chung *et al*[125] 2001	Retrospective cohort	Korea	1	143	13.3	N/A	107	55.2 ± 13.7 (17 – 85)	PUB
Choudari *et al*[126] 1995	Interventional, non-randomised	Scotland	4	326	35.9	N/A	210	(17 – 95) ¶	PUB
Church *et al*[127] 2003	RCT	Scotland	4	247	32	N/A	156	For subgroups only	PUB
Duch *et al*[128] 2016	Prospective cohort	Denmark	21	3056	44.6	N/A	373	74.2 (65.1 – 82.7) †	PUB
Edmunds *et al*[75] 1988	Prospective descriptive	Australia	1	22	N/A	N/A	14	For subgroups only	PUB
Garrido *et al*[129] 2008	RCT	Spain	1	41	17.1	26	N/A	For subgroups only	PUB
Halland *et al*[130] 2011	Prospective cohort	Australia	1	265	45	100	N/A	71 ± 15	PUB
Higa *et al*[131] 2011	Retrospective cohort	Japan	1	676	23.9	N/A	182	60 ± 15	PUB

Hunt *et al*[132] 1991	Prospective cohort	Australia	1	840	27.4	N/A	269	N/A	PUB
Hunt *et al*[133] 1983	Prospective cohort	Australia	1	633	27	N/A	184	N/A	PUB
Hu *et al*[134] 2010	Retrospective cohort	Taiwan	1	175	29.1	N/A	38	For subgroups only	PUB
Ishikawa *et al*[135] 1994	Retrospective cohort	Japan	1	253	25.7	N/A	110	For subgroups only	PUB
Ishikawa *et al*[136] 1995	Retrospective cohort	Japan	1	75	20	N/A	42	For subgroups only	PUB
Kondo *et al*[137] 2018	Retrospective cohort	Japan	1	185	27	76	N/A	68 (58.5 – 75.5) †	PUB
Kubba *et al*[138] 1996	RCT	Scotland	4	140	33.6	N/A	72	For subgroups only	PUB
Kuo *et al*[139] 2015	Retrospective cohort	Taiwan	1	235	23	N/A	21	For subgroups only	PUB
Lahmidani *et al*[140] 2012	Retrospective cohort	Morocco	1	428	16.4	5	N/A	For subgroups only	PUB
Lai *et al*[141] 1994	RCT	Taiwan	2	52	9.6	N/A	9	For subgroups only	PUB
Lanas *et al*[142] 2013	Retrospective cohort	Spain	12	539	29.5	N/A	36	N/A	PUB
Laursen *et al*[143] 2016	Prospective cohort	Denmark	DCRES database	12601	45	2933	N/A	74 (48 – 91) ††	PUB
Lausaević *et al*[144] 2007	Prospective cohort	Serbia	1	80	N/A	24	N/A	For subgroups only	PUB
Liang *et al*[145] 2016	Retrospective cohort	Taiwan	NHIRD database	1229	65.3	N/A	87	For subgroups only	PUB

Lohse *et al*[146] 2015	Prospective cohort	Denmark	Danish Anesthesia databases	3580	46.1	N/A	903	For subgroups only	PUB
Lu *et al*[147] 2012	Retrospective case-control	Taiwan	1	220	32.3	N/A	112	For subgroups only	PUB
Mäkelä *et al*[148] 1996	RCT	Finland	1	78	61.5	N/A	15	For subgroups only	PUB
Mine *et al*[149] 2013	Retrospective descriptive	Japan	1	21	19.1	11	N/A	66 (32 – 94) ‡	PUB
O'brien *et al*[150] 1986	RCT	UK	1	204	N/A	N/A	70	For subgroups only	PUB
Ogasawara *et al*[151] 2014	Retrospective cohort	Japan	1	428	24.3	N/A	44	N/A	PUB
Oxner *et al*[152] 1992	RCT	UK	1	93	43	N/A	46	For subgroups only	PUB
Parreira *et al*[153] 2002	Retrospective cohort	Brazil	1	200	23.5	N/A	27	52 ± 18	PUB
Potakhin *et al*[154] 2021	Retrospective cohort	Russia	1	409	26.4	80	N/A	For subgroups only	PUB
Rajgopal *et al*[155] 1991	RCT	UK	1	109	N/A	N/A	64	For subgroups only	PUB
Rosenstock *et al*[156] 2013	Prospective cohort	Denmark	DCRES database	13498	45	N/A	2530	74 (63 – 83) †	PUB
Saperas *et al*[157] 1987	RCT	Spain	1	69	27.5	N/A	7	For subgroups only	PUB
Saperas *et al*[158] 1988	RCT	Spain	1	92	29.4	N/A	7	For subgroups only	PUB
Yang *et al*[159] 2018	Prospective cohort	Taiwan	1	368	29.4	N/A	71	N/A	PUB
Yii *et al*[160] 1996	Prospective cohort	Australia	1	269	49	65	N/A	N/A	PUB
Tekant *et al*[161] 1995	RCT	Singapore	1	155	22.6	N/A	34	(15 – 87) ¶	PUB

Simon-Rudler *et al*[162] 2007	Retrospective cohort	France	1	114	65.8	N/A	47	For subgroups only	PUB
Thomopoulos *et al*[163] 2004	Retrospective cohort	Greece	1	191	18.9	N/A	32	58.3 ± 17.2	PUB
Thomopoulos *et al*[164] 2001	Prospective cohort	Greece	1	427	19.7	N/A	51	58.6 ± 16.6	PUB
Tsoi *et al*[165] 2021	Prospective cohort	Hongkong	1	8222	33.4	N/A	713	For subgroups only	PUB
Elloumi *et al*[166] 2003	Retrospective descriptive	Tunisia	1	208	18.8	N/A	14	50 (16 – 89) ‡	PUB
Huang *et al*[167] 1989	Retrospective cohort	Taiwan	1	147	9.5	N/A	49	N/A	PUB
Jaramillo *et al*[168] 1994	Prospective cohort	Spain	1	1567	29.4	N/A	159	55 ± 16.9	PUB
Branicki *et al*[169] 1992	Prospective cohort	Hongkong	1	842	N/A	N/A	147	N/A	PUB
Hsu *et al*[170] 1994	Prospective descriptive	Taiwan	1	204	27.9	N/A	14	N/A	PUB
Wang *et al*[171] 2015	RCT	Taiwan	1	116	30.2	N/A	7	For subgroups only	PUB
Lin *et al*[172] 1990	RCT	China	1	137	13.1	N/A	78	For subgroups only	PUB
Lin *et al*[173] 1993	RCT	China	1	200	10	N/A	67	For subgroups only	PUB
Lin *et al*[174] 1988	RCT	China	1	50	20	N/A	28	58.9 ± 16	PUB
Lin *et al*[175] 1990	RCT	China	1	61	14.8	N/A	28	For subgroups only	PUB
Lin *et al*[176] 1993	RCT	Taiwan	1	64	11	N/A	26	For subgroups only	PUB
Lin *et al*[177] 1988	Retrospective descriptive	Taiwan	1	30	30	N/A	10	52.3 (17 – 75) ‡	PUB

