

**American College of Radiology
ACR Appropriateness Criteria®**

Clinical Condition: Treatment of Acute Nonvariceal Gastrointestinal Tract Bleeding

Variant 1: Upper GI tract bleeding suspected based on clinical exam and NG tube aspirate. Active hematemesis and/or melena. Next procedure/intervention.

Treatment/Procedure	Rating	Comments
Diagnostic/therapeutic endoscopy	9	
Transcatheter arteriography/intervention (TAI)	5	Embolization particularly useful for poor surgical candidates.
Surgery	4	
CT abdomen	3	
Nuclear medicine scan	2	
MRI abdomen	1	
<u>Rating Scale:</u> 1=Least appropriate, 9=Most appropriate		

Variant 2: Upper GI tract bleeding. Endoscopy localized the bleeding site. Ongoing or recurrent bleeding. Next procedure/intervention.

Treatment/Procedure	Rating	Comments
Diagnostic/therapeutic endoscopy (repeat)	7	If there is a reasonable likelihood that patient will respond to a second attempt at therapeutic endoscopy.
Surgery	7	
Transcatheter arteriography/intervention (TAI)	7	Embolization particularly useful for poor surgical candidates.
Nuclear medicine scan	2	
CT abdomen	2	
MRI abdomen	1	
<u>Rating Scale:</u> 1=Least appropriate, 9=Most appropriate		

An ACR Committee on Appropriateness Criteria and its expert panels have developed criteria for determining appropriate imaging examinations for diagnosis and treatment of specified medical condition(s). These criteria are intended to guide radiologists, radiation oncologists and referring physicians in making decisions regarding radiologic imaging and treatment. Generally, the complexity and severity of a patient's clinical condition should dictate the selection of appropriate imaging procedures or treatments. Only those exams generally used for evaluation of the patient's condition are ranked. Other imaging studies necessary to evaluate other co-existent diseases or other medical consequences of this condition are not considered in this document. The availability of equipment or personnel may influence the selection of appropriate imaging procedures or treatments. Imaging techniques classified as investigational by the FDA have not been considered in developing these criteria; however, study of new equipment and applications should be encouraged. The ultimate decision regarding the appropriateness of any specific radiologic examination or treatment must be made by the referring physician and radiologist in light of all the circumstances presented in an individual examination.

Clinical Condition:**Treatment of Acute Nonvariceal Gastrointestinal Tract Bleeding****Variant 3:**

Upper GI tract bleeding. Active bleeding from the biliary tract or pancreatic duct, confirmed by endoscopy. Next procedure/intervention.

Treatment/Procedure	Rating	Comments
Transcatheter arteriography/intervention (TAI)	8	Particularly if vascular etiology is suspected.
CT abdomen	6	Most appropriate in certain clinical circumstances (eg, likely pseudoaneurysm).
Surgery	4	
Diagnostic/therapeutic endoscopy (repeat)	3	
MRI abdomen	3	
Nuclear medicine scan	1	
Rating Scale: 1=Least appropriate, 9=Most appropriate		

Variant 4:

Lower GI tract bleeding. Active bleeding with hematochezia or melena in a hemodynamically stable patient. Next procedure/intervention.

Treatment/Procedure	Rating	Comments
Diagnostic/therapeutic colonoscopy	8	Use of colonoscopy or nuclear medicine depends on local expertise and experience.
Nuclear medicine scan	8	Use of colonoscopy or nuclear medicine depends on local expertise and experience.
Transcatheter arteriography/intervention (TAI)	5	Embolization if arteriogram positive.
CT abdomen	4	CTA is an emerging technology that may become increasingly more appropriate.
Surgery	3	
MRI abdomen	1	
Rating Scale: 1=Least appropriate, 9=Most appropriate		

An ACR Committee on Appropriateness Criteria and its expert panels have developed criteria for determining appropriate imaging examinations for diagnosis and treatment of specified medical condition(s). These criteria are intended to guide radiologists, radiation oncologists and referring physicians in making decisions regarding radiologic imaging and treatment. Generally, the complexity and severity of a patient's clinical condition should dictate the selection of appropriate imaging procedures or treatments. Only those exams generally used for evaluation of the patient's condition are ranked. Other imaging studies necessary to evaluate other co-existent diseases or other medical consequences of this condition are not considered in this document. The availability of equipment or personnel may influence the selection of appropriate imaging procedures or treatments. Imaging techniques classified as investigational by the FDA have not been considered in developing these criteria; however, study of new equipment and applications should be encouraged. The ultimate decision regarding the appropriateness of any specific radiologic examination or treatment must be made by the referring physician and radiologist in light of all the circumstances presented in an individual examination.

