# General Surgery or Procedure GRG

**GRG: SG-GS (ISC GRG)**

**MCG Health**
General Recovery Care
30th Edition
Surgical Admission Case Management GRG GRG

***Note: An appropriate Optimal Recovery Guideline (ORG) should be identified and used whenever possible. This General Recovery Guideline (GRG) is intended to aid only in situations in which no ORG appears applicable.***



# Care Planning - Inpatient Admission and Alternatives

## Clinical Indications for Procedure

- Surgery or other procedure covered by this guideline is indicated for **1 or more** of the following:
  - General abdominal procedure needed, as indicated by **1 or more** of the following:
    - Exploratory laparotomy(1)(2)
    - Trauma evaluation or repair(1)(2)
    - Biopsy or resection of mass (eg