Lin *et al*[178] 1999	RCT	Taiwan	1	65	1.5	N/A	10	For subgroups only	PUB
Lin *et al*[179] 1999	RCT	Taiwan	1	96	8.3	N/A	32	(18 – 80) ¶	PUB
Lin *et al*[180] 1995	RCT	Taiwan	1	54	3.7	N/A	13	For subgroups only	PUB
Lin *et al*[181] 1996	Prospective descriptive	Taiwan	1	101	28.6	N/A	26	60.4 ± 17.7	PUB
Gado *et al*[182] 2014	Cross-sectional	Egypt	1	62	50	30	N/A	59 ± 7 (37 – 72)	PUB
Abbas *et al*[183] 2005	Retrospective cohort	New Zealand	1	88	36	46	N/A	70 (8-90)	LGIB
Albeldawi *et al*[184] 2014	Interventional, non-randomised	USA	1	57	49.12	30	N/A	68 ± 12.5	LGIB
Arroja *et al*[185] 2011	Prospective descriptive	Portugal	13	371	48.4	105	N/A	72.4 (15-101)	LGIB
Bua-ngam *et al*[186] 2017	Retrospective descriptive	Thailand	1	38	36.8	21	N/A	61 (9-84) ‡	LGIB
García *et al*[187] 2001	Retrospective descriptive	Spain	1	50	50	42	N/A	66 ± 7 (20-90)	LGIB
Hermie *et al*[188] 2021	Retrospective cohort	Belgium	1	82	38.8	58	N/A	67.6 ± 15.7	LGIB
Li *et al*[189] 2020	Retrospective cohort	USA	NIS database	124620	50.44	N/A	4115	For subgroups only	LGIB
Lv *et al*[190] 2019	Retrospective descriptive	China	1	31	22.58	N/A	21	66.3 ± (36-81) ‡	LGIB
Niikura *et al*[191] 2020	RCT	Japan	15	159	33.34	5	N/A	For subgroups only	LGIB
Nykänen *et al*[192] 2018	Retrospective cohort	Finland	1	53	30	24	N/A	72 (30-95)	LGIB

Oakland *et al*[193] 2018	Prospective cohort	UK	143	2528	52.2	N/A	58	74 (57-83) †	LGIB
Radaelli *et al*[194] 2021	Prospective cohort	Italy	15	1198	47.8	110	N/A	78 (67-84) †	LGIB
Rios *et al*[195] 2007	Retrospective cohort	Spain	1	171	46	29	N/A	68 ± 17	LGIB
Yap *et al*[26] 2013	Retrospective cohort	USA	1	19	42.11	4		67 (39-87) ‡	LGIB
Siddiqui *et al*[29] 2019	Retrospective cohort	USA	NIS database	3221016	54.56	N/A	56226	N/A	LGIB
Foley *et al*[196] 2010	Retrospective descriptive	UK	1	20	30	13	N/A	76.8 (mean)	LGIB
Klinvimol *et al*[197] 1994	Retrospective descriptive	Singapore	1	10	40	6	N/A	47 (15-72)	LGIB
Chen *et al*[198] 2009	Retrospective cohort	China	1	73	41	N/A	3	70 (22-90) ‡	CDB
Doi *et al*[199] 2020	Retrospective cohort	Japan	1	142	38.03	N/A	16	71.7 ± 12.7	CDB
Fujino *et al*[200] 2013	Retrospective cohort	Japan	1	90	33.33	N/A	37	For subgroups only	CDB
Gilshtein *et al*[201] 2016	Retrospective cohort	Israel	1	104	51.92	5	N/A	For subgroups only	CDB
Ichiba *et al*[202] 2018	Retrospective case-control	Japan	1	282	30.5	60	N/A	For subgroups only	CDB
Joaquim *et al*[203] 2017	Retrospective cohort	Portugal	1	74	37.8	N/A	6	75.7 ± 9.5	CDB
Kitagawa *et al*[204] 2019	Retrospective cohort	Japan	1	144	39.6	N/A	13	73.8 ± 10.5	CDB

Sato *et al*[205] 2021	Retrospective case-control	Japan	1	608	31.8	N/A	92	72.4 ± 13	CDB

VA: Veteran affairs; NIS: National inpatient sample; NHIRD: National health insurance research database; DCRES: Danish clinical register of emergency surgery; PNED: Progetto nazionale emorragia digestive; SE: Standard error; SD: Standard deviation; IQR: Interquartile range; N/A: Not available; GIB: Gastrointestinal bleeding; UGIB: Upper gastrointestinal bleeding; NVUGIB: Non-variceal upper gastrointestinal bleeding; VUGIB: Variceal upper gastrointestinal bleeding; PUB: Peptic ulcer bleeding; LGIB: Lower gastrointestinal bleeding; CDB: Colonic diverticular bleeding; RCT: Randomized controlled trial

†, median with interquartile range; ‡, mean with age ranges; §, mean with confidence interval; ¶, age ranges only; ††, median with confidence interval

Supplementary Table 5 Results of risk of bias assessment

Study	1	2	3	4	5	6	7	8	9	Overall score (0-9)
Ballester-Clau *et al*[12] 2018	Y	Y	Y	Y	Y	N	N	Y	Y	7
Cangemi *et al*[13] 2017	Y	Y	Y	Y	Y	N	N	Y	Y	7
Hampers *et al*[15] 2002	U	U	Y	Y	Y	Y	Y	Y	Y	7
Lee *et al*[17] 2012	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Mehta *et al*[18] 2015	U	U	Y	Y	Y	Y	Y	Y	Y	7
Mohan *et al*[19] 2018	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Parker *et al*[23] 2017	Y	Y	Y	Y	Y	N	N	Y	Y	7
Yap *et al*[26] 2013	Y	Y	Y	N	Y	N	N	Y	Y	6
Van Weyenberg *et al*[28] 2012	U	U	Y	Y	Y	Y	Y	Y	Y	7
Catano *et al*[14] 2021	U	U	Y	Y	Y	Y	Y	Y	Y	7
Konecki *et al*[16] 2017	Y	Y	N	Y	Y	Y	Y	Y	Y	8
Nagata *et al*[20] 2017	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Nishida *et al*[21] 1992	Y	Y	Y	Y	Y	N	N	Y	Y	7
Oprita *et al*[22] 2018	U	U	Y	Y	Y	N	N	Y	Y	5
Robert *et al*[24] 2006	U	U	Y	Y	Y	N	N	Y	Y	5
Sabat *et al*[25] 1998	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Trebicka *et al*[27] 2021	Y	U	N	Y	Y	N	N	Y	Y	5
Siddiqui *et al*[29] 2019	U	U	Y	Y	Y	Y	Y	Y	Y	7
Adamopoulos *et al*[30] 2003	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Elsebaey *et al*[42] 2018	U	Y	Y	Y	Y	Y	Y	Y	Y	8

