

Table 1. Data Dictionaries for AAST Grading System for EGS Conditions

A. Acute Appendicitis

AAST Grade	Description	Clinical Criteria	Imaging Criteria (CT findings)	Operative Criteria	Pathologic Criteria
I	Acutely inflamed appendix, intact	Pain, leukocytosis and right lower quadrant (RLQ) tenderness	Inflammatory changes localized to appendix +/- appendiceal dilation +/- contrast non-filling	Acutely inflamed appendix, intact	Presence of neutrophils at the base of crypts, submucosa +/- in muscular wall
II	Gangrenous appendix, intact	Pain, leukocytosis and RLQ tenderness	Appendiceal wall necrosis with contrast non-enhancement +/- air in appendiceal wall	Gangrenous appendix, intact	Mucosa and muscular wall digestion; not identifiable on hematoxylin and eosin stain (H & E)
III	Perforated appendix with local contamination	Pain, leukocytosis and RLQ tenderness	Above with local periappendiceal fluid +/- contrast extravasation	Above, with evidence of local contamination	Gross perforation or focal dissolution of muscular wall
IV	Perforated appendix with periappendiceal phlegmon or abscess	Pain, leukocytosis and RLQ tenderness; may have palpable mass	Regional soft tissue inflammatory changes, phlegmon or abscess	Above, with abscess or phlegmon in region of appendix	Gross perforation
V	Perforated appendix with generalized peritonitis	Generalized peritonitis	Diffuse abdominal or pelvic inflammatory changes +/- free intra-peritoneal fluid or air	Above, with addition of generalized purulent contamination away from appendix	Gross perforation

B. Breast Infections

AAST Grade	Description	Clinical Criteria	Imaging Criteria (US or CT findings)	Operative Criteria	Pathologic Criteria
I	Breast cellulitis	Erythema, induration, edema, pain, tenderness	Inflammation without fluid collection	N/A	N/A
II	Simple abscess	Single, small abscess without loculations; not involving the nipple/areolar complex	Single well circumscribed fluid collection within breast tissue, not involving nipple/areolar complex	Single, well circumscribed fluid collection within breast tissue, not involving nipple/areola complex	Acute inflammation limited to breast tissue
III	Complex abscess	Large abscess with multiple loculations, multiple abscesses, or abscess involving nipple/areola complex; lymphadenopathy	Multiple separate fluid collections or single large collection with multiple loculations within breast tissue or involvement of nipple/areola complex	Multiple separate fluid collections or single large collection with multiple loculations within breast tissue, or involvement of nipple/areola complex; enlarged lymph nodes	Acute inflammation limited to breast tissue with cultures positive for organism if available
IV	Breast abscess with axillary extension	Breast abscess with ipsilateral lymphadenopathy, thrombophlebitis, lymphangitis	Fascial plane thickening with enhancement; evidence of lymphadenopathy on US or CT	Above, plus axillary fluid collections, extension of inflammatory changes well beyond the abscesses	Acute inflammation of breast tissue and axillary lymph nodes with cultures positive for organisms

V	Breast abscess with chest wall involvement	Above, plus erosion into chest wall muscles or ribs or pleural space, or necrotizing fasciitis	Above, plus inflammatory changes in the chest wall muscles, ribs or pleural space	Above, with erosion into chest wall muscles or ribs or pleural space, or necrotizing fasciitis	Acute inflammation involving chest wall, fascia, muscles or ribs with or without necrosis and cultures positive for organisms
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C. Acute Cholecystitis

