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American College of Radiology
ACR Appropriateness Criteria®

Staging and Follow-up of Gastric Cancer

Variant: 1 Adult. Suspected gastric adenocarcinoma. Initial imaging.

Procedure	Appropriateness Category	Relative Radiation Level
CT abdomen and pelvis with IV contrast	Usually Appropriate	☢☢☢
FDG-PET/CT skull base to mid-thigh	Usually Appropriate	☢☢☢☢
US abdomen endoscopic	May Be Appropriate (Disagreement)	O
MRI abdomen without and with IV contrast	May Be Appropriate	O
CT abdomen and pelvis without and with IV contrast	May Be Appropriate	☢☢☢☢
US abdomen	Usually Not Appropriate	O
US abdomen and pelvis	Usually Not Appropriate	O
Radiography abdomen	Usually Not Appropriate	☢☢
Fluoroscopy upper GI series	Usually Not Appropriate	☢☢☢
MRI abdomen and pelvis without and with IV contrast	Usually Not Appropriate	O
MRI abdomen and pelvis without IV contrast	Usually Not Appropriate	O
MRI abdomen without IV contrast	Usually Not Appropriate	O
CT abdomen and pelvis without IV contrast	Usually Not Appropriate	☢☢☢
CT chest with IV contrast	Usually Not Appropriate	☢☢☢
CT chest without and with IV contrast	Usually Not Appropriate	☢☢☢
CT chest without IV contrast	Usually Not Appropriate	☢☢☢

Variant: 2 Adult. Gastric adenocarcinoma. Staging for locoregional or distant metastases.

Procedure	Appropriateness Category	Relative Radiation Level
CT abdomen and pelvis with IV contrast	Usually Appropriate	☢☢☢
FDG-PET/CT skull base to mid-thigh	Usually Appropriate	☢☢☢☢
MRI abdomen and pelvis without and with IV contrast	May Be Appropriate	O
MRI abdomen and pelvis without IV contrast	May Be Appropriate	O
CT chest with IV contrast	May Be Appropriate	☢☢☢
CT abdomen and pelvis without and with IV contrast	May Be Appropriate	☢☢☢☢
US abdomen	Usually Not Appropriate	O
US abdomen and pelvis	Usually Not Appropriate	O
US abdomen endoscopic	Usually Not Appropriate	O
Radiography abdomen	Usually Not Appropriate	☢☢
Fluoroscopy upper GI series	Usually Not Appropriate	☢☢☢
CT abdomen and pelvis without IV contrast	Usually Not Appropriate	☢☢☢
CT chest without and with IV contrast	Usually Not Appropriate	☢☢☢
CT chest without IV contrast	Usually Not Appropriate	☢☢☢

Variant: 3 Adult. Gastric adenocarcinoma. Posttreatment evaluation.

Procedure	Appropriateness Category	Relative Radiation Level
CT abdomen and pelvis with IV contrast	Usually Appropriate	☢☢☢

FDG-PET/CT skull base to mid-thigh	Usually Appropriate	☢☢☢☢
MRI abdomen and pelvis without and with IV contrast	May Be Appropriate	O
MRI abdomen without and with IV contrast	May Be Appropriate	O
US abdomen	Usually Not Appropriate	O
US abdomen and pelvis	Usually Not Appropriate	O
US abdomen endoscopic	Usually Not Appropriate	O
Radiography abdomen	Usually Not Appropriate	☢☢
Fluoroscopy upper GI series	Usually Not Appropriate	☢☢☢
MRI abdomen and pelvis without IV contrast	Usually Not Appropriate	O
MRI abdomen without IV contrast	Usually Not Appropriate	O
CT abdomen and pelvis without IV contrast	Usually Not Appropriate	☢☢☢
CT chest with IV contrast	Usually Not Appropriate	☢☢☢
CT chest without and with IV contrast	Usually Not Appropriate	☢☢☢
CT chest without IV contrast	Usually Not Appropriate	☢☢☢
CT abdomen and pelvis without and with IV contrast	Usually Not Appropriate	☢☢☢☢

Variant: 4 Adult. Surveillance of gastric adenocarcinoma.

Procedure	Appropriateness Category	Relative Radiation Level
CT abdomen and pelvis with IV contrast	Usually Appropriate	☢☢☢
FDG-PET/CT skull base to mid-thigh	May Be Appropriate	☢☢☢☢
US abdomen	Usually Not Appropriate	O
US abdomen and pelvis	Usually Not Appropriate	O
US abdomen endoscopic	Usually Not Appropriate	O
Radiography abdomen	Usually Not Appropriate	☢☢
Fluoroscopy upper GI series	Usually Not Appropriate	☢☢☢
MRI abdomen and pelvis without and with IV contrast	Usually Not Appropriate	O
MRI abdomen and pelvis without IV contrast	Usually Not Appropriate	O
MRI abdomen without and with IV contrast	Usually Not Appropriate	O
MRI abdomen without IV contrast	Usually Not Appropriate	O
CT abdomen and pelvis without IV contrast	Usually Not Appropriate	☢☢☢
CT chest with IV contrast	Usually Not Appropriate	☢☢☢
CT chest without and with IV contrast	Usually Not Appropriate	☢☢☢
CT chest without IV contrast	Usually Not Appropriate	☢☢☢
CT abdomen and pelvis without and with IV contrast	Usually Not Appropriate	☢☢☢☢

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Summary of Literature Review

Introduction/Background

Gastric cancer is the fifth most commonly diagnosed malignancy and is the third most common cause of death worldwide. Approximately 26,500 patients will be diagnosed in 2024, and approximately 11,130 patients will succumb to the disease [1]. Surgical resection is the only potentially curative approach for gastric cancer. Chemotherapy and radiation therapy can prolong survival.

Pathologically, there are two types, intestinal and diffuse. The tumor caused by Helicobacter pylori infection is known as intestinal gland-forming carcinoma and includes tubular, papillary, and mucinous subtypes. In contrast, diffuse gastric cancer has a familial predisposition of 10% to 15%, and 5% are inherited and have a poorer prognosis [2].

Early gastric cancers are typically surgically resectable and confined to the mucosa or submucosa. Lesions measuring less than 2 cm without ulceration are classified as early-stage, regardless of lymph node status. Based on size, early gastric cancers are described as small when ≤2 cm and minute when <5 mm. As tumor size increases, the lesions often exhibit greater histologic heterogeneity and a higher likelihood of poor differentiation.

The likelihood of prolonged disease-free survival decreases once the tumor cells infiltrate the submucosa, with 5-year survival rates between 20% and 30% [3]. Patients with node-positive disease are candidates for adjuvant therapy [3,4]. Surgery is the main treatment for stage I gastric cancer. For stages II and III gastric cancer, treatment is gastrectomy with or without neoadjuvant or postoperative chemotherapy and/or radiation therapy. Stage IV disease is not resectable. The most common sites of metastases are the liver, lungs, bones, adrenal glands, and the peritoneum.