Clinical Condition:**Treatment of Acute Nonvariceal Gastrointestinal Tract Bleeding****Variant 5:****Lower GI tract bleeding. Active bleeding in a hemodynamically unstable patient or a patient who has required more than 5 units of blood. Next procedure/intervention.**

Treatment/Procedure	Rating	Comments
Transcatheter arteriography/intervention (TAI)	8	Embolization if arteriogram positive.
Diagnostic/therapeutic colonoscopy	6	Less appropriate in hemodynamically unstable patients.
Surgery	6	More appropriate when the bleeding site has been localized.
Nuclear medicine scan	6	More appropriate in the hemodynamically stable patient.
CT abdomen	3	CTA is an emerging technology that may become increasingly more appropriate.
MRI abdomen	1	
Rating Scale: 1=Least appropriate, 9=Most appropriate		

Variant 6:**Lower GI tract bleeding. Colonoscopy localized the bleeding site. Ongoing or recurrent bleeding. Next procedure/intervention.**

Treatment/Procedure	Rating	Comments
Transcatheter arteriography/intervention (TAI)	8	Embolization if arteriogram positive.
Surgery	7	Most appropriate when the site of bleeding has been localized.
Diagnostic/therapeutic colonoscopy	5	If there is a reasonable likelihood that patient will respond to a second attempt at therapeutic colonoscopy.
Nuclear medicine scan	2	
CT abdomen	2	
MRI abdomen	1	
Rating Scale: 1=Least appropriate, 9=Most appropriate		

An ACR Committee on Appropriateness Criteria and its expert panels have developed criteria for determining appropriate imaging examinations for diagnosis and treatment of specified medical condition(s). These criteria are intended to guide radiologists, radiation oncologists and referring physicians in making decisions regarding radiologic imaging and treatment. Generally, the complexity and severity of a patient's clinical condition should dictate the selection of appropriate imaging procedures or treatments. Only those exams generally used for evaluation of the patient's condition are ranked. Other imaging studies necessary to evaluate other co-existent diseases or other medical consequences of this condition are not considered in this document. The availability of equipment or personnel may influence the selection of appropriate imaging procedures or treatments. Imaging techniques classified as investigational by the FDA have not been considered in developing these criteria; however, study of new equipment and applications should be encouraged. The ultimate decision regarding the appropriateness of any specific radiologic examination or treatment must be made by the referring physician and radiologist in light of all the circumstances presented in an individual examination.

TREATMENT OF ACUTE NONVARICEAL GASTROINTESTINAL TRACT BLEEDING

Expert Panel on Interventional Radiology: Steven F. Millward, MD¹; Curtis W. Bakal, MD²; Joshua L. Weintraub, MD³; James C. Bass, MD⁴; Daniel B. Brown, MD⁵; Kevin W. Dickey, MD⁶; John M. Gemery, MD⁷; David P. Klyde, MD⁸; Aalpen A. Patel, MD⁹; Riad Salem, MD¹⁰; John B. Selby, Jr., MD¹¹; James E. Silberzweig, MD¹²; Frederick L. Greene, MD¹³; Don C. Rockey, MD.¹⁴

Summary of Literature Review

Acute gastrointestinal (GI) tract bleeding remains a major cause of morbidity and mortality despite advances in management. The mortality rate is around 10%, but increases to up to 40% in cases of massive bleeding associated with hemodynamic instability or the requirement for transfusion of more than four units of blood.

Part 1: Upper Gastrointestinal Tract

Bleeding from the esophagus, stomach, or upper small bowel proximal to the ligament of Treitz is termed upper gastrointestinal (UGI) tract bleeding. It presents with hematemesis and/or melena, but may sometimes cause bright red hematochezia in cases with severe bleeding. Causes of UGI bleeding include duodenal and gastric ulcers, gastric erosions, Mallory-Weiss tears, esophagitis, duodenitis, neoplasms, esophageal ulcers, stomal ulcers, and vascular malformations. Varices are also an important cause of UGI bleeding. However, since these involve the diagnosis and management of portal hypertension, variceal bleeding will not be described in this document.