AAST Grade	Description	Clinical Criteria	Imaging Criteria (CT/US/HIDA findings)	Operative Criteria	Pathologic Criteria
I	Acute cholecystitis	Right upper quadrant (RUQ) or epigastric pain; Murphy's Sign; leukocytosis	Wall thickening; distention; gallstones or sludge; pericholecystic fluid; non-visualization of gallbladder (GB) on hepatobiliary iminodiacetic acid (HIDA) scan	Inflammatory changes localized to GB; wall thickening; distention; gallstones	Acute inflammatory changes in the GB wall without necrosis or pus
II	GB empyema or gangrenous cholecystitis or emphysematous cholecystitis	RUQ or epigastric pain; Murphy's Sign; leukocytosis	Above, plus air in GB lumen, wall or in the biliary tree; focal mucosal defects without frank perforation	Distended GB with pus or hydrops; necrosis or gangrene of wall; not perforated	Above, plus pus in the GB lumen; necrosis of GB wall; intramural abscess; epithelial sloughing; no perforation
III	GB perforation with local contamination	Localized peritonitis in RUQ	HIDA with focal transmural defect, extraluminal fluid collection or radiotracer but limited to RUQ	Perforated GB wall (non-iatrogenic) with bile outside the GB but limited to RUQ	Necrosis with perforation of the GB wall (non-iatrogenic)
IV	GB perforation with pericholecystic abscess or gastrointestinal fistula	Localized peritonitis at multiple locations; abdominal distention with symptoms of bowel obstruction	Abscess in RUQ outside GB; bilio-enteric fistula; gallstone ileus	Pericholecystic abscess; bilio-enteric fistula; gallstone ileus	Necrosis with perforation of the GB wall (non-iatrogenic)
V	GB perforation with generalized peritonitis	Above, with generalized peritonitis	Free intra-peritoneal bile	Above, plus generalized peritonitis	Necrosis with perforation of the GB wall (non-iatrogenic)

D. Acute Diverticulitis of the Colon

AAST Grade	Description	Clinical Criteria	Imaging Criteria (CT findings)	Operative Criteria	Pathologic Criteria
I	Colonic inflammation	Pain; leukocytosis; minimal or no tenderness	Mesenteric stranding; colon wall thickening	N/A	N/A
II	Colon micro-perforation or pericolic phlegmon without abscess	Local tenderness (single or multiple areas) without peritonitis	Pericolic phlegmon; foci of air (single or multiple); no abscess	Pericolic phlegmon with no abscess	Inflamed colon with microscopic perforation
III	Localized pericolic abscess	Localized peritonitis	Pericolic abscess	Pericolic abscess	Inflamed colon with perforation
IV	Distant and/or multiple abscesses	Localized peritonitis at multiple locations	Abscess or phlegmon away from the colon	Abscess or phlegmon away from the colon	Inflamed colon with perforation
V	Free colonic perforation with generalized peritonitis	Generalized peritonitis	Free air and free fluid	Perforation with generalized fecal and purulent contamination	Inflamed colon with perforation

E. Esophageal Perforation

AAST Grade	Description	Clinical Criteria	Imaging and/or endoscopic criteria	Operative Criteria	Pathologic criteria
I	Mucosal tear	Dysphagia; chest pain, upper abdominal pain or back pain; breathing problems	No abnormality or possible intramural air	Preservation of normal anatomy with dissection required to identify inflammation	Partial thickness or mucosal tear
II	Full thickness tear with minimal inflammation	Above, with subcutaneous emphysema	Esophageal thickening	Obvious inflammation	Full thickness perforation with minimal inflammation without mediastinitis or peritonitis
III	Full thickness tear with localized abscess	Above, with vomiting and ill-appearing	Air in prevertebral planes	Presence of inflammation and stigmata of perforation with contained collection	Mediastinal inflammation or emphysema
IV	Esophageal wall necrosis	As above	Mediastinal widening	Inflammation; necrosis of the esophageal wall with localized contamination	Severe mediastinal necrosis
V	Empyema; peritonitis; mediastinitis	As above	Pleural effusion	Perforation with disseminated contamination; erosion into adjacent structures (chest, mediastinum, or abdomen)	Pleural invasion or empyema