Li *et al*[48] 2019	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Minakari *et al*[69] 2017	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Ntagirabiri *et al*[52] 2012	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Sheibani *et al*[60] 2013	U	Y	Y	Y	U	Y	Y	Y	Y	7
Yap *et al*[26] 2013	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Bunchorntavakul *et al*[66] 2017	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Alexandrino *et al*[31] 2019	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Asaki *et al*[32] 1988	U	Y	Y	Y	Y	Y	Y	Y	Y	8
Bilal *et al*[33] 2019	U	Y	Y	Y	Y	Y	Y	Y	Y	8
Cárdenas *et al*[34] 2001	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Chaabane *et al*[35] 2011	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Chandnani *et al*[36] 2019	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Chi *et al*[37] 2021	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Chirapongsathorn *et al*[38] 2021	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Clason *et al*[39] 1986	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Dewan *et al*[40] 2014	U	U	Y	Y	Y	Y	Y	Y	Y	7
El Mekkaoui *et al*[41] 2011	U	U	Y	Y	Y	Y	Y	Y	Y	7
Hayat *et al*[43] 2017	U	Y	Y	Y	Y	Y	Y	Y	Y	8
Jaka *et al*[44] 2012	U	U	Y	Y	Y	Y	Y	Y	Y	7
Kaviani *et al*[45] 2010	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Kiefhaber *et al*[46] 1986	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Lai *et al*[47] 2018	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
MacLeod *et al*[49] 1982	Y	Y	Y	Y	Y	Y	Y	Y	Y	9

Makhlouf *et al*[50] 2012	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Noraini *et al*[51] 2013	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Park *et al*[53] 2016	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Pauwels *et al*[54] 1996	U	Y	Y	Y	Y	U	U	Y	Y	6
Rivory *et al*[55] 2014	U	U	Y	Y	Y	N	N	Y	Y	5
Rudolph *et al*[56] 2003	U	Y	Y	Y	U	Y	Y	Y	Y	7
Scibelli *et al*[57] 2021	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Sayhan *et al*[70] 2012	U	Y	Y	Y	Y	Y	Y	Y	Y	8
Sereda *et al*[58] 1977	U	Y	Y	Y	Y	Y	Y	Y	Y	8
Skok *et al*[59] 2011	U	Y	U	Y	Y	N	N	Y	Y	5
Shih *et al*[61] 2018	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Wordenhoff *et al*[62] 1982	Y	U	U	Y	Y	N	N	NA	Y	5
Yadav *et al*[63] 2021	U	Y	U	Y	Y	Y	Y	Y	Y	7
Sood *et al*[64] 2012	Y	Y	Y	Y	Y	N	N	Y	Y	7
Vivas *et al*[65] 2001	Y	Y	Y	U	Y	Y	Y	Y	Y	8
Siddiqui *et al*[29] 2019	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Chen *et al*[67] 2003	U	Y	Y	Y	Y	Y	Y	Y	Y	8
Lanas *et al*[68] 1998	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Ahn *et al*[72] 2016	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Baracat *et al*[73] 2020	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Elsebaey *et al*[42] 2018	U	Y	Y	Y	Y	Y	Y	Y	Y	8
Gao *et al*[76] 2019	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
González *et al*[77] 2011	Y	Y	Y	Y	Y	Y	Y	Y	Y	9

Hwang *et al*[78] 2016	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Kwon *et al*[80] 2018	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Maggio *et al*[81] 2013	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Morsy *et al*[82] 2014	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Rotondano *et al*[85] 2014	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Bunchorntavakul *et al*[66] 2017	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Abougergi *et al*[71] 2017	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Chirapongsathorn *et al*[38] 2021	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Di Felice *et al*[74] 1987	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Edmunds *et al*[75] 1988	Y	Y	N	Y	Y	Y	Y	Y	Y	8
Jairath *et al*[79] 2012	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Lai *et al*[47] 2018	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Nguyen *et al*[83] 2010	U	U	Y	N	Y	N	N	Y	Y	4
Park *et al*[53] 2016	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Restellini *et al*[84] 2013	Y	Y	Y	Y	Y	N	N	Y	Y	7
Sey *et al*[86] 2019	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Wierzchowski *et al*[87] 2013	Y	Y	Y	U	Y	N	N	U	Y	5
Wang *et al*[89] 2009	Y	Y	Y	Y	U	N	N	Y	Y	6
Zhang *et al*[88] 2010	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Siddiqui *et al*[29] 2019	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Choi *et al*[93] 2018	U	Y	U	Y	Y	Y	Y	Y	Y	7
Elsebaey *et al*[42] 2018	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Gado *et al*[117] 2014	Y	Y	Y	Y	Y	Y	Y	Y	Y	9

Ismail *et al*[97] 2008	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Bunchorntavakul *et al*[66] 2017	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Farooqi *et al*[115] 2001	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Amitrano *et al*[90] 2012	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Ardevol *et al*[91] 2018	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Bilal *et al*[92] 2020	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Chirapongsathorn *et al*[38] 2021	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Fallatah *et al*[94] 2012	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Hassanien *et al*[95] 2018	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Hermie *et al*[96] 2018	U	U	N	Y	Y	Y	Y	Y	Y	6
Kim J *et al*[98] 2021	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Kim D *et al*[99] 2018	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Kim S *et al*[100] 2017	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Lai *et al*[47] 2018	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Lee H *et al*[101] 1992	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Liu T *et al*[102] 2006	Y	Y	N	Y	Y	Y	Y	Y	Y	8
Liu Y *et al*[103] 2009	Y	Y	N	Y	Y	Y	Y	Y	Y	8
Maiwall *et al*[104] 2020	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Naeshiro *et al*[105] 2014	Y	Y	U	Y	Y	Y	Y	Y	Y	8
Park et al[53] 2016	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Singal *et al*[106] 2012	Y	Y	Y	Y	Y	N	N	Y	Y	7
Villanueva *et al*[107] 1999	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Villanueva *et al*[108] 2006	Y	Y	Y	Y	Y	Y	Y	Y	Y	9