Patients with acute GI bleeding should initially be managed with restoration of intravascular volume. Insertion of a nasogastric tube and aspiration of gastric contents can be used to help determine if the source is the UGI tract. UGI endoscopy is the best initial method for both the diagnosis and treatment of UGI bleeding: the source of bleeding is identified in 95% of cases, and endoscopic treatment is effective in 80%-90% of patients.

Management options for patients with acute nonvariceal UGI bleeding that fails to stop with endoscopic treatment

include repeat endoscopy, emergency surgery and transcatheter arteriography followed by transcatheter intervention (usually embolization). Surgery and transcatheter arteriography/intervention (TAI) are both equally effective in treating patients with acute non-variceal UGI bleeding that fails to respond to endoscopic treatment [1]. In a comparative study of 70 patients, mortality rates and recurrent bleeding rates were similar for both surgery and TAI, despite more advanced age and greater prevalence of heart disease in those receiving TAI [1]. Failure of TAI to control bleeding is more likely in patients with coagulation disorders, or multiorgan failure and in cases of technically inadequate TAI [2,3].

Diagnostic arteriography is done prior to embolization. Generally, positive findings at arteriography (contrast extravasation) are required in order to direct embolization. However, with UGI bleeding, embolization directed by endoscopic findings alone (with no extravasation seen with diagnostic arteriography) is also effective [2,3].

Complication rates with TAI, including ischemia of the embolized organ, are low, and prolonged clinical success can be expected in at least 65% of patients [1-5].

There is no large randomized trial on which to base recommendations, so the choice of either surgery or TAI for patients with acute, nonvariceal UGI bleeding that fails to respond to endoscopic therapy must be based on local experience and expertise. However, TAI should be considered, particularly in patients at high risk for surgery [1]. TAI should also be strongly considered in those rare instances where acute UGI bleeding occurs from the pancreatic or bile ducts [6,7].

Part 2: Lower Gastrointestinal Tract

Acute lower gastrointestinal (LGI) tract bleeding is defined as bleeding into the small bowel distal to the ligament of Treitz, or bleeding into the large bowel. It may present as either melena or hematochezia, depending on the site. Causes of LGI bleeding include inflammatory bowel disease, neoplasms, stress ulcers, surgical anastomoses, vascular lesions such as angiodysplasia, and diverticulitis.

There is considerable controversy in regard to the best modality for the initial diagnosis of the cause of LGI bleeding. Radiological tests that can be used include radionuclide scans, contrast enhanced computed tomography (CT) scans, and transcatheter arteriography. Radionuclide scans are more sensitive than arteriography for detecting lower rates of bleeding (approximately 0.05-0.1 ml/min, compared to 0.5 ml/min), but radionuclide scans provide less precise anatomic localization of the site of bleeding. CT scanning is emerging as a new technique

¹Principal Author, University of Western Ontario, London, Ontario (Canada); ²Panel Chair, University of Medicine and Dentistry of New Jersey-New Jersey Medical School, Newark, NJ; ³Panel Vice-Chair, Mount Sinai Medical Center, New York, NY; ⁴Miriam Hospital, Providence, RI; ⁵Mallinckrodt Institute of Radiology, Saint Louis, Mo; ⁶Saint Vincent's Medical Center, Bridgeport, Conn; ⁷Dartmouth-Hitchcock Medical Center, Lebanon, NH; ⁸University of Medicine and Dentistry of New Jersey-New Jersey Medical School, Newark, NJ; ⁹Hospital of the University of Pennsylvania, Philadelphia, Pa; ¹⁰Northwestern Memorial Hospital, Chicago, Ill; ¹¹Medical University of South Carolina, Charleston, SC; ¹²St. Luke's-Roosevelt Hospital Center, New York, NY; ¹³Carolinas Medical Center, Charlotte, NC, American College of Surgeons; ¹⁴University of Texas, Southwest Medical Center, Dallas, Texas, American Gastroenterological Association.

Reprint requests to: Department of Quality & Safety, American College of Radiology, 1891 Preston White Drive, Reston, VA 20191-4397.

