Critical Review Form
Diagnostic Test

HYPERLINK "http://pmid.us/25995683"Kim J, Kim YH, Lee KH, Lee YJ, Park JH. Diagnostic Performance of CT Angiography in Patients Visiting Emergency Department with Overt Gastrointestinal Bleeding. Korean J Radiol. 2015 May-Jun;16(3):541-9.

Objectives: **"to investigate the diagnostic performance of CTA as a first-line diagnostic modality in identifying definite or possible causes of bleeding and clinical features associated with positive test result of CTA in patients with overt GI bleeding." (p. 542)**

Methods: **This retrospective, observation study was conducted in the ED of Seoul National University Bundang Hospital in Seoul, Korea between July and December of 2010. Adult patients age > 18 years who visited the ED with "overt" GI bleeding and underwent CT angiography were identified by a retrospective search of the medical records. Two radiologists who were aware of overt GI bleeding but were otherwise blinded to clinical information and endoscopic results retrospectively reviewed CT images and reached consensus whether there was any "definite" or "potential" bleeding focus through the GI tract. A definite bleeding focus was defined as active extravasation of contrast in the GI tract, while a potential focus was defined as "a lesion known to be associated with GI bleeding," such as ulceration or mass in the GI tract without active extravasation of contrast.**

Massive bleeding was defined as either the need for transfusion of at least 4 units of blood during a 24-hour period or hemodynamic instability (SBP < 90 mmHg). Recent bleeding was defined as episodes of GI bleeding within 24 hours of undergoing CTA.

Out of 254 patients identified as presenting to the ED with overt GI bleeding, those who initially underwent endoscopy (n = 73), underwent CT scanning with non-triple phase CTA protocol (n = 38), did not undergo any diagnostic testing (n = 21), or had a "lack of acceptable standard of reference" (n = 11) were excluded, leaving 111 patients for analysis. The mean age was 63.4 years and 45% were female. Other diagnostic studies were performed within 24 hours after CTA in 93 patients (83.8%). The remaining patients were followed clinically for a median of 34 months (range 6 to 51 months).

Guide		Comments
I.	**Are the results valid?**	
A.	**Did clinicians face diagnostic uncertainty?**	Yes. The study included patients with both upper and lower GI hemorrhage. CT scans were performed prior to additional testing, hence the location of bleeding and presence of extravasation were not known.
B.	**Was there a blind comparison with an independent gold**	Uncertain. The authors report that "One investigator who was not involved in CT image interpretation or

	standard applied similarly to all patients? (Confirmation Bias)	medical record review reviewed all available subsequent studies." (p. 544) They do not specify whether this investigator was blinded to CT results (diagnostic review bias). Radiologists reviewing the CT scans were blinded to clinical information and additional results. Additionally, no single "gold standard" was used, but rather the gold standard was any additional work-up (formal angiography, small bowel follow-through, endoscopy, tagged RBC scanning) or resolution of bleeding with no recurrence within 6 months (partial/differential verification bias).
C.	**Did the results of the test being evaluated influence the decision to perform the gold standard? (Ascertainment Bias)**	Presumably yes. As noted above, not all patients underwent additional testing, and those that did underwent a variety of studies. As CT results would have been available to clinicians providing care, it seems likely that these results would have influenced which (if any) additional studies were ordered (ascertainment bias).
II.	**What are the results?**	
A.	**What likelihood ratios were associated with the range of possible test results?**	• Of the 111 patients, 23 (20.7%) with overt GI bleeding had definite bleeding foci on CTA. • CTA failed to demonstrate a definite bleeding focus in one patient who had confirmed hemorrhagic gastritis with active bleeding on gastroscopy. • CT angiography also identified potential causes of bleeding in 45 patients (40.5%), 44 of which were confirmed on subsequent testing. o One patient diagnosed with colitis on CT subsequently had a negative colonoscopy. • To identify either a definite or potential cause of bleeding, the diagnostic yield of CTA was 61.3% (68 of 111), with the following test characteristics: • Sensitivity 84.8% (67 of 79). • Specificity 96.9% (31 of 32) • PPV 98.5% (67 of 68). • NPV 72.1% (31 of 43). • LR+ 27 • LR- 0.16
III.	**How can I apply the results to patient care?**	
A.	**Will the reproducibility of the test result and its interpretation be satisfactory in my clinical setting?**	Yes. We have the capability of performing CT angiography of the abdomen and pelvis with access to experienced radiologist capable of accurately interpreting the results.

B.	**Are the results applicable to the patients in my practice?**	Yes. We frequently encounter patients with GI hemorrhage for whom the location and source of bleeding are unclear.
C.	**Will the results change my management strategy?**	Uncertain. While this study suggests that in cases of GI hemorrhage in the ED, CT angiography accurately identified sources of active or potential bleeding, the clinical utility of this is uncertain. Patients with a positive CT required additional testing in the majority of cases. This study was not designed to assess impact, and it is possible (and likely) that CTA results guided which additional tests to perform. It remains unclear whether specific patients (e.g. those with massive hemorrhage) are more likely to benefit from CTA.
D.	**Will patients be better off as a result of the test?**	Uncertain. See above.

Limitations:

1. **This was a retrospective review at risk for selection bias and incomplete enrollment, particularly as the primary enrollment criteria ("overt GI bleeding") is vague and subjective.**

2. **It is unclear whether the investigator determining outcomes was blinded to CT results (diagnostic review bias).**

3. **No single "gold standard" was used, but rather the gold standard was based on additional work-up or resolution of bleeding with no recurrence within 6 months (partial/differential verification bias).**

4. **CT results likely influenced which (if any) additional studies were performed (ascertainment bias).**

5. **It is unclear based on this study if CTA results have a significant, positive influence on subsequent testing beyond clinician gestalt and lab results.**

Bottom Line:

For patients in the ED with GI hemorrhage, while CTA is diagnostically accurate (positive likelihood ratio 27, negative likelihood ratio 0.16) this study was not designed to assess impact. Specifically, it remains unclear whether CTA helps guide further testing/treatment in this patient population.