Sung *et al*[109] 1995	U	Y	Y	Y	Y	N	N	Y	Y	6
Thomopoulos *et al*[110] 2006	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Tsai *et al*[111] 2019	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Tsai *et al*[112] 2014	U	Y	Y	Y	Y	Y	Y	Y	Y	8
Vuachet *et al*[113] 2015	Y	Y	Y	U	Y	Y	U	Y	Y	7
Senosiain *et al*[114] 2016	Y	Y	U	Y	Y	N	N	Y	Y	6
Siddiqui *et al*[29] 2019	Y	N	Y	Y	Y	Y	Y	Y	Y	8
Thomas *et al*[116] 1992	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Garrido *et al*[129] 2008	Y	Y	N	Y	Y	Y	Y	Y	Y	8
Gado *et al*[117] 2014	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Halland *et al*[130] 2011	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Kondo *et al*[137] 2018	U	Y	U	Y	Y	Y	Y	Y	Y	7
Lahmidani *et al*[140] 2012	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Laursen *et al*[143] 2016	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Lausaević *et al*[144] 2007	Y	Y	N	Y	Y	Y	Y	Y	Y	8
Mine *et al*[149] 2013	Y	Y	N	Y	Y	Y	Y	Y	Y	8
Potakhin *et al*[154] 2021	U	U	Y	Y	Y	Y	Y	Y	Y	7
Yii *et al*[160] 1996	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Ardevol *et al*[91] 2018	Y	Y	U	Y	Y	Y	Y	Y	Y	8
Boix *et al*[118] 1987	Y	Y	N	Y	Y	Y	Y	Y	Y	8
Bornman *et al*[119] 1985	Y	Y	U	Y	Y	Y	Y	Y	Y	8
Brullet *et al*[120] 1996	Y	Y	U	Y	Y	Y	Y	Y	Y	8
Brullet *et al*[121] 1996	Y	Y	U	Y	Y	Y	Y	Y	Y	8

Carter *et al*[122] 1994	Y	Y	N	Y	Y	Y	Y	Y	Y	8
Cheng Y *et al*[123] 2014	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Cheng H *et al*[124] 2017	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Chung *et al*[125] 2001	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Church *et al*[127] 2003	Y	Y	U	Y	Y	Y	Y	Y	Y	8
Duch *et al*[128] 2016	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Edmunds *et al*[75] 1988	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Higa *et al*[131] 2011	Y	Y	N	Y	Y	Y	Y	Y	Y	8
Hu *et al*[134] 2010	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Hunt *et al*[133] 1983	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Hunt *et al*[132] 1991	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Ishikawa *et al*[135] 1994	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Ishikawa *et al*[136] 1995	U	Y	N	Y	Y	Y	Y	Y	Y	7
Kubba *et al*[138] 1996	Y	Y	U	Y	Y	Y	Y	Y	Y	8
Kuo *et al*[139] 2015	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Lai *et al*[141] 1994	Y	Y	N	Y	Y	Y	Y	Y	Y	8
Lanas *et al*[142] 2013	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Liang *et al*[145] 2016	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Lin *et al*[173] 1993	Y	Y	N	Y	Y	Y	Y	Y	Y	8
Lin *et al*[174] 1988	Y	Y	N	Y	Y	Y	Y	Y	Y	8
Lin *et al*[178] 1999	Y	Y	N	Y	Y	Y	Y	Y	Y	8
Lin *et al*[179] 1999	Y	Y	N	Y	Y	Y	Y	Y	Y	8
Lin *et al*[180] 1995	Y	Y	N	Y	Y	Y	Y	Y	Y	8

Lin *et al*[172] 1990	U	Y	U	Y	Y	Y	Y	Y	Y	7
Lin *et al*[176] 1993	Y	Y	U	Y	Y	Y	Y	Y	Y	8
Lin *et al*[177] 1998	Y	Y	N	Y	Y	Y	Y	Y	Y	8
Lin *et al*[175] 1990	Y	Y	N	Y	Y	Y	Y	Y	Y	8
Lin *et al*[181] 1996	Y	Y	U	Y	Y	Y	Y	Y	Y	8
Lohse *et al*[146] 2015	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Lu *et al*[147] 2012	Y	Y	U	Y	Y	Y	Y	Y	Y	8
Mäkelä *et al*[148] 1996	Y	Y	N	Y	Y	Y	Y	Y	Y	8
O'brien *et al*[150] 1986	Y	Y	U	N	Y	Y	Y	Y	Y	7
Ogasawara *et al*[151] 2014	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Oxner *et al*[152] 1992	Y	Y	N	Y	Y	Y	Y	Y	Y	8
Parreira *et al*[153] 2002	Y	Y	U	Y	Y	Y	Y	Y	Y	8
Rajgopal *et al*[155] 1991	Y	Y	U	N	Y	Y	Y	Y	Y	7
Rosenstock *et al*[156] 2013	U	Y	Y	Y	U	Y	Y	Y	Y	7
Saperas *et al*[157] 1987	U	Y	N	Y	Y	N	N	Y	Y	6
Saperas *et al*[158] 1988	Y	Y	N	Y	Y	N	N	Y	Y	6
Yang *et al*[159] 2018	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Tekant *et al*[161] 1995	U	U	U	U	Y	Y	U	Y	Y	4
Simon-Rudler *et al*[162] 2007	U	Y	U	Y	Y	Y	Y	Y	Y	7
Thomopoulos *et al*[163] 2004	Y	Y	U	Y	Y	Y	Y	Y	Y	8
Thomopoulos *et al*[164] 2001	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Tsoi *et al*[165] 2012	Y	Y	Y	Y	Y	N	N	Y	Y	7
Elloumi *et al*[166] 2003	U	Y	U	Y	Y	Y	Y	Y	Y	7