An ACR Committee on Appropriateness Criteria and its expert panels have developed criteria for determining appropriate imaging examinations for diagnosis and treatment of specified medical condition(s). These criteria are intended to guide radiologists, radiation oncologists and referring physicians in making decisions regarding radiologic imaging and treatment. Generally, the complexity and severity of a patient's clinical condition should dictate the selection of appropriate imaging procedures or treatments. Only those exams generally used for evaluation of the patient's condition are ranked. Other imaging studies necessary to evaluate other co-existent diseases or other medical consequences of this condition are not considered in this document. The availability of equipment or personnel may influence the selection of appropriate imaging procedures or treatments. Imaging techniques classified as investigational by the FDA have not been considered in developing these criteria; however, study of new equipment and applications should be encouraged. The ultimate decision regarding the appropriateness of any specific radiologic examination or treatment must be made by the referring physician and radiologist in light of all the circumstances presented in an individual examination.

for localization of bleeding, although there are little current data regarding use of CT for GI bleeding.

Urgent colonoscopy can be used for both the diagnosis and treatment of LGI bleeding. A randomized, controlled trial of urgent colonoscopy compared to standard care was performed in 100 patients with acute LGI bleeding. Although there was no difference in outcomes, colonoscopy identified the cause of bleeding more often than standard care [8].

Transcatheter arteriography is more likely to identify the source of LGI bleeding in patients who have massive bleeding resulting in either hemodynamic instability or requirement for greater than five units of blood transfusion [9]. Demonstration of the site of bleeding at arteriography enables the possibility of treatment with TAI. Success rates of TAI for first-line therapy for LGI bleeding range from 40%-85% depending on the cause of bleeding [10]. Technically successful TAI could be performed in approximately 73% of patients in one series [11]. Asymptomatic ischemia of the embolized bowel can occur, but ischemia that requires treatment is uncommon [11-16].

Technically successful TAI will usually result in initial hemostasis, but rebleeding rates of 22%-56% have been reported [11,12,15,16]. However, in some series TAI has provided definitive treatment for 81%-86% of patients [13,14]. TAI may be most effective for bleeding from colonic diverticulitis, and where bleeding is occurring from the large bowel distal to the cecum [10,16].

No large prospective, randomized trials have been conducted to compare TAI with surgery for LGI bleeding. However, TAI can be performed at the time of diagnostic arteriography. Consequently, use of TAI in patients with acute LGI bleeding, where active contrast extravasation is seen during diagnostic arteriography, appears to be a safe and relatively effective treatment that should be considered, depending on local experience and expertise.

Summary

Upper GI Bleeding:

- Endoscopy is the best initial diagnostic and therapeutic procedure.
- Surgery and transcatheter arteriography/intervention (TAI) are equally effective following failed therapeutic endoscopy, but TAI should be considered particularly in patients at high-risk for surgery.
- TAI is less likely to be successful in patients with impaired coagulation.
- TAI is the best technique for treatment of bleeding into the biliary tree or pancreatic duct.

Lower GI Bleeding:

- For diagnosis of the cause of colonic bleeding urgent colonoscopy is the most effective technique.
- Arteriography is most likely to demonstrate the site of bleeding (and guide therapeutic embolization) in hemodynamically unstable patients, or those who have required transfusion of greater than 5 units of blood.
- TAI is more effective for the treatment of diverticular bleeding than for bleeding from other causes, and is more effective for lesions distal to the cecum, compared to lesions involving the cecum, ileum, or jejunum.
- Recurrence of bleeding following technically successful TAI may occur in 14-65% of patients.
- Symptomatic bowel ischemia following TAI is uncommon.

Many of the diagnostic, surgical, and interventional procedures described here are highly specialized. Their availability and utility vary by institutional and operator experience.