F. Hernias (Internal or Abdominal wall)

AAST Grade	Description	Clinical Criteria	Imaging Criteria (CT findings)	Operative Criteria	Pathologic Criteria
I	Reducible hernia	Palpable, reducible hernia without fever or leukocytosis	Hernia visible on CT	Abdominal wall defect present	N/A
II	Incarcerated hernia without bowel ischemia	Local tenderness with non-reducible palpable hernia. No fever of leukocytosis.	Hernia visible on CT	Abdominal wall defect present with abdominal contents lodged in defect; healthy appearing viscera	N/A
III	Incarcerated with bowel ischemic but viable	Local tenderness with non-reducible palpable hernia; may be associated with fever, tachycardia, or leukocytosis	Hernia visible on CT with local stranding or inflammatory changes	Abdominal wall defect present with abdominal contents lodged in defect; visibly inflamed but viable appearing viscera	N/A
IV	Incarcerated hernia with gangrenous bowel or perforation with local spillage	Local tenderness with guarding, non-reducible palpable hernia with associated skin changes such as erythema	Hernia visible on CT with local stranding or inflammatory changes as well as contained fluid collection	Abdominal wall defect present with abdominal contents lodged in defect; gangrenous or perforated abdominal contents	Local necrosis or perforation
V	Incarcerated with perforation and diffuse peritoneal contamination	Diffuse abdominal tenderness with guarding or rebound; non-reducible palpable hernia with associated skin changes such as erythema	Hernia visible on CT with local stranding or inflammatory changes as well as diffuse fluid collections and inflammation	Abdominal wall defect present with abdominal contents lodged in defect; gangrenous or perforated abdominal contents with diffuse contamination	Local necrosis or perforation

G. Infectious Colitis

AAST Grade	Description	Clinical Criteria	Imaging Criteria (CT findings)	Operative Criteria	Pathologic Criteria
I	Mucosal disease with positive cultures or other confirmatory laboratory testing	Diarrhea and/or abdominal pain with positive stool cultures or toxin assays; inflamed mucosa on endoscopy	Normal CT	Normal colon	Mucosal inflammatory changes on biopsy, positive stool cultures or toxin assays
II	Colon wall thickening by cross-sectional imaging or pseudo-membranes on endoscopy	Diarrhea and/or abdominal pain, and/or abdominal tenderness with pseudo-membranes on endoscopy	Localized colonic wall thickening	Localized thickened but otherwise normal colon	Transmural colonic inflammation
III	Colon wall thickening with ascites or diffuse colonic dilation or diffuse coalescing pseudo-membranes	Abdominal pain and tenderness and/or distension; coalescing pseudomembranes by endoscopy	Diffuse colonic thickening or localized thickening and free intra-abdominal fluid	Diffusely thickened colon or localized thickening with free intra-abdominal fluid	Transmural colonic inflammation

Grade	Description	Clinical Criteria	Imaging Criteria (CT findings)	Operative Criteria	Pathologic Criteria
IV	Localized colonic necrosis, with or without perforation	Abdominal pain with peritonitis and mucosal necrosis by endoscopy	Colonic thickening with free fluid +/- evidence of perforation or abscess	Colonic thickening with localized or discontinuous transmural necrosis or ischemia with or without perforation or abscess	Transmural colonic inflammation with areas of necrosis
V	Diffuse transmural colonic necrosis, with or without perforation	Abdominal pain with peritonitis mucosal necrosis by endoscopy	Colonic thickening with free fluid +/- evidence of perforation or abscess	Diffuse colonic necrosis with or without perforation or abscess	Transmural colonic inflammation with areas of full thickness necrosis

H. Intestinal Obstruction Due to Adhesions

AAST Grade	Description	Clinical Criteria	Imaging Criteria (CT findings)	Operative Criteria	Pathologic criteria
I	Partial SBO	Some flatus; normal or hypoactive bowel sounds; minor abdominal distention	Normal imaging or minimal intestinal distension	Minimal intestinal distension with no evidence of bowel obstruction	N/A
II	Complete SBO; bowel viable and not compromised	Minimal to no flatus; hypoactive bowel sounds; distension without generalized tenderness	Intestinal distension with transition point; delayed contrast flow with some distal contrast; no evidence of bowel compromise	Intestinal distention with transition point; no evidence of bowel compromise	N/A
III	Complete SBO with compromised but viable bowel	No flatus; absent bowel sounds; abdominal distension with localized tenderness	Intestinal distension with transition point and no distal contrast flow; evidence of complete obstruction or impending bowel compromise	Intestinal distention with impending bowel compromise	N/A
IV	Complete SBO with non-viable bowel or perforation with localized spillage	Obstipation; abdominal distension with diffuse tenderness, rebound, guarding	Evidence of localized perforation or free air; bowel distension with free air or free fluid	Intestinal distension with localized perforation or free fluid	Bowel gangrene or perforation
V	SB perforation with diffuse peritoneal contamination	Abdominal distension with evidence of peritonitis	Bowel perforation with free air and free fluid	Intestinal distension with perforation, free fluid and evidence of diffuse peritonitis	Bowel gangrene or perforation