Huang *et al*[167] 1989	Y	Y	U	Y	Y	Y	Y	Y	Y	8
Jaramillo *et al*[168] 1994	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Branicki *et al*[169] 1992	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Hsu *et al*[170] 1994	Y	Y	U	Y	Y	Y	Y	Y	Y	8
Wang *et al*[171] 2015	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Abbas *et al*[183] 2005	U	U	Y	Y	Y	Y	Y	Y	Y	7
Albeldawi *et al*[184] 2014	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Arroja *et al*[185] 2011	U	U	Y	Y	Y	Y	Y	Y	Y	7
Bua-ngam *et al*[186] 2017	U	U	N	Y	Y	Y	Y	Y	Y	6
García *et al*[187] 2001	N	U	Y	Y	Y	Y	Y	Y	Y	7
Hermie *et al*[188] 2021	N	U	Y	Y	Y	U	U	Y	Y	5
Niikura *et al*[191] 2020	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Nykänen *et al*[192] 2018	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Radaelli *et al*[194] 2021	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Rios *et al*[195] 2007	Y	Y	Y	Y	Y	N	N	Y	Y	7
Yap *et al*[26] 2013	Y	Y	N	Y	Y	Y	Y	Y	Y	8
Foley *et al*[196] 2010	N	Y	N	Y	Y	Y	Y	Y	Y	7
Klinvimol *et al*[197] 1994	Y	Y	N	Y	Y	Y	Y	Y	Y	8
Li *et al*[189] 2020	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Lv *et al*[190] 2019	N	Y	N	Y	Y	Y	Y	Y	Y	7
Oakland *et al*[193] 2018	Y	N	Y	Y	Y	Y	Y	Y	Y	8
Siddiqui *et al*[29] 2019	U	U	Y	Y	Y	Y	Y	Y	Y	7
Chen *et al*[198] 2009	Y	Y	N	Y	Y	Y	Y	Y	Y	8

Doi *et al*[199] 2020	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Fujino *et al*[200] 2013	Y	Y	N	Y	Y	Y	Y	Y	Y	8
Joaquim *et al*[203] 2017	Y	Y	N	Y	Y	Y	Y	Y	Y	8
Kitagawa *et al*[204] 2019	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Sato *et al*[205] 2021	Y	Y	Y	Y	Y	Y	N	Y	Y	8
Gilshtein *et al*[201] 2016	Y	Y	U	Y	Y	Y	Y	Y	Y	8
Ichiba *et al*[202] 2018	Y	Y	Y	Y	Y	Y	Y	Y	Y	9

1. Was the sample frame appropriate to address the target population?
2. Were study participants sampled in an appropriate way?
3. Was the sample size adequate?
4. Were the study subjects and the setting described in detail?
5. Was the data analysis conducted with sufficient coverage of the identified sample?
6. Were valid methods used for the identification of the condition?
7. Was the condition measured in a standard, reliable way for all participants?
8. Was there appropriate statistical analysis?
9. Was the response rate adequate, and if not, was the low response rate managed appropriately?

N: No; NA: Not applicable; U: Unclear; Y: Yes

Supplementary Table 6 Certainty of evidence in general gastrointestinal bleeding

№ of studies	Certainty assessment						Effect			Certainty	Importance
	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	№ of events	№ of individuals	Rate (95% CI)		
Hemodynamic instability on admission											
5	observational studies	very serious	very serious	not serious	not serious	none	151	446	event rate 0.3% (0.12 to 0.56)	⨁◯◯◯ Very low	CRITICAL
Hemodynamic instability during hospital stay											
4	observational studies	not serious	very serious	not serious	serious	none	146	456	event rate 0.3% (0.11 to 0.68)	⨁◯◯◯ Very low	CRITICAL
Shock on admission											
4	observational studies	serious	very serious	not serious	serious	none	382	1193	event rate 0.3% (0.08 to 0.6)	⨁◯◯◯ Very low	CRITICAL
Shock during hospital stay											
5	observational studies	serious	very serious	not serious	not serious	none	137524	6412280	event rate 0.1% (0.05 to 0.36)	⨁◯◯◯ Very low	CRITICAL

CI: Confidence interval

Supplementary Table 7 Certainty of evidence in upper gastrointestinal bleeding

№ of studies	Certainty assessment						Effect			Certainty	Importance
	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	№ of events	№ of individuals	Rate (95% CI)		
Hemodynamic instability on admission											
8	observational studies	not serious	very serious	not serious	not serious	none	2387	6545	event rate 0.3% (0.16 to 0.56)	⨁⨁◯◯ Low	CRITICAL
Shock on admission											
17	observational studies	serious	very serious	not serious	not serious	publication bias strongly suspected	1497	7000	event rate 0.1% (0.09 to 0.25)	⨁◯◯◯ Very low	CRITICAL
Shock during hospital stay											
18	observational studies	serious	very serious	not serious	not serious	publication bias strongly suspected	100432	3608125	event rate 0.2% (0.12 to 0.3)	⨁◯◯◯ Very low	CRITICAL

CI: Confidence interval

Supplementary Table 8 Certainty of evidence in variceal upper gastrointestinal bleeding

№ of studies	Certainty assessment						Effect			Certainty	Importance
	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	№ of events	№ of individuals	Rate (95% CI)		
Hemodynamic instability on admission											
4	observational studies	not serious	very serious	not serious	serious	none	419	911	event rate 0.4% (0.12 to 0.73)	⨁◯◯◯ Very low	CRITICAL
Hemodynamic instability during hospital stay											
2	observational studies	not serious	very serious	not serious	not serious	none	58	181	not pooled	⨁⨁◯◯ Low	CRITICAL
Shock on admission											
18	observational studies	not serious	very serious	not serious	not serious	publication bias strongly suspected	5083	69224	event rate 0.3% (0.18 to 0.36)	⨁◯◯◯ Very low	CRITICAL
Shock during hospital stay											
10	observational studies	very serious	very serious	not serious	not serious	publication bias strongly suspected	1179	30130	event rate 0.2% (0.1 to 0.3)	⨁◯◯◯ Very low	CRITICAL

CI: Confidence interval

Supplementary Table 9 Certainty of evidence in non-variceal gastrointestinal bleeding

№ of studies	Certainty assessment						Effect			Certainty	Importance
	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	№ of events	№ of individuals	Rate (95% CI)		
Hemodynamic instability on admission											
9	observational studies	not serious	very serious	not serious	not serious	none	722	4351	event rate 0.2% (0.12 to 0.36)	⨁⨁◯◯ Low	
Hemodynamic instability during hospital stay											
2	observational studies	not serious	very serious	not serious	serious	none	182	1630	not pooled	⨁◯◯◯ Very low	
Shock on admission											
9	observational studies	very serious	very serious	not serious	not serious	none	3643	10088	event rate 0.4% (0.21 to 0.53)	⨁◯◯◯ Very low	
Shock during hospital stay											
5	observational studies	not serious	very serious	not serious	not serious	none	90604	3363288	event rate 0.1% (0.02 to 0.18)	⨁⨁◯◯ Low	