References

1. Ripoll C, Banares R, Beceiro I, et al. Comparison of transcatheter arterial embolization and surgery for treatment of bleeding peptic ulcer after endoscopic treatment failure. *J Vasc Interv Radiol* 2004; 15(5):447-450.
2. Aina R, Oliva VL, Therasse E, et al. Arterial embolotherapy for upper gastrointestinal hemorrhage: outcome assessment. *J Vasc Interv Radiol* 2001; 12(2):195-200.
3. Schenker MP, Duszak R, Jr., Soulen MC, et al. Upper gastrointestinal hemorrhage and transcatheter embolotherapy: clinical and technical factors impacting success and survival. *J Vasc Interv Radiol* 2001; 12(11):1263-1271.
4. De Wispelaere JF, De Ronde T, Trigaux JP, de Canniere L, De Geeter T. Duodenal ulcer hemorrhage treated by embolization: results in 28 patients. *Acta Gastroenterol Belg* 2002; 65(1):6-11.
5. Holme JB, Nielsen DT, Funch-Jensen P, Mortensen FV. Transcatheter arterial embolization in patients with bleeding duodenal ulcer: an alternative to surgery. *Acta Radiol* 2006; 47(3):244-247.
6. Dasgupta R, Davies NJ, Williamson RC, Jackson JE. Haemosuccus pancreaticus: treatment by arterial embolization. *Clin Radiol* 2002; 57(11):1021-1027.
7. Moodley J, Singh B, Lalloo S, Pershad S, Robbs JV. Non-operative management of haemobilia. *Br J Surg* 2001; 88(8):1073-1076.
8. Green BT, Rockey DC, Portwood G, et al. Urgent colonoscopy for evaluation and management of acute lower gastrointestinal hemorrhage: a randomized controlled trial. *Am J Gastroenterol* 2005; 100(11):2395-2402.
9. Abbas SM, Bissett IP, Holden A, Woodfield JC, Parry BR, Duncan D. Clinical variables associated with positive angiographic localization of lower gastrointestinal bleeding. *ANZ J Surg* 2005; 75(11):953-957.
10. Khanna A, Ognibene SJ, Koniaris LG. Embolization as first-line therapy for diverticulosis-related massive lower gastrointestinal bleeding: evidence from a meta-analysis. *J Gastrointest Surg* 2005; 9(3):343-352.
11. Bandi R, Shetty PC, Sharma RP, Burke TH, Burke MW, Kastan D. Superselective arterial embolization for the treatment of lower

An ACR Committee on Appropriateness Criteria and its expert panels have developed criteria for determining appropriate imaging examinations for diagnosis and treatment of specified medical condition(s). These criteria are intended to guide radiologists, radiation oncologists and referring physicians in making decisions regarding radiologic imaging and treatment. Generally, the complexity and severity of a patient's clinical condition should dictate the selection of appropriate imaging procedures or treatments. Only those exams generally used for evaluation of the patient's condition are ranked. Other imaging studies necessary to evaluate other co-existent diseases or other medical consequences of this condition are not considered in this document. The availability of equipment or personnel may influence the selection of appropriate imaging procedures or treatments. Imaging techniques classified as investigational by the FDA have not been considered in developing these criteria; however, study of new equipment and applications should be encouraged. The ultimate decision regarding the appropriateness of any specific radiologic examination or treatment must be made by the referring physician and radiologist in light of all the circumstances presented in an individual examination.

- gastrointestinal hemorrhage. *J Vasc Interv Radiol* 2001; 12(12):1399-1405.
12. DeBarros J, Rosas L, Cohen J, Vignati P, Sardella W, Hallisey M. The changing paradigm for the treatment of colonic hemorrhage: superselective angiographic embolization. *Dis Colon Rectum* 2002; 45(6):802-808.
 13. Funaki B, Kostelic JK, Lorenz J, et al. Superselective microcoil embolization of colonic hemorrhage. *AJR* 2001; 177(4):829-836.
 14. Kuo WT, Lee DE, Saad WE, Patel N, Sahler LG, Waldman DL. Superselective microcoil embolization for the treatment of lower gastrointestinal hemorrhage. *J Vasc Interv Radiol* 2003; 14(12):1503-1509.
 15. Neuman HB, Zarzaur BL, Meyer AA, Cairns BA, Rich PB. Superselective catheterization and embolization as first-line therapy for lower gastrointestinal bleeding. *Am Surg* 2005; 71(7):539-544; discussion 544-535.
 16. Peck DJ, McLoughlin RF, Hughson MN, Rankin RN. Percutaneous embolotherapy of lower gastrointestinal hemorrhage. *J Vasc Interv Radiol* 1998; 9(5):747-751.

An ACR Committee on Appropriateness Criteria and its expert panels have developed criteria for determining appropriate imaging examinations for diagnosis and treatment of specified medical condition(s). These criteria are intended to guide radiologists, radiation oncologists and referring physicians in making decisions regarding radiologic imaging and treatment. Generally, the complexity and severity of a patient's clinical condition should dictate the selection of appropriate imaging procedures or treatments. Only those exams generally used for evaluation of the patient's condition are ranked. Other imaging studies necessary to evaluate other co-existent diseases or other medical consequences of this condition are not considered in this document. The availability of equipment or personnel may influence the selection of appropriate imaging procedures or treatments. Imaging techniques classified as investigational by the FDA have not been considered in developing these criteria; however, study of new equipment and applications should be encouraged. The ultimate decision regarding the appropriateness of any specific radiologic examination or treatment must be made by the referring physician and radiologist in light of all the circumstances presented in an individual examination.