I. Intestinal Arterial Ischemia of the Bowel

AAST Grade	Description	Clinical Criteria	Imaging Criteria (CT findings)	Operative Criteria	Pathologic Criteria
I	Bowel ischemia without tissue loss	Anorexia with abdominal pain	Wall thickening and mucosal edema with enhancement.	Normal appearing bowel	Ischemia without ulceration
II	Bowel ischemia with mucosal ulceration only, without transmural infarction	Abdominal pain out of proportion to exam; no peritonitis	Wall thickening and edema without enhancement; mesenteric vessel occlusion	Normal serosa, mucosal ischemia and ulceration	Mucosal ulceration
III	Segmental transmural bowel infarction without perforation	Abdominal pain and tenderness without peritonitis	Wall thickening without mucosal or intestinal wall enhancement; intramural, portal, or mesenteric pneumatosis	Transmural necrosis without perforation	Transmural necrosis without perforation
IV	Segmental transmural bowel infarction with perforation	Abdominal pain and tenderness with peritonitis	Pneumoperitoneum, contrast extravasation, abscess	Transmural necrosis with perforation and peritonitis	Transmural necrosis with perforation
V	Pan-intestinal infarction	Abdominal pain and tenderness with peritonitis	Grade III or IV above with involvement of both Superior Mesenteric Artery and Inferior Mesenteric Artery distributions	Pan-intestinal infarction and necrosis with or without perforation	Transmural infarction with perforation

J. Acute Pancreatitis

AAST Grade	Description	Clinical Criteria	Imaging Criteria (CT findings)	Operative Criteria	Pathologic Criteria
I	Acute edematous pancreatitis	Midepigastric abdominal pain and tenderness; elevated amylase and/or lipase	Pancreatitis without phlegmon, necrosis, peripancreatic fluid collection or abscess	Edematous pancreas	N/A
II	Pancreatic phlegmon or peripancreatic fluid collection or hemorrhage	Midepigastric abdominal pain and tenderness; elevated amylase and/or lipase	Phlegmon or peripancreatic fluid collection or hemorrhage	Pancreatic phlegmon or peripancreatic fluid collection	N/A
III	Sterile pancreatic necrosis	Midepigastric abdominal pain and tenderness; elevated amylase and/or lipase	Pancreatic necrosis without extraluminal air or abscess	Pancreatic necrosis without purulence or abscess	Gram stain and culture of necrosis negative for organisms
IV	Infected pancreatic necrosis or abscess	Severe midepigastric abdominal pain and tenderness; elevated amylase and/or lipase	Pancreatic necrosis with extraluminal air or abscess	Pancreatic necrosis with purulence or abscess	Gram stain and culture of necrosis or abscess positive for organisms
V	Extra-pancreatic extension of pancreatic necrosis involving adjacent organs, such as colonic necrosis	Severe diffuse midepigastric abdominal pain and tenderness; elevated amylase and/or lipase	Extra-pancreatic extension of necrosis involving adjacent organs, such as colonic necrosis	Involvement or necrosis of adjacent organs	Involvement or necrosis of resected adjacent organs

K. Pelvic Inflammatory Disease

AAST Grade	Description	Clinical Criteria	Imaging Criteria (CT or US findings)	Operative Criteria	Pathologic Criteria
I	Inflammation of the cervix	None	N/A	N/A	N/A
II	Purulent cervical drainage	None OR vaginal discharge, vaginal irritation, pelvic discomfort	N/A	N/A	None or positive cervical cultures for organisms
III	Inflammation of the tubes, ovaries, and/or entire uterus	Above, plus pelvic pain or discomfort; fever	Inflammation of pelvic organ or organs	None, or purulent pelvic fluid on laparoscopy	None or positive cervical cultures for organisms
IV	Tubo-ovarian abscess, pyometra	Severe pelvic pain; fever	Inflammation and abscess of pelvic organ or organs	Drainage of tubo-ovarian abscess or pyometra	None, or positive cervical or pelvic cultures for organisms
V	Generalized pelvic sepsis	Generalized peritonitis	Single or multiple abscesses, widespread inflammation	Drainage of fluid collections, complications related to abscesses, such as interloop abscesses causing bowel obstruction; hysterectomy	None, or positive cervical or pelvic cultures for organisms