CI: Confidence interval

Supplementary Table 10 Certainty of evidence in peptic ulcer bleeding

№ of studies	Certainty assessment						Effect			Certainty	Importance
	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	№ of events	№ of individuals	Rate (95% CI)		
Hemodynamic instability on admission											
6	observational studies	not serious	very serious	not serious	not serious	none	3224	13950	event rate 0.2% (0.09 to 0.44)	⨁⨁◯◯ Low	CRITICAL
Hemodynamic instability during hospital stay											
4	observational studies	not serious	very serious	not serious	serious	none	126	411	event rate 0.4% (0.12 to 0.78)	⨁◯◯◯ Very low	CRITICAL
Shock on admission											
34	observational studies	serious	very serious	not serious	not serious	publication bias strongly suspected	6574	36215	event rate 0.3% (0.19 to 0.32)	⨁◯◯◯ Very low	CRITICAL
Shock during hospital stay											
23	observational studies	serious	very serious	not serious	not serious	publication bias strongly suspected	1143	6306	event rate 0.2% (0.17 to 0.33)	⨁◯◯◯ Very low	CRITICAL

CI: Confidence interval

Supplementary Table 11 Certainty of evidence in lower gastrointestinal bleeding

№ of studies	Certainty assessment						Effect			Certainty	Importance
	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	№ of events	№ of individuals	Rate (95% CI)		
Hemodynamic instability on admission											
3	observational studies	serious	very serious	not serious	serious	none	143	1388	event rate 0.1% (0.01 to 0.81)	⨁◯◯◯ Very low	CRITICAL
Hemodynamic instability during hospital stay											
10	observational studies	serious	very serious	not serious	not serious	publication bias strongly suspected	350	928	event rate 0.5% (0.27 to 0.71)	⨁◯◯◯ Very low	CRITICAL
Shock on admission											
2	observational studies	not serious	very serious	not serious	not serious	none	4173	127148	not pooled	⨁⨁◯◯ Low	CRITICAL
Shock during hospital stay											
2	observational studies	serious	very serious	not serious	not serious	none	56247	3221047	not pooled	⨁◯◯◯ Very low	CRITICAL

CI: Confidence interval

Supplementary Table 12 Certainty of evidence in colonic diverticular bleeding

№ of studies	Certainty assessment						Effect			Certainty	Importance
	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	№ of events	№ of individuals	Rate (95% CI)		
Hemodynamic instability											
2	observational studies	not serious	very serious	not serious	not serious	none	65	386	not pooled	⨁⨁◯◯ Low	CRITICAL
Shock											
6	observational studies	not serious	very serious	not serious	not serious	none	167	1131	event rate 0.1% (0.05 to 0.26)	⨁⨁◯◯ Low	CRITICAL

CI: Confidence interval

Supplementary Table 13 Definitions of hemodynamic instability among the included studies

Study	Definition of Hemodynamic instability
Abbas *et al*[183] 2005	SBP of ≤ 90 mmHg.
Adamopoulos *et al*[30] 2003	SBP < 100 mmHg and/or HR > 100 bpm and/or orthostatic changes in SBP (a decrease of > 10%) or HR (an increase of > 10%) between a supine and seated position.
Ahn *et al*[72] 2016	SBP of less than 100 mmHg, with symptoms or signs of organ hypoperfusion.
Albeldawi *et al*[184] 2014	Gastrointestinal blood loss, anemia, or shock requiring packed red blood cell transfusions or vasopressor therapy.
Arroja *et al*[185] 2011	Syncope and/or SBP < 100 mmHg and/or HR > 100 bpm.
Ballester-Clau *et al*[12] 2018	SBP < 100 mmHg with/without tachycardia (> 100 bpm).
Bua-ngam *et al*[186] 2017	SBP of < 90 mmHg and HR > 100/min.
Bunchorntavakul *et al*[66] 2017	SBP <100 mmHg, a HR >100 bpm and/or orthostatic changes in SBP (a decrease of >10%) or HR (an increase of >10%) between a supine and seated position.
Cangemi *et al*[13] 2017	SBP <90 mmHg or HR > 100 bpm.
Farooqi *et al*[115] 2001	Pulse rate > 120, SBP < 60, pallor, oligo-anuria.
Foley *et al*[196] 2010	Tachycardia, hypotension (SBP < 100 mm Hg), or postural drop in BP.
Gado *et al*[182] 2014	HR > 100 bpm, hypotension with a SBP < 90 mmHg and/or diastolic value < 60 mmHg.
Gao *et al*[76] 2019	Tachycardia or hypotension; defined as a HR of > 120 bpm, SBP of < 90 mmHg or a reduction in the SBP from baseline of > 30 mmHg, or a hemoglobin level of < 50 g/L).
García *et al*[187] 2001	SBP < 90 mmHg, HR > 100 bpm, orthostatic hypotension (documentation after switching from the decubitus to the orthostatic position of a patient) a decrease in SBP ≥ 20 mmHg and an increase in HR ≥ 20 bpm and signs of low peripheral perfusion.

Garrido *et al*[129] 2008	When two or more of the following criteria were present: SBP less than 100 mmHg, HR greater than 100 bpm, presence of signs of peripheral hypoperfusion, changes in BP or HR after orthostatism.
Gilshtein *et al*[201] 2016	SBP < 90 mmHg or HR > 120 bpm.
González *et al*[77] 2011	HR > 100 bpm, hypotension with a SBP < 90 mmHg and/or diastolic value < 60 mmHg.
Halland *et al*[130] 2011	Either HR greater than 100 or SBP under 100 mmHg on presentation.
Hampers *et al*[15] 2002	SBP < 90 mmHg and HR > 100 bpm.
Hermie *et al*[188] 2021	SBP of ≤ 90 mmHg and/or vasopressor need secondary to blood loss.
Hwang *et al*[78] 2016	SBP < 90 mmHg, diastolic BP < 60 mmHg, or both.
Ichiba *et al*[202] 2018	Hypotension (SBP under 100 mmHg), orthostatic hypotension, or hypotension-associated symptoms such as syncope or light headedness.
Ismail *et al*[97] 2008	SBP < 100 mm Hg, a postural change of > 20 mm Hg, and/or pulse rate > 100 bpm.
Kwon *et al*[80] 2018	SBP < 100 mmHg, HR > 100 bpm, or both.
Laursen *et al*[143] 2016	Presentation with a combination of SBP below 100 mmHg and HR above 100 bpm.
Lausaević *et al*[144] 2007	Pulse greater than 100 bpm and a SBP less than 100 mmHg.
Lee *et al*[17] 2012	SBP < 90 mm Hg ± vasopressor use at time of procedure.
Li *et al*[48] 2019	HR greater than 100 beats bpm and SBP less than 90 mmHg.
Mine *et al*[149] 2013	Shock index > 1.
Mohan *et al*[19] 2018	Patient on vasopressors or SBP less than 90 mmHg.
Niikura *et al*[191] 2020	HR > 100 bpm and SBP < 115 mmHg.
Ntagirabiri *et al*[52] 2012	HR >100 bpm.
Nykänen *et al*[192] 2018	SBP < 100 mmHg and/or HR > 100 bpm.
Parker *et al*[23] 2017	SBP < 90 mm Hg and/or HR ≥ 120 bpm.