The standard chemotherapy drugs can be given alone or in combination, including capecitabine, cisplatin, docetaxel, fluorouracil, leucovorin, and oxaliplatin. For stage IV gastric cancer that is HER2 negative, the treatment includes chemotherapy with or without immunotherapy. For HER2-positive tumors, trastuzumab may be included. Several trials have shown the potential benefit of neoadjuvant chemotherapy, with or without radiation therapy, resulting in downsizing the tumor, potentially increasing the likelihood of curative resection, and eliminating micrometastasis [3,4]. Imaging plays a key role in assessing response to treatment [4,5].

Special Imaging Considerations

Advanced imaging and machine learning enhance gastric cancer diagnostics, improving staging and treatment decisions; however, they are still in the exploratory phase. CT texture analysis predicts clinical T and N stages in gastric cancer with a 90.4% and 81.6% accuracy, respectively [6]. Perfusion CT, especially blood flow, can distinguish metastatic from inflammatory perigastric lymph nodes with an 85.3% sensitivity and 66.0% specificity [7]. Iodine concentration in dual-energy CT (DECT) may differentiate between cancerous and benign gastric tissues and various adenocarcinoma grades, aiding noninvasive diagnosis [8].

New techniques have been used to improve the diagnostic accuracy of CT. For example, dual-energy spectral CT imaging differentiates early from advanced gastric cancer by using the iodine concentration [9]. For example, in the venous phase, the mean iodine concentration for early gastric cancer was 19.36 ± 2.82 mg/mL versus 21.25 ± 4.91 mg/mL for advanced gastric cancer.

Computer-aided diagnosis systems increased classification accuracy from 83.33% to 90.00% using spectral features like low single-energy CT values, tumor size, iodine density, and effective-Z values [10]. Multiple instance learning for computer-aided diagnosis with DECT imaging has achieved 76.92% accuracy with an improved Citation-KNN (k-nearest neighbors) algorithm [11].

Initial Imaging Definition

Initial imaging is defined as imaging at the beginning of the care episode for the medical condition defined by the variant. More than one procedure can be considered usually appropriate in the initial imaging evaluation when:

- There are procedures that are equivalent alternatives (ie, only one procedure will be ordered to provide the clinical information to effectively manage the patient's care)

OR

- There are complementary procedures (ie, more than one procedure is ordered as a set or simultaneously wherein each procedure provides unique clinical information to effectively manage the patient's care).

Variant 1: Adult. Suspected gastric adenocarcinoma. Initial imaging.

In this clinical scenario, the patient has suspicion for gastric cancer, and the goal of imaging is to identify the location and size of the tumor. Imaging will help T stage the tumor and assess for locoregional disease for surgical treatment planning.

Variant 1: Adult. Suspected gastric adenocarcinoma. Initial imaging.
A. CT abdomen and pelvis with IV contrast

Recent studies have evaluated advanced imaging techniques for their effectiveness in diagnosing gastric tumors, offering promising noninvasive alternatives with significant benefits. CT using water as an oral contrast agent (Hydro-CT) demonstrated a 92.5% accuracy in tumor identification, comparable to endoscopy [12]. Three-dimensional CT gastrography using 6 g of effervescent crystals mixed in 5 to 10 mL of water as contrast before CT scanning in the left posterior oblique or right lateral decubitus position is more effective in detecting and localizing stomach tumors, particularly early gastric cancers [13]. Low-dose DECT with iodine mapping has a 90% sensitivity in detecting gastric cancer without compromising image quality [14].

The above studies highlight the potential of using water as an oral contrast material and low-dose DECT with iodine mapping as accurate, safer diagnostic tools for gastric tumors. They also highlight their importance in clinical settings in which endoscopy or biopsy may not be feasible.

Variant 1: Adult. Suspected gastric adenocarcinoma. Initial imaging.
B. CT abdomen and pelvis without and with IV contrast

There are no studies that directly compare CT of the abdomen and pelvis without and with intravenous (IV) contrast with CT abdomen and pelvis with IV contrast; thus, the usefulness or added value of including the without IV contrast scan for suspected gastric cancer is not known. This procedure may be useful in some clinical scenarios based on expert opinion.

Variant 1: Adult. Suspected gastric adenocarcinoma. Initial imaging.
C. CT abdomen and pelvis without IV contrast

There are no studies that directly compare CT of the abdomen and pelvis without IV contrast with CT of the abdomen and pelvis with IV contrast in suspected gastric cancer.

Variant 1: Adult. Suspected gastric adenocarcinoma. Initial imaging.
D. CT chest with IV contrast

There is no relevant literature to support the use of CT chest with IV contrast in suspected gastric cancer.

Variant 1: Adult. Suspected gastric adenocarcinoma. Initial imaging.
E. CT chest without and with IV contrast

There is no relevant literature to support the use of CT chest without and with IV contrast in suspected gastric cancer.

Variant 1: Adult. Suspected gastric adenocarcinoma. Initial imaging.
F. CT chest without IV contrast

There is no relevant literature to support the use of CT chest without IV contrast in suspected gastric cancer.

Variant 1: Adult. Suspected gastric adenocarcinoma. Initial imaging.
G. FDG-PET/CT skull base to mid-thigh

The effectiveness of fluorine-18-2-fluoro-2-deoxy-D-glucose (FDG)-PET/CT in diagnosing primary gastric cancer under fasting conditions and after stomach distension using milk and diatrizoate meglumine mixture has been explored [15]. In the fasting state, the sensitivity, specificity, positive predictive value, and negative predictive value were 92.9%, 75.0%, 94.5%, and 69.0%, respectively. After gastric distension, these values were 91.1%, 91.7%, 98.1%, and 68.8%, respectively. The lesion visibility improved significantly, with the maximum standardized uptake value (SUV_{max}) ratio increasing from 3.30 to 13.50, although this did not significantly enhance overall diagnostic accuracy.

Diffusion-weighted imaging (DWI)/T2 and PET/CT have similar sensitivity for detecting upper gastrointestinal (GI) cancers, with tumor size and invasion depth influencing the detectability [16]. Larger tumors showed higher positivity in imaging results. Dual time point imaging with PET/CT effectively differentiates malignant from benign gastric lesions, showing a high sensitivity (87%) and specificity (89.3%) and an area under the curve (AUC) of 0.923 [17]. When used alone, it has a relative sensitivity of only 37.9% and a positive predictive value of 33.6% for detecting gastric cancer, significantly lower than other combined diagnostic methods like endoscopy [18].

A systematic review by Wang et al [19] revealed that the novel agent Ga-68-FAPI-04 PET MRI/CT outperforms PET MRI/CT in detecting primary gastric tumors (100% versus 84.4%), lymph node metastases (81.9% versus 67.2%), and peritoneal metastases (100% versus 44.7%), suggesting its superior diagnostic and staging capabilities for gastric cancer.

Variant 1: Adult. Suspected gastric adenocarcinoma. Initial imaging.
H. Fluoroscopy upper GI series

There is no relevant literature to support the use of fluoroscopy upper GI series in suspected gastric cancer.

Variant 1: Adult. Suspected gastric adenocarcinoma. Initial imaging.
I. MRI abdomen and pelvis without and with IV contrast

There are no studies that directly compare MRI of the abdomen and pelvis without and with IV contrast with MRI abdomen; thus, the usefulness or added value of including the pelvis for suspected gastric cancer is not known.

Variant 1: Adult. Suspected gastric adenocarcinoma. Initial imaging.
J. MRI abdomen and pelvis without IV contrast

There is no relevant literature to support the use of an MRI of the abdomen and pelvis without IV contrast in suspected gastric cancer.

Variant 1: Adult. Suspected gastric adenocarcinoma. Initial imaging.
K. MRI abdomen without and with IV contrast

Limited evidence suggests that MRI abdomen, particularly with DWI, is more effective in detecting gastric cancer than 2-D multidetector CT (MDCT) or conventional MRI alone. In a study by Jang et al [20], researchers found that MRI, combining conventional and DWI techniques, had a higher diagnostic accuracy (77.8%-78.3%) and sensitivity (75.3%-75.9%) for gastric cancer than CT (67.7%-71.4% accuracy, 64.1%-68.2% sensitivity) or conventional MRI (72%-73% accuracy, 68.8%-70% sensitivity). This combined MRI approach was particularly more sensitive for pT2 and pT3 gastric cancers (91.6%-92.6%) than CT (76.8%-81.1%). A recent study showed that multiparametric MRI was better than DECT for the T staging of gastric cancer, with the overall accuracy ranging from 60.9% to 77.2%, which was higher than DECT. Additionally, gastric cancer lesions showed significantly different mean apparent diffusion coefficients (ADC) compared with normal gastric walls, supporting MRI with DWI's enhanced sensitivity for gastric cancer detection [21].

Variant 1: Adult. Suspected gastric adenocarcinoma. Initial imaging.
L. MRI abdomen without IV contrast

Limited evidence exists for using an MRI abdomen without IV contrast in suspected gastric cancer cases. Combining MRI-DWI signal intensity with serum levels of pepsinogen I, pepsinogen II, and carbohydrate antigen 199 can significantly improve early gastric cancer detection [22]. The study showed that DWI signal intensity correlates with gastric cancer differentiation, and changes in serum marker levels (pepsinogen I, pepsinogen II, carbohydrate antigen 199) were significant between patients and healthy controls. This combined diagnostic method achieved an AUC of 0.932, with a 91.67% sensitivity and 90.00% specificity, outperforming individual markers.

Variant 1: Adult. Suspected gastric adenocarcinoma. Initial imaging.
M. Radiography abdomen

There is no relevant literature to support the use of radiography of the abdomen in suspected gastric cancer

Variant 1: Adult. Suspected gastric adenocarcinoma. Initial imaging.
N. US abdomen

There is no relevant literature to support the use of the US abdomen in suspected gastric cancer.

Variant 1: Adult. Suspected gastric adenocarcinoma. Initial imaging.
O. US abdomen and pelvis

There is no relevant literature to support the use of the US abdomen and pelvis in suspected gastric cancer.

Variant 1: Adult. Suspected gastric adenocarcinoma. Initial imaging.
P. US abdomen endoscopic

Limited evidence exists for using an endoscopic US (EUS) in suspected gastric cancer cases. A study comparing EUS and CT for diagnosing gastric lesions in 160 patients found CT to have a higher detection rate of 90.63% compared with EUS's 78.13% [23]. Combining both methods further improved diagnostic accuracy.

Another study on oral contrast ultrasonography (OCUS) in 12,716 patients, including 5,021 elderly, showed that OCUS had a 94.73% diagnostic coincidence rate with gastroscopy for detecting gastric cancer, with sensitivity and specificity rates of 94.74% and 100%, respectively, and a positive and negative predictive value of 100% and 95% [24]. Endoscopy is the reference standard for the detection of cancer.

Variant 2: Adult. Gastric adenocarcinoma. Staging for distant metastases.

In this clinical scenario, the patient has known locally advanced gastric cancer, and imaging aims to assess distant nodal disease, solid organ metastases, and peritoneal disease.

Variant 2: Adult. Gastric adenocarcinoma. Staging for distant metastases.
A. CT abdomen and pelvis with IV contrast

Gastric adenocarcinoma staging studies have highlighted the accuracy and limitations of various imaging techniques, particularly Hydro-MDCT.

He et al [25] noted that CT is superior to double contrast-enhanced ultrasound (CEUS) (US using both an oral US contrast agent and an IV US contrast agent) for T3 and T4 stages, although both have limitations in early-stage cancer. CT has an accuracy of 86.3% for lymph node staging. Accuracy for staging N0, N1, N2, and N3 disease was 83.5%, 89.0%, 83.5%, and 89.0%, respectively [26]; however, slice thickness, tumor size [27], tumor volume [28], and serosal invasion impact accuracy [29]. Wu et al [30] found no significant difference in overall accuracy between OCUS and contrast-enhanced CT (CECT) for staging. However, the former was more accurate for early-stage tumors.

Girolamo et al [31] found that Hydro-CT has an accuracy of 75% for T staging, 69% for N staging, and 99% for detecting metastatic disease, making it reliable for T3 and T4 stages but less so for T1 and T2. Similarly, Fujikawa et al [32] noted the limited usefulness of CT for staging clinical T1 gastric cancer. They reported high detection rates and accuracy for primary tumors, depth of invasion, serosal involvement, and lymph node staging when using Hydro-CT. Li et al [33] reported that pelvic CT yielded negligible additional gastric cancer staging information.

CT has an 86.3% accuracy for N staging [26]. One study's lymph node short axis diameter lymph node-sum correlates with the pathological N stage and provides better diagnostic performance than the conventional MDCT [34]. Kawaguchi et al [35] found that the total diameter of enlarged lymph nodes ≥45 mm was associated with a worse prognosis. However, Wada et al [36] reported a high false-positive rate for nodal metastasis after endoscopic submucosal dissection, indicating the unreliability of CT for nodal diagnosis after this procedure.

CECT is commonly used to detect distant metastatic disease. A meta-analysis reported that CT has a sensitivity and specificity for hepatic metastases and peritoneal carcinomatosis of 74% and 99%, and 33% and 99%, respectively [37].

Identification of peritoneal carcinomatosis preoperatively can preclude unnecessary surgery [37].

Studies have suggested that gastric cancer sizes of 3 to 4 cm have a higher chance of developing peritoneal carcinomatosis [37]. CT has a sensitivity and specificity of 40% and 97% for the detection of ascites [38]. The presence of ascites, peritoneal nodules, smudge-like ground-glass opacities, fat stranding, and peritoneal enhancement suggests peritoneal carcinomatosis [39,40]. For the detection of <5 mm peritoneal nodules, CECT has a low sensitivity of 43% versus 89% for >5 mm. Therefore, the presence of free fluid in the abdomen or pelvis should alert for the possible presence of peritoneal carcinomatosis [38]. However, staging laparoscopy is more effective than CT in detecting peritoneal metastases in esophagogastric cancer, with staging laparoscopy showing a sensitivity of 94.1% and specificity of 100%, compared with MDCT's sensitivity of 58.8% and specificity of 89.6% [41].

Variant 2: Adult. Gastric adenocarcinoma. Staging for distant metastases.
B. CT abdomen and pelvis without and with IV contrast

A retrospective study on 50 patients with gastric cancer to assess the efficacy of 64-slice MDCT prior to as well as following IV contrast administration in detecting peritoneal metastasis [39] had an accuracy of 80% for detecting ascites, 80% for detecting increased peritoneal fat density, 68% for detecting peritoneal thickening/enhancement, and 84% for detecting peritoneal nodules, concluding that CT is a valuable noninvasive tool for diagnosing and staging gastric cancer with peritoneal carcinomatosis [39]. It remains unknown if there is any added utility in including a noncontrast scan phase, although it is unlikely of added benefit.

Variant 2: Adult. Gastric adenocarcinoma. Staging for distant metastases.
C. CT abdomen and pelvis without IV contrast

There are no studies comparing noncontrast CT with CECT for gastric cancer. Tian et al [42] evaluated the efficacy of virtual noncontrast imaging from spectral CT compared with conventional noncontrast CT. The study found that virtual noncontrast imaging may serve as a viable alternative, particularly in the arterial phase, with higher contrast-to-noise ratio values for carcinoma-water (2.72 for virtual noncontrast arterial, 2.60 for virtual noncontrast venous, and 2.61 for virtual noncontrast equilibrium phases) compared with normal CT images [42].

Variant 2: Adult. Gastric adenocarcinoma. Staging for distant metastases.
D. CT chest with IV contrast

Chong et al [43] evaluated the need for thoracic CT in staging gastric cancer in a study of 808 cases. The study found that only 0.42% of patients had isolated lung metastasis, suggesting the limited value of routine thoracic CT in gastric cancer staging due to the rarity of isolated lung metastases and concurrent intraabdominal metastases in most cases. Nevertheless, based on expert opinion, CT of the chest can be performed in the setting of advanced gastric cancer when lung metastasis is suspected.

Variant 2: Adult. Gastric adenocarcinoma. Staging for distant metastases.
E. CT chest without and with IV contrast

Isolated metastases to the lungs are rare. Only 0.42% to 1.6% of patients have pulmonary metastases at presentation, none isolated to the lung [44]. Liver metastases and abdominal lymphadenopathy are associated with an increased risk of pulmonary metastases [45]. Thus, routine chest CT is not useful for gastric cancer staging due to the low incidence of isolated pulmonary metastases.

Variant 2: Adult. Gastric adenocarcinoma. Staging for distant metastases.
F. CT chest without IV contrast

There is no relevant literature to support the use of the noncontrast CT of the chest to evaluate lung metastases in gastric cancer. See above.

Variant 2: Adult. Gastric adenocarcinoma. Staging for distant metastases.
G. FDG-PET/CT skull base to mid-thigh

Gastric adenocarcinoma is FDG-avid. However, the depth of tumor invasion cannot be determined due to PET's low spatial resolution [46,47]. PET/CT is useful for initial overall staging and has a sensitivity of 76.4% and a specificity of 86.7% [48]. The sensitivity of PET/CT is 96.5% for tumors >3 cm versus 33.3% for those <3 cm [49]. Park et al [50] found that PET/CT was more sensitive than CECT for primary tumor detection, with a sensitivity of 67% compared with 55% for CECT, but less so for lymph node metastasis, suggesting limited use in early gastric cancer.

Lymph node metastases are an important prognostic indicator in gastric carcinoma. Accurate staging is imperative and has implications for surgical planning. However, PET/CT is not sensitive to preoperative lymph node staging, specifically in early gastric cancer [26,50]. Some studies have reported that PET/CT is less sensitive but more specific in assessing the lymph nodes than CECT. The low sensitivity may be related to the lymph nodes' size and the cancer's histopathology [49]. The reasons for the low sensitivity of PET/CT are the histological type of the primary tumor and the size of metastatic lymph nodes <3 mm. Despite the low sensitivity, PET/CT usually shows a higher specificity than most other imaging modalities, including CECT, because PET/CT diagnoses lymph node metastases using glucose metabolism rather than size. Another limitation may be that the FDG activity for the primary tumor may obscure the adjacent lymph nodes [51,52]. PET/CT can be used as a prognostic indicator for recurrent disease, and studies have shown that patients with PET-positive lymph nodes have a higher chance of recurrence [53,54].

Song et al [55] demonstrated that high nodal SUV_{max} on PET/CT predicts poorer survival, advocating for its inclusion in prognostic assessment. The sensitivity and specificity of PET/CT for lymph node involvement are reported to be 86% and 97% in one meta-analysis [49]. Heterogenous uptake in advanced gastric cancer and SUV_{max} are predictive of lymph node metastases [56,57].

PET/CT has a sensitivity of 95.2% and a specificity of 100% in detecting solid organ metastases [49]. In one study, the specificity of CECT versus PET/CT was 88.57% versus 62.86% for distant metastatic disease [49]. Bosch et al [58] highlighted its usefulness in patients with advanced disease and demonstrated the ability to upstage disease in 19% of patients. Thus, PET/CT helps detect unsuspected metastases and helps in risk stratification [54], greatly impacting management [57-59].

PET/CT has a lower sensitivity for diagnosing peritoneal metastases than CECT, which may be due to a lack of oral and IV contrast on the CT scan of the PET and the size of the peritoneal nodules. However, PET/CT can be used for indeterminate peritoneal nodules seen on CECT, which may preclude unnecessary laparotomy. The reported specificity of PET/CT for detecting peritoneal disease compared with CECT is 80% versus 60% [49]. Although imaging may be useful in detecting peritoneal disease lesions <5 mm, it may not be FDG-avid; staging laparoscopy is better in assessing peritoneal nodules, specifically in patients with locally advanced gastric cancer [59].

PET/CT is superior to whole body bone scans in detecting bone metastasis and has a sensitivity of 93.5% and a specificity of 25.0% [60]. Depending on the type of bone metastases, sclerotic versus lytic, the metastasis may or may not be FDG-avid. Activity can predict disease-specific survival more accurately than TNM staging [55]. High SUV_{max} in bone metastases is associated with poorer survival in certain histologies [61,62].

Variant 2: Adult. Gastric adenocarcinoma. Staging for distant metastases.
H. Fluoroscopy upper GI series

There is no relevant literature to support the use of fluoroscopy upper GI series in staging gastric cancer.

Variant 2: Adult. Gastric adenocarcinoma. Staging for distant metastases.
I. MRI abdomen and pelvis without and with IV contrast

An MRI examination is time-consuming, which might affect the image quality and diagnostic accuracy, and has lower spatial resolution than CT or US [26]. Some studies have suggested that MRI can visualize the three layers of the gastric wall, and the tumor's thickness can be useful for early T staging. In one study, the accuracy of T staging on MRI was only 50%; others have reported a higher sensitivity ranging from 68% to 78% and a specificity of 89% to 95% [63]. Studies have suggested that rapid enhancement of gastric cancer compared with normal mucosa after administration of gadolinium chelates aids in diagnosis [64].

Dynamic contrast-enhanced MRI can be beneficial in assessing cancer in uncooperative patients [65]. Recent studies have explored various MRI techniques for diagnosing and staging gastric cancer, highlighting the potential of DWI and texture analysis in improving diagnostic accuracy [66]. DWI-MRI has been used to T stage gastric cancer and has shown a diagnostic accuracy of 80% to 93% [67]. The ADC values are significantly higher in the intestinal-type tumors versus the diffuse-type [68]. DWI in T staging can be a prognostic indicator because lower ADC values ($\leq 1.5 \times 10-3$ mm2/s) are associated with poorer survival outcomes [69,70]. A recent study showed that multiparametric MRI was better than DECT for the T staging of gastric cancer, with the overall accuracy ranging from 60.9% to 77.2%, which was higher than DECT [21].

Kim et al [71] reported a 47% accuracy in detecting lymph node metastases using size and signal intensity on T1- and T2-weighted images. Lymph nodes ≥8 mm in the short axis were considered positive for metastases [71]. Adding DWI increases the sensitivity (86.7% and 58.8%, respectively) but lowers the specificity compared with MRI without DWI (50.0% and 94.1%) [72]. Metastatic nodes have been shown to have a lower ADC value (1.70 ± 0.40 mm2/s) compared with nonmetastatic lymph nodes (2.10 ± 0.22) [67]. ADC values of primary gastric cancer have been used to predict lymph node metastasis [67,73,74]. MRI with DWI had a diagnostic accuracy of 76.6% for N staging, superior to MDCT (63.8%) [72].

MRI is widely used for detecting and characterizing liver lesions in the setting of gastric cancer and diagnosing liver metastases [47]. Contrast-enhanced MRI and DWI-MRI can differentiate liver metastases from benign liver lesions. MRI is superior to PET/CT for detecting liver metastases ≤10 mm [75].

There is limited evidence on the performance of MRI in assessing peritoneal disease. Laparoscopic assessment is more useful in identifying microscopic peritoneal disease because small <5 mm nodules may not be visible on MRI. Peritoneal carcinomatosis can appear as enhancing nodules on the postcontrast images. DWI is now widely accepted for abdominal MRI, and adding DWI with high b-values to delayed gadolinium-enhanced imaging can improve the detection rate of peritoneal carcinomatosis [76].

Variant 2: Adult. Gastric adenocarcinoma. Staging for distant metastases.
J. MRI abdomen and pelvis without IV contrast

DWI-MRI is superior to T2-weighted MRI for preoperative staging of gastric cancer in 45 patients, particularly in detecting early and advanced stages, with a higher accuracy in staging advanced cancers at 87.9% compared with 69.7% with T2-weighted imaging [77]. The ADC values are significantly lower than those of normal gastric wall, which helps with diagnosis. Lower ADC values from DWI correlate with poorer differentiation and advanced histological types of gastric cancer, suggesting that ADC can be used as a noninvasive biomarker to assess the aggressiveness of cancer [78].

Novel methods such as intravoxel incoherent motion DWI can effectively predict lymphovascular invasion in gastric cancer by analyzing intravoxel incoherent motion parameters (ADC, D, D*, and f). Lower ADC and D values and higher f values indicate the lymphovascular invasion presence [79].

Variant 2: Adult. Gastric adenocarcinoma. Staging for distant metastases.
K. Radiography abdomen

There is no relevant literature to support the use of radiography in the staging of gastric cancer.

Variant 2: Adult. Gastric adenocarcinoma. Staging for distant metastases.
L. US abdomen

In a highly selected series of studies from Asia evaluating diagnostic tools for gastric cancer, transabdominal US proved effective, particularly for advanced stages, with a pooled accuracy of 79.7% and a sensitivity of 98.6% for advanced gastric cancer, compared with a 38.7% accuracy and a 61.2% sensitivity for early stages [80]. Transabdominal US also matched CECT with an accuracy of 86% versus 83% and slightly surpassed EUS with a 77.2% accuracy compared with 74.7%. Transabdominal OCUS is comparable to CT for preoperative tumor staging in advanced cases, with accuracies of 88%, 86%, and 98% for stages T2 to T4, respectively, versus 93%, 83%, and 90% for CT [81]. A study by Urakawa et al [82] showed that combining transabdominal US with endoscopy and CT improved the overall accuracy from 47.8% to 60.7% in preoperative tumor depth diagnosis, with accuracy varying by tumor region from 31.8% in the middle region to 53.7% in the lower region. A combined diagnostic approach using CT, MRI, and CEUS may significantly enhance the diagnostic metrics, with sensitivity rates ranging from 88.00% to 97.22%, specificity rates ranging from 95.89% to 100%, and diagnostic coincidence rates ranging from 96.33% to 98.17% across different T stages [63]. However, most of these studies were performed in Asia and have not been replicated in the United States. Because this procedure remains very patient dependent, the expert panel questioned its appropriateness for cancer staging. It could be used in some situations as an alternative to CT.

Variant 2: Adult. Gastric adenocarcinoma. Staging for distant metastases.
M. US abdomen and pelvis

There is no relevant literature to support the use of US abdomen and pelvis in the staging of gastric cancer.

Variant 2: Adult. Gastric adenocarcinoma. Staging for distant metastases.
N. US abdomen endoscopic

The studies by Yu et al [83], Mehmedovic et al [84], and Han et al [85] used various imaging techniques to explore aspects of preoperative T staging in gastric cancer. Yu et al [83] found that combining enhanced CT and US increased the accuracy to 85%, better than using either technique alone. Mehmedovic et al [84] demonstrated that EUS was more effective for locoregional staging. The reported accuracy of EUS in identifying lymph node metastasis was 85.3%, with a sensitivity of 29.2% and positive predictive value of 38.7% [86]. EUS achieves a 74.7% accuracy in T staging; however, CT remains better at detecting distant metastases. Key factors associated with EUS staging inaccuracy include tumor location, the type of echoendoscope used, and histological type [85].

Variant 3: Adult. Gastric adenocarcinoma. Posttreatment evaluation.

In this clinical scenario, the patient has locally advanced disease with metastasis. The patient has been treated with radiation or chemotherapy. Imaging in this context aims to assess response to treatment.

Even though neoadjuvant therapy is advocated, about 22% to 51% of patients may have adverse effects, and about 16% may have progression. Imaging may help identify disease progression and avoid unnecessary surgery [87].

Variant 3: Adult. Gastric adenocarcinoma. Posttreatment evaluation.
A. CT abdomen and pelvis with IV contrast

CT is one of the main modalities to assess response to postchemotherapy treatment. CT uses tumor size to assess response to therapy, and postcontrast images are usually recommended to assess the primary tumor and metastatic disease [38]. Recent studies have explored the efficacy of various imaging techniques in assessing treatment outcomes and staging of gastric adenocarcinoma. Lee et al [88] demonstrated that perfusion CT parameters, particularly the permeability surface value, can predict chemotherapy response and survival in patients with unresectable advanced gastric cancer. However, the usefulness of CECT following neoadjuvant chemotherapy is limited. In one study, CT overstaged 38% and understaged 38% of the tumors after neoadjuvant chemotherapy. The researchers found similar patterns of discordance for the T and N stages. For the M-stage, restaging CT found carcinomatosis in only 12 patients, and an additional 14 patients with peritoneal disease were found during surgery [4]. Restaging CT after neoadjuvant therapy may be equivocal in identifying distant metastases, which usually precludes surgery. In one study, 3% of distant interval metastases were not identified, and patients underwent unnecessary surgery [87]. Although CT may not be able to identify distant metastases, CT may identify disease progression and help change chemotherapy or surgery [87].