L. Perforated Peptic Ulcer Disease (Gastric or Duodenal)

AAST Grade	Description	Clinical Criteria	Imaging Criteria (CT findings)	Operative Criteria	Pathologic Criteria
I	Micro-perforation without peritonitis	Discomfort in the epigastric region	Extraluminal gas with no associated inflammatory changes	Preservation of normal anatomy with dissection required to identify the perforation	Perforation with minimal bowel wall inflammation
II	Contained perforation with localized peritonitis	Tenderness confined to the right upper quadrant (RUQ)	Extraluminal gas contained in a walled off collection or the retroperitoneum	Presence of inflammation and stigmata of perforation with contained collection	Perforation with bowel wall inflammation
III	Perforation with localized peritonitis and localized fluid collection in lesser sac or RUQ	Tenderness confined to the RUQ	Perforation with associated collection that is not contained in a anatomic space or abscess but not disseminated	Inflammation and contamination of peritoneal cavity confined to the RUQ	Perforation with bowel wall inflammation
IV	Free perforation with peritonitis	Diffuse peritonitis	Perforation with disseminated air and fluid	Perforation with disseminated succus or purulent peritonitis	Perforation with bowel wall inflammation
V	Perforation with duodenal destruction ± penetration into adjacent organs and generalized peritonitis	Diffuse peritonitis	Perforation with disseminated air and fluid with loss of local anatomic planes at the site of perforation	Perforation with disseminated succus or purulent peritonitis and erosion into adjacent structures	Destructive erosion of involved structures

M. Perirectal Abscess

AAST Grade	Description	Clinical Criteria	Imaging Criteria	Operative Criteria	Pathologic Criteria
I	Perianal abscess	Anal pain and swelling, erythema, tenderness	N/A	Drainage of localized pus	N/A
II	Intersphincteric abscess or ischiorectal abscess	Fever; perineal pain; diffuse swelling; pain with defecation; palpable fluctuant area on digital examination	Endorectal ultrasound localization; CT may localize collection but MRI preferable	Drainage of localized pus	Culture of abscess positive for organisms
III	Horseshoe abscess	Pain with defecation; palpable fluctuant area on digital examination	Endorectal ultrasound localization; CT may localize collection but MRI preferable	Drainage of localized pus	Culture of abscess positive for organisms
IV	Supralelevator abscess	Fever; may present with sepsis or perineal discomfort; may have no localized clinical signs	Endorectal ultrasound not useful; CT demonstrating collection	Drainage of localized pus	Culture of abscess positive for organisms
V	Necrotizing soft tissue infection of the perineum, buttocks, etc., AKA Fournier's gangrene	Systemic signs of sepsis, perineal pain and swelling, cellulitis, crepitus, necrotic skin changes	X-ray or CT may demonstrate air in soft tissues. CT or MRI may demonstrate intra-abdominal or retro-peritoneal source of infection.	Necrotic skin and soft tissue of perianal, perineal, and genitalia	Above, plus necrotic skin and soft tissue of perianal, perineal, and genitalia

N. Pleural Space Infection

AAST Grade	Description	Clinical Criteria	Imaging Criteria	Operative Criteria	Pathologic Criteria
I	Retained hemothorax or pleural effusion with positive pleural fluid cultures	Leukocytosis, fever, chest pain	Pleural fluid consistent with blood or infected fluid no evidence of loculations	Retained blood, blood clot, or other non-purulent fluid without lung trapping.	Culture of fluid positive for organisms
II	Purulent, free-flowing pleural effusion or hemothorax by imaging	Respiratory failure, leukocytosis, fever, chest pain	Pleural fluid consistent with blood or infected fluid; no evidence of loculation	Retained blood, blood clot, with purulent areas OR completely purulent fluid.	Culture of fluid positive for organisms
III	Fibrinopurulent stage with loculated areas of effusion or hemothorax	Respiratory failure, leukocytosis, fever, chest pain	Pleural fluid consistent with blood or infected fluid, with evidence of loculation	Retained blood, blood clot or other purulent fluid with limited lung trapping	Culture of fluid positive for organisms with areas of fibrous peel
IV	Organizing stage with evidence for restricted lung expansion and pulmonary mechanics	Severe respiratory failure, leukocytosis, fever, chest pain	Pleural fluid consistent with blood or infected fluid with evidence of loculation; significantly decreased lung volumes	Retained blood, blood clot or other purulent fluid with diffuse pleural inflammation and lung trapping	Culture of fluid positive for organisms with areas of fibrous peel
V	Spontaneous external drainage or spreading extra-thoracic	Severe respiratory failure, leukocytosis, fever, chest pain	Above, plus severe inflammatory changes of adjacent abdominal,	Above, with external drainage or necrotizing soft tissue infection of mediastinum,	Above, with necrotic soft tissue from mediastinum, or subcutaneous space

	necrotizing soft tissue infection		mediastinal or subcutaneous tissue	diaphragm or subcutaneous tissues	
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O. Soft Tissue Infections

AAST Grade	Description	Clinical Criteria	Imaging Criteria (CT findings)	Operative Criteria	Pathologic Criteria
I	Cellulitis	Folliculitis, erysipelas, impetigo, simple cellulitis	Superficial inflammation with no subcutaneous stranding	N/A	Acute inflammation involving epidermis only
II	Superficial necrosis or liquefaction	Necrotizing, blistering or bullous cellulitis or skin necrosis	Subcutaneous stranding, but no abscess	N/A	Acute inflammation involving epidermis and dermis
III	Subcutaneous Abscess	Subcutaneous abscess	Well defined (walled off) subcutaneous fluid collection with surrounding inflammation	Well defined subcutaneous fluid collection	Acute inflammation involving epidermis, dermis, and subcutaneous fat with cultures positive for organisms if available
IV	Fasciitis	Fasciitis	Inflammation extending to fascia; likely air along fascia margins	Clear involvement of fascia with healthy, viable muscle underneath.	Acute inflammation involving epidermis, dermis, sub-cutaneous fat, and muscular fascia with cultures positive for organisms if available
V	Myonecrosis	Myonecrosis	Air deep to fascia; likely poor perfusion of muscle	Extension of necrosis into muscle and deeper tissue	Acute inflammation involving epidermis, dermis, sub- cutaneous fat, muscular fascia, adjacent tissue (muscle, etc.) with cultures positive for organisms if available

P. Surgical Site Infections

Grade	Description	Clinical Criteria	Imaging Criteria (CT findings)	Operative Criteria	Pathologic Criteria
I	Infection involving skin only	One or more of the following: peri-incisional erythema, warmth, pain, swelling without induration, exudate, or wound separation	N/A	N/A	N/A
II	Infection involving subcutaneous tissue	One or more of the following: peri-incisional erythema warmth, pain, swelling plus induration or exudate confined to subcutaneous tissues	Soft tissue inflammatory changes, phlegmon or abscess in subcutaneous tissues	Phlegmon or abscess in subcutaneous tissues	Acute inflammation limited to subcutaneous tissues
III	Infection involving fascia or muscle layer	Subcutaneous abscess or phlegmon extending to muscle or fascia	Regional soft tissue inflammatory changes, phlegmon or abscess involving muscle or fascia	Phlegmon or abscess involving muscle or fascia	Acute inflammation involving muscle or fascia with cultures positive for organism if available
IV	Infection involving body cavity or deep space that was opened or manipulated	Above, plus separation of fascia or subfascial abscess	Phlegmon or abscess extending deep to muscle or fascia OR fascial dehiscence at surgical site	Phlegmon or abscess extending deep to muscle or fascia OR fascial wound dehiscence	Acute inflammation involving fascia and underlying tissues with cultures positive

	during the surgery				for organism if available
V	Infection involving body cavity or deep space away from the site that was opened or manipulated during surgery	Purulent drainage in a body cavity away from the operative site	Phlegmon or abscess in body cavity or deep space extending deeper than the fascia/deep muscle incision	Phlegmon or abscess in body cavity or deep space extending deeper than the fascial/deep muscle incision	Acute inflammation in body cavity or deep space away extending deeper than the fascial/deep muscle incision with cultures positive for organisms if available