Potakhin *et al*[154] 2021	SBP < 100 mmHg and pulse ≥ 100 bpm on admission and/or having a collapse before admission.
Radaelli *et al*[194] 2021	SBP < 100 mmHg and/or heart rate > 100 bpm.
Rios *et al*[195] 2007	Hypotension (70-80/30-50 mmHg) and tachycardia (109–135 bpm).
Rotondano *et al*[85] 2014	SBP < 100 mmHg and a pulse greater than 100 beats/min, or both.
Sheibani *et al*[60] 2013	SBP ≤ 90 mmHg or HR ≥ 100 bpm.
Sung *et al*[109] 1995	SBP < 90 mmHg and pulse > 100 bpm for 2 hours.
Van Weyenberg *et al*[28] 2012	Pulse ≥ 100 bpm or SBP < 100 mmHg.

SBP: Systolic blood pressure; HR: Heart rate; bpm: Beats per minute; BP: Blood pressure

Supplementary Table 14 Definitions of shock among the included studies

Study	Definition of shock
Ardevol *et al*[91] 2018	SBP < 100 mmHg and HR > 100 bpm.
Bornman *et al*[119] 1985	SBP < 100 mmHg.
Branicki *et al*[169] 1992	SBP ≤ 100 mmHg.
Brullet *et al*[120] 1996	The presence of either a SBP less than 100 mmHg or postural hypotension (defined as a fall of more than 20 mmHg while the patient is sitting in an up-right position), associated with a pulse rate higher than 100 bpm and signs of peripheral circulatory failure (pallor, diaphoresis, tachypnea, or cutaneous vasoconstriction).
Brullet *et al*[121] 1996	SBP < 100 mmHg and peripheral circulatory failure, or the presence of compensated shock, with postural hypotension defined as a fall of more than 20 mmHg siting in an upright position, associated with peripheral circulatory failure.
Cárdenas *et al*[34] 2001	Decrease in SBP < 90 mmHg or a reduction of more than 40 mmHg compared with baseline systolic pressure, together with signs of hypoperfusion not responsive to the administration of plasma expanders and PRBC.
Carter *et al*[122] 1994	SBP < 100 mmHg in the absence of known hypertension.
Catano *et al*[14] 2021	Excessive bleeding associated with arterial hypotension resulting in the use of vasopressors and/or excessive bleeding associated with lactatemia > 2 mmol.
Chaabane *et al*[35] 2011	SBP < 90 mm Hg.
Chandnani *et al*[36] 2019	Pulse > 100 per minute and SBP < 90 mmHg.
Chen *et al*[67] 2003	Hypovolemic shock and/or the requirement of more than 6 units of PRBC.
Cheng H *et al*[124] 2017	SBP < 100 mmHg on arrival.
Chirapongsathorn *et al*[38] 2021	Mean arterial pressure < 50 mmHg.
Choudari *et al*[4] 1992	Pulse rate > 100 bpm and/or a SBP < 100 mmHg.

Choudari *et al*[5] 1994	Pulse rate > 100, or a SBP < 100 mmHg.
Choudari *et al*[126] 1995	Pulse rate greater than 100 beats per minute, a systolic blood pressure less than 100 mm Hg, or both.
Chung *et al*[125] 2001	SBP < 100 mmHg and a pulse rate > 100 bpm, accompanied by pallor or cold sweating.
Church *et al*[127] 2003	Pulse rate > 100 bpm or a SBP < 100 mmHg or both.
Dewan *et al*[40] 2014	SBP < 90 mmHg.
Di Felice *et al*[74] 1987	SBP < 100mmHg.
Doi *et al*[199] 2020	SBP < 90 mm Hg.
Duch *et al*[128] 2016	SBP < 100 mmHg and HR > 100/min.
Edmunds *et al*[75] 1988	SBP < 100mmHg.
Fujino *et al*[200] 2013	Inclusive of blood pressure decrease to < 100 mmHg, paleness, cold sweat, syncope or unconsciousness.
Hayat *et al*[43] 2017	SBP < 90 mmHg and HR > 100 bpm requiring either fluids or vasopressor agents.
Hermie *et al*[96] 2018	SBP <90 mmHg and/or vasopressor need.
Higa *et al*[131] 2011	Decrease of SBP to 80 mmHg or less, or SBP:HR of 1.0 or more
Hu *et al*[134] 2010	Either a SBP of less than 90 mmHg, or less than 100 mmHg plus a pulse rate of more than 100 per minute.
Hunt *et al*[133] 1983	BP of less than 100 mmHg and peripheral circulatory failure on admission, or the presence of compensated shock with postural hypotension, defined as fall in BP below 100 mmHg or more than 20 mmHg on sitting upright.
Hunt *et al*[132] 1991	BP < 100 mmHg and pulse rate > 100 per minute and peripheral shutdown.
Ishikawa *et al*[135] 1994	SBP of 80 mmHg or less.
Ishikawa *et al*[136] 1995	SBP of less than 80 mmHg.
Jairath *et al*[79] 2012	Tachycardia (pulse < 100) and/or hypotension (SBP < 100 mmHg)
Jaka *et al*[44] 2012	SBP < 90 mmHg.