Blank et al [5] evaluated the prognostic value of clinical response in esophagogastric adenocarcinomas using endoscopy and CT scans. Their findings indicated that preoperative clinical response is a significant prognostic indicator, with substantial differences in median survival times between responders (108 months) and nonresponders (27 months). Using CT for staging post–neoadjuvant chemotherapy in locally advanced gastric cancer revealed a low accuracy for both T staging (42.7%) and N staging (44%), suggesting that CT restaging should not be solely relied upon for clinical decision making due to its poor correlation with pathologically staged cancer [89]. The effectiveness of restaging CT scans following neoadjuvant chemotherapy for resectable gastric cancer was explored, and the concordance between radiologic and pathologic staging was limited because there were significant discrepancies in tumor assessment, highlighting the challenges of using CT for accurate restaging postchemotherapy. Specifically, the study reported a 43% response rate to neoadjuvant chemotherapy with CT scans but only 24% concordance between radiology and pathology, suggesting that restaging CT may not be able to stratify patients into long-term survivors based on imaging response and cannot be used as a biomarker [4].

Variant 3: Adult. Gastric adenocarcinoma. Posttreatment evaluation.
B. CT abdomen and pelvis without and with IV contrast

There is no relevant literature to support the use of CT abdomen and pelvis without and with IV contrast in the posttreatment follow-up imaging of gastric cancer.

Variant 3: Adult. Gastric adenocarcinoma. Posttreatment evaluation.
C. CT abdomen and pelvis without IV contrast

There is no relevant literature to support the use of CT abdomen and pelvis without IV contrast in the posttreatment follow-up imaging of gastric cancer.

Variant 3: Adult. Gastric adenocarcinoma. Posttreatment evaluation.
D. CT chest with IV contrast

There is no relevant literature to support the use of CT chest with IV contrast in the posttreatment follow-up imaging of gastric cancer.

Variant 3: Adult. Gastric adenocarcinoma. Posttreatment evaluation.
E. CT chest without and with IV contrast

There is no relevant literature to support the use of CT chest without and with IV contrast in the posttreatment follow-up imaging of gastric cancer.

Variant 3: Adult. Gastric adenocarcinoma. Posttreatment evaluation.
F. CT chest without IV contrast

There is no relevant literature to support the use of CT chest without IV contrast in the posttreatment follow-up imaging of gastric cancer.

Variant 3: Adult. Gastric adenocarcinoma. Posttreatment evaluation.
G. FDG-PET/CT skull base to mid-thigh

Response to treatment on PET/CT is based on the SUV_{max} increase or decrease posttreatment. The tumors may not respond as early as 2 weeks [29-31] posttreatment, but the response may be more evident after 4 to 6 weeks [90].

PET/CT has been shown to predict treatment response and influence management plans in 52.9% of cases, with a sensitivity of 95.8% and specificity of 100% [53,91]. A systematic review and meta-analysis showed that FDG-PET had a sensitivity of 78% and a specificity of 82% in detecting recurrent gastric cancer, with slight improvements when combined with CT [92]. Another systematic review and meta-analysis reported that FDG-PET/CT has a pooled sensitivity of 85% and a specificity of 78% for detecting recurrent gastric cancer [93]. A clinical study revealed that high SUV on FDG-PET was associated with longer overall survival in patients with localized gastric adenocarcinoma treated with preoperative chemoradiation. Pretreatment SUV values have been associated with a pathological response after neoadjuvant chemotherapy and better progression-free survival [53,54].

A novel feasibility study using FDG-PET/MRI for predicting chemotherapy response in patients with unresectable advanced gastric cancers found that the perfusion parameters' Ktrans and the initial AUC may serve as early predictive markers for chemotherapy efficacy [94].

Variant 3: Adult. Gastric adenocarcinoma. Posttreatment evaluation.

H. Fluoroscopy upper GI series

There is no relevant literature to support the use of fluoroscopy upper GI series in the posttreatment follow-up imaging of gastric cancer.

Variant 3: Adult. Gastric adenocarcinoma. Posttreatment evaluation.
I. MRI abdomen and pelvis without and with IV contrast

Although there is no relevant literature to support the use of MRI of the abdomen and pelvis without and with IV contrast in the posttreatment follow-up of gastric cancer, the expert consensus is that it may be appropriate. DWI has been used as a biomarker for response in many cancers. MRI with DWI can detect early changes in the tumor [68]. ADC values are associated with several tumor features that correlate with the cellularity of the tumor, which causes restriction of water molecule diffusivity in tissues. Gastric cancers with a lower ADC value are more likely to respond than those with a higher ADC value [68]. Giganti et al [95] found significant inverse correlations between posttreatment changes in ADC on DWI-MRI and tumor regression grade. ADC better-differentiates nonresponders than FDG-PET/CT. Imaging of the pelvis may help identify metastatic disease in the pelvis and assess response and is specifically valuable as an alternative to CT.

Variant 3: Adult. Gastric adenocarcinoma. Posttreatment evaluation.
J. MRI abdomen and pelvis without IV contrast

There is no relevant literature to support the use of MRI of the abdomen and pelvis without IV contrast in the posttreatment follow-up imaging of gastric cancer.

Variant 3: Adult. Gastric adenocarcinoma. Posttreatment evaluation.
K. MRI abdomen without and with IV contrast

There is no relevant literature to support the use of MRI of the abdomen without and with IV contrast in the posttreatment follow-up imaging of gastric cancer; however, the expert consensus is that it may be appropriate.

Variant 3: Adult. Gastric adenocarcinoma. Posttreatment evaluation.
L. MRI abdomen without IV contrast

The increase in ADC values post–radiation treatment is a biomarker of response, and these changes occur before any changes are seen in the carcinoembryonic antigen and can be used to assess radiation therapy [96]. Similarly, lymph node metastases have increased ADC values posttreatment, suggesting a response [68]. Like SUV, ADC values have been used to predict survival outcomes in patients with various cancer responses [95]. In one study, an ADC value of 1.36×10^{-3} mm^2/s or lower was associated with poor survival [68]. However, expert consensus favors the use of MRI without and with IV contrast over MRI without IV contrast alone.

Variant 3: Adult. Gastric adenocarcinoma. Posttreatment evaluation.
M. Radiography abdomen

There is no relevant literature to support the use of radiography of the abdomen in the posttreatment follow-up imaging of gastric cancer.

Variant 3: Adult. Gastric adenocarcinoma. Posttreatment evaluation.
N. US abdomen

There is no relevant literature to support the use of US abdomen in the posttreatment follow-up imaging of gastric cancer.

Variant 3: Adult. Gastric adenocarcinoma. Posttreatment evaluation.
O. US abdomen and pelvis

There is no relevant literature to support the use of US abdomen and pelvis in the posttreatment follow-up imaging of gastric cancer.

Variant 3: Adult. Gastric adenocarcinoma. Posttreatment evaluation.
P. US abdomen endoscopic

There is no relevant literature to support the use of EUS in the posttreatment follow-up imaging of gastric cancer.

Variant 4: Adult. Surveillance of gastric adenocarcinoma.

In this clinical scenario, the patient undergone surgical resection of gastric cancer, and imaging is done for evaluation of recurrence.

The tumor recurs in high-risk patients in about 11.4% of patients who have pathological lymph node metastases and lymphovascular invasion despite surgery with curative intent [97]. Distant recurrence is more common than locoregional recurrence and most commonly occurs in the liver and the peritoneum. Local recurrence can occur at the anastomosis [97].

Variant 4: Adult. Surveillance of gastric adenocarcinoma.
A. CT abdomen and pelvis with IV contrast

CECT is commonly used for postsurgical surveillance of gastric cancer. However, it has a poor sensitivity for detecting local gastric recurrence because it may not be able to detect small mucosal lesions due to poor soft tissue resolution. Several studies collectively explored the role of CT in managing and surveilling gastric cancer. Some of the specific preoperative CT findings, such as spiculated and nodular extramural tumor infiltration and a CT size of 5 to 10 cm, are predictors of recurrence and worse disease-free survival in advanced gastric cancer, suggesting its use for prognostic stratification [98,99]. Similarly, CT is not needed after endoscopic submucosal dissection for early gastric cancer; in one prospective study, only 2 of 81 recurrent lesions over a median follow-up of 19.7 months were detected on CT [100]. The 10-year extragastric recurrence-free survival in a low-risk group is 99.7% [97]. Thus, intensive surveillance after 2 years is unnecessary. For low-risk patients, the reported cumulative incidence of extragastric recurrence is 0.5% over 5 years. This advocates for using endoscopy with biopsy and reconsidering routine CT scans to reduce unnecessary radiation and costs [101].

Seo et al [97] devised a risk-scoring system to predict extragastric recurrence following surgical resection of early gastric cancer, using data from 3,162 patients, in which the overall incidence of extragastric recurrence was 1.4%. This risk-scoring system, validated internally and externally, effectively categorized patients into low- and high-risk groups. The findings suggest that postsurgical CT surveillance might be unnecessary for the low-risk group due to the rare occurrence of extragastric recurrence, potentially reducing unnecessary medical interventions and associated costs.

CT has a sensitivity of 15% for local recurrence and 91% for distant recurrence. About 56.4% of patients with high-risk factors will develop extragastric recurrence in the first 2 years after surgery [97].

The incidence of extragastric recurrence (2.2%) is low in stage I gastric cancer, suggesting a limited role for postoperative CT surveillance in low-risk patients [102]. CT has a higher sensitivity for peritoneal carcinomatosis (96% versus 50%, $P = .001$) detection than PET/CT due to better contrast resolution [103].

Variant 4: Adult. Surveillance of gastric adenocarcinoma.
B. CT abdomen and pelvis without and with IV contrast

There is no relevant literature to support the use of CT abdomen and pelvis without and with IV contrast in the surveillance of gastric cancer.

Variant 4: Adult. Surveillance of gastric adenocarcinoma.
C. CT abdomen and pelvis without IV contrast

There is no relevant literature to support the use of CT abdomen and pelvis without IV contrast in the surveillance of gastric cancer.

Variant 4: Adult. Surveillance of gastric adenocarcinoma.
D. CT chest with IV contrast

There is no relevant literature to support the use of CT chest with IV contrast in the surveillance of gastric cancer.

Variant 4: Adult. Surveillance of gastric adenocarcinoma.
E. CT chest without and with IV contrast

There is no relevant literature to support the use of CT chest without and with IV contrast in the surveillance of gastric cancer.

Variant 4: Adult. Surveillance of gastric adenocarcinoma.
F. CT chest without IV contrast

There is no relevant literature to support the use of CT chest without IV contrast in the surveillance of gastric cancer.

Variant 4: Adult. Surveillance of gastric adenocarcinoma.
G. FDG-PET/CT skull base to mid-thigh

Recent studies have explored the usefulness of FDG-PET/CT in gastric cancer, focusing on its effectiveness in detecting recurrence, guiding treatment decisions, and assessing prognostic outcomes. PET/CT has an overall sensitivity of 42.9% to 100% and a specificity of 59.7% to 88.1% for detecting recurrence [104,105].

Due to physiologic activity in the stomach, the detection of recurrence after surgery in the gastric remnant is limited. PET/CT has a moderate sensitivity and specificity for detecting gastric cancer recurrence due to false-positive uptake at the anastomosis after surgery [106]. Low-grade reuptake is usually noted in the stomach, and gastritis can cause higher uptake. Distention of the stomach with negative oral contrast may help better localize the recurrence.

A meta-analysis confirmed the moderate accuracy of PET/CT in detecting gastric cancer recurrence in the remnant postsurgery, with a sensitivity of 86% and specificity of 88%. Similarly, PET/CT, compared with CT alone, has shown much greater sensitivity for mediastinal lymph node recurrences [107,108].

PET/CT has a specificity of 47.8% for locoregional disease, 87.5% for peritoneal disease, and 94.4% for liver metastases [108]. Although PET/CT and abdominal CECT are comparable in detecting recurrence, CT has a higher rate of detecting peritoneal carcinomatosis [109].

Metabolic tumor burden can be used as a prognostic indicator for recurrence and survival postsurgery [110]. PET/CT can be used as a prognostic marker; patients with a positive PET have a shorter survival rate than those with a negative PET at 18.5 months versus 6.9 months [107].

Bone metastases in gastric cancer are rare and seen in up to 3.8% of patients [111]. FDG uptake in bone metastases is an independent prognostic factor for survival [112].

Variant 4: Adult. Surveillance of gastric adenocarcinoma.
H. Fluoroscopy upper GI series

There is no relevant literature to support the use of fluoroscopy upper GI series in the surveillance of gastric cancer.

Variant 4: Adult. Surveillance of gastric adenocarcinoma.
I. MRI abdomen and pelvis without and with IV contrast

There is no relevant literature to support the use of MRI of the abdomen and pelvis without and with IV contrast in the surveillance of gastric cancer.

Variant 4: Adult. Surveillance of gastric adenocarcinoma.
J. MRI abdomen and pelvis without IV contrast

There is no relevant literature to support the use of MRI of the abdomen and pelvis without IV contrast in the surveillance of gastric cancer.

Variant 4: Adult. Surveillance of gastric adenocarcinoma.
K. MRI abdomen without and with IV contrast

There is no relevant literature to support the use of MRI abdomen without and with IV contrast in the surveillance of gastric cancer.

Variant 4: Adult. Surveillance of gastric adenocarcinoma.
L. MRI abdomen without IV contrast

There is no relevant literature to support the use of MRI abdomen without IV contrast in gastric cancer surveillance.

Variant 4: Adult. Surveillance of gastric adenocarcinoma.
M. Radiography abdomen

There is no relevant literature to support the use of radiography of the abdomen in the surveillance of gastric cancer.

Variant 4: Adult. Surveillance of gastric adenocarcinoma.
N. US abdomen

There is no relevant literature to support the use of US abdomen in the surveillance of gastric cancer.

Variant 4: Adult. Surveillance of gastric adenocarcinoma.
O. US abdomen and pelvis

There is no relevant literature to support the use of US abdomen and pelvis in the surveillance of gastric cancer.

Variant 4: Adult. Surveillance of gastric adenocarcinoma.
P. US abdomen endoscopic

There is no relevant literature to support the use of EUS in the surveillance of gastric cancer.

Summary of Highlights

This is a summary of the key recommendations from the variant tables. Refer to the complete narrative document for more information.

- **Variant 1:** For suspected gastric adenocarcinoma, CT abdomen and pelvis with IV contrast and FDG-PET/CT skull base to mid-thigh are complementary and usually appropriate for initial staging, providing high-resolution anatomic detail and whole-body metabolic assessment, respectively. CT demonstrates tumor location, wall invasion, regional lymphadenopathy, and intraabdominal metastases, whereas PET/CT detects occult nodal and distant lesions. EUS may be appropriate for precise T staging of early lesions, and MRI with IV contrast and DWI can be considered as an alternative to CT, offering superior soft tissue characterization and peritoneal implant detection. Plain radiography, fluoroscopy, noncontrast CT, and transabdominal US are usually not recommended due to limited diagnostic value.

- **Variant 2:** For staging known gastric adenocarcinoma, CT of the abdomen and pelvis with IV contrast remains the pivotal imaging modality because it detects tumor spread within the stomach, identifies regional lymph node enlargement, evaluates hepatic metastasis, and detects peritoneal involvement. FDG-PET/CT from skull base to mid-thigh provides complementary whole body metabolic information, detecting nodal and bone metastases that may not be detected on anatomic imaging and can offer prognostic insights based on tumor uptake. MRI of the abdomen and pelvis can be a useful alternative to CT or when more detailed soft tissue characterization is desired; diffusion-weighted sequences enhance the detection of subtle peritoneal disease and better evaluate small hepatic lesions. Chest CT with IV contrast may be considered if thoracic involvement is suspected. Other modalities lack sufficient sensitivity or specificity for comprehensive staging and are therefore not recommended.

- **Variant 3:** For posttreatment evaluation following chemotherapy or radiation, CT abdomen and pelvis with IV contrast and FDG-PET/CT are both usually appropriate as complementary procedures for assessing treatment response and detecting disease spread. DWI-MRI may be appropriate when additional treatment response biomarkers are needed, as ADC changes correlate with tumor response. For postsurgical surveillance, CT abdomen and pelvis with IV contrast is usually appropriate, particularly for high-risk patients, as recurrence can occur predominantly at distant sites. FDG-PET/CT may be appropriate when suspicious findings warrant further evaluation or for detecting distant recurrences. For low-risk early-stage patients, routine imaging surveillance may be unnecessary given extremely low recurrence rates, with endoscopy and clinical follow-up being sufficient.

- **Variant 4:** For surveillance following curative surgical resection of gastric adenocarcinoma, CT abdomen and pelvis with IV contrast is usually appropriate as the primary imaging modality. CT effectively detects distant recurrences, particularly in the liver and peritoneum, where gastric cancer most commonly metastasizes. FDG-PET/CT may be appropriate in select scenarios, particularly when CT findings are equivocal or when there is clinical suspicion of recurrence not well-visualized on anatomic imaging. Surveillance intensity should be risk-stratified based on tumor characteristics and patient factors. High-risk patients with lymph node metastases or lymphovascular invasion benefit most from regular CT surveillance, especially within the first 2 years when recurrence risk is highest. Conversely, low-risk early-stage patients have extremely low recurrence rates, making routine CT surveillance potentially unnecessary and favoring endoscopic follow-up with selective imaging based on clinical findings.

Supporting Documents

The evidence table, literature search, and appendix for this topic are available at https://acsearch.acr.org/list. The appendix includes the strength of evidence assessment and the final rating round tabulations for each recommendation.

For additional information on the Appropriateness Criteria methodology and other supporting documents, please go to the ACR website at https://www.acr.org/Clinical-Resources/Clinical-Tools-and-Reference/Appropriateness-Criteria.

Gender Equality and Inclusivity Clause

The ACR acknowledges the limitations in applying inclusive language when citing research studies that predates the use of the current understanding of language inclusive of diversity in sex, intersex, gender, and gender-diverse people. The data variables regarding sex and gender used in the cited literature will not be changed. However, this guideline will use the terminology and definitions as proposed by the National Institutes of Health.

Appropriateness Category Names and Definitions

Appropriateness Category Name	Appropriateness Rating	Appropriateness Category Definition
Usually Appropriate	7, 8, or 9	The imaging procedure or treatment is indicated in the specified clinical scenarios at a favorable risk-benefit ratio for patients.
May Be Appropriate	4, 5, or 6	The imaging procedure or treatment may be indicated in the specified clinical scenarios as an alternative to imaging procedures or treatments with a more favorable risk-benefit ratio, or the risk-benefit ratio for patients is equivocal.
May Be Appropriate (Disagreement)	5	The individual ratings are too dispersed from the panel median. The different label provides transparency regarding the panel's recommendation. "May be appropriate" is the rating category and a rating of 5 is assigned.
Usually Not Appropriate	1, 2, or 3	The imaging procedure or treatment is unlikely to be indicated in the specified clinical scenarios, or the risk-benefit ratio for patients is likely to be unfavorable.

Relative Radiation Level Information

Potential adverse health effects associated with radiation exposure are an important factor to consider when selecting the appropriate imaging procedure. Because there is a wide range of radiation exposures associated with different diagnostic procedures, a relative radiation level (RRL) indication has been included for each imaging examination. The RRLs are based on effective dose, which is a radiation dose quantity that is used to estimate population total radiation risk associated with an imaging procedure. Patients in the pediatric age group are at inherently higher risk from exposure, because of both organ sensitivity and longer life expectancy (relevant to the long latency that appears to accompany radiation exposure). For these reasons, the RRL dose estimate ranges for pediatric examinations are lower as compared with those specified for adults (see Table below). Additional information regarding radiation dose assessment for imaging examinations can be found in the ACR Appropriateness Criteria® Radiation Dose Assessment Introduction document.

Relative Radiation Level Designations

Relative Radiation Level*	Adult Effective Dose Estimate Range	Pediatric Effective Dose Estimate Range
O	0 mSv	0 mSv
☢	<0.1 mSv	<0.03 mSv
☢☢	0.1-1 mSv	0.03-0.3 mSv
☢☢☢	1-10 mSv	0.3-3 mSv
☢☢☢☢	10-30 mSv	3-10 mSv
☢☢☢☢☢	30-100 mSv	10-30 mSv

*RRL assignments for some of the examinations cannot be made, because the actual patient doses in these procedures vary as a function of a number of factors (e.g., region of the body exposed to ionizing radiation, the imaging guidance that is used). The RRLs for these examinations are designated as "Varies."

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