Jaramillo *et al*[168] 1994	SBP < 100 mmHg, HR > 100 bpm, signs of impaired systemic perfusion.
Joaquim *et al*[203] 2017	Patients presenting with syncope, unconsciousness, light headedness, abnormal mental status, postural dizziness, or hypotensive and tachycardia.
Kaviani *et al*[45] 2010	BP < 90/60 mmHg in supine position.
Kubba *et al*[138] 1996	Pulse rate of more than 100 bpm, a SBP of < 100 mm Hg, or both.
Lai *et al*[141] 1994	BP < 90 mmHg, HR > 100 bpm.
Lai *et al*[47] 2018	SBP < 100 mmHg and pulse rate > 100 bpm.
Lee H *et al*[101] 1992	SBP < 80 mmHg; HR > 100 bpm; and a decrease in CVP or JVP.
Lin *et al*[177] 1988	SBP less than 100 mmHg and pulse rate greater than 100 bpm.
Lin *et al*[174] 1988	SBP < 100 mmHg and pulse rate is > 100 bpm with or without sings of hypovolemia such as cold sweats, dry mouth, oliguria, or even disturbed consciousness.
Lin *et al*[172] 1990	SBP < 100 mmHg and pulse rate is > 100 bpm.
Lin *et al*[175] 1990	SBP < 100 mmHg and pulse rate is > 100 bpm accompanied by cold sweating, pallor, and oliguria.
Lin *et al*[173] 1993	SBP < 100 mmHg and pulse rate is > 100 bpm accompanied by cold sweating, pallor, and oliguria.
Lin *et al*[180] 1995	SBP < 100 mmHg and pulse rate > 100.
Lin *et al*[181] 1996	SBP < 100 mmHg and a pulse rate > 100 bpm accompanied by pallor or cold sweating.
Lin *et al*[178] 1999	SBP < 100 mmHg and pulse rate > 100 bpm accompanied by cold sweating, pallor, and oliguria.
Lin *et al*[179] 1999	SBP < 100 mmHg and pulse rate > 100 bpm accompanied by cold sweating, pallor, and oliguria.
Liu T *et al*[102] 2006	SBP <90 mmHg persisting for more than 1 hour despite fluid challenge, and signs of hypotension.
Lohse *et al*[146] 2015	SBP < 100 mmHg and HR > 100 bpm.

Lv *et al*[190] 2019	Cardiogenic shock, with SBP levels < 80 mmHg.
MacLeod *et al*[49] 1982	Pulse rate of > 100 bpm and a SBP < 100mmHg.
Maiwall *et al*[104] 2020	Mean arterial pressure less than 65 mm of Hg.
Mäkelä *et al*[148] 1996	Pulse of more than 100 bpm, and SBP less than 100 mmHg.
Makhlouf *et al*[50] 2012	SBP < 90 mmHg, together with signs of hypoperfusion not responsive to the administration of plasma expanders and PRBC.
Minakari *et al*[69] 2017	Including orthostatic hypotension (defined as reduction of 20 mmHg in SBP or of 10 mmHg in diastolic blood pressure after three minutes of standing compared with BP from sitting or supine position) and shock (defined as SBP < 90 mmHg).
Morsy *et al*[82] 2014	SBP < 90 mmHg or a reduction of > 40 mmHg compared with the baseline, together with signs of hypoperfusion unresponsive to the administration of plasma expanders and PRBCs.
Nagata *et al*[20] 2017	SBP < 90 mmHg, paleness, cold sweats, dizziness, syncope, or unconsciousness.
Ntagirabiri *et al*[52] 2012	SBP < 90 mmHg.
Oakland *et al*[193] 2018	HR ≥ 100 bpm and SBP < 100 mmHg.
O'brien *et al*[150] 1986	SBP < 100 mmHg or tachycardia ≥ 100 bpm plus a postural fall in BP on sitting up.
Ogasawara *et al*[151] 2014	SBP of < 90 mmHg or a HR of > 100 bpm.
Oxner *et al*[152] 1992	Pulse > 100 bpm, SBP < 100 mmHg, or a fall in haemoglobin greater than 2 g/dl in 24 hour.
Park *et al*[53] 2016	Decrease in mean blood pressure below 60 mmHg.
Parreira *et al*[153] 2002	SBP < 90 mmHg, accompanied by HR over 100 bpm.
Rajgopal *et al*[155] 1991	Pulse rate greater than 100 bpm or a SBP less than 100 mmHg, or both.

Rosenstock *et al*[156] 2013	HR > 100 bpm and SBP < 100 mmHg.
Rudolph *et al*[56] 2003	SBP < 100 mmHg.
Sabat *et al*[25] 1998	SBP < 100 mmHg and tachycardia (heart rate > 100 bpm), with signs of hypoperfusion.
Sato *et al*[205] 2021	BP of ≤ 90 mmHg caused by bleeding.
Sereda *et al*[58] 1977	SBP below 100 mmHg and tachycardia (a pulse rate higher than 110 per minute with peripheral sympathetic overactivity, postural hypotension or a history of syncope).
Sey *et al*[86] 2019	Tachycardia (pulse ≥ 100, SBP ≥ 100) and/or hypotension (BP < 100).
Shih *et al*[61] 2018	SBP < 90 mmHg at ED triage.
Simon-Rudler *et al*[162] 2007	Pulse > 100 bpm or SBP < 100 mmHg.
Tekant *et al*[161] 1995	BP < 100 mmHg.
Thomas *et al*[116] 1992	SBP <90 mm Hg.
Thomopoulos *et al*[164] 2001	SBP < 100 mmHg, pulse rate > 100 bpm.
Thomopoulos *et al*[163] 2004	SBP < 100 mmHg, pulse rate > 100 bpm.
Thomopoulos *et al*[110] 2006	SBP < 100 mmHg, pulse rate > 100 bpm.
Tsai *et al*[112] 2014	Signs of peripheral hypoperfusion on physical examination, along with a SBP below 100 mmHg.
Tsai *et al*[111] 2019	Signs of peripheral hypoperfusion on physical examination, along with a SBP below 100 mmHg.
Villanueva *et al*[107] 1999	SBP < 100 mmHg and heart rate > 100 bpm.
Villanueva *et al*[108] 2006	SBP < 100 mmHg and heart rate > 100 bpm.
Vivas *et al*[65] 2001	SBP below 90 mmHg or a decrease of more than 20 mmHg from the initial value during the bleeding episode.
Vuachet *et al*[113] 2015	SBP below 80 mmHg with signs of hypoperfusion.
Wang *et al*[171] 2015	SBP < 90 mmHg or diastolic blood pressure < 60 mmHg, together with HR exceeding 100 bpm.
Yadav *et al*[63] 2021	Mean arterial blood pressure of < 100 mmHg and tachycardia as pulse rate of > 100 bpm.

Yang *et al*[159] 2018	SBP < 100 mmHg on arrival.
Yii *et al*[160] 1996	BP < 100 mmHg, pulse rate > 110 bpm and peripheral vasoconstriction and indications for emergency operation.

SBP: Systolic blood pressure; HR: Hear rate; bpm: Beats per minute; BP: Blood pressure; CVP: Central venous pressure; JVP: Jugular venous pressure; ED: Emergency department; PRBC: Packed red blood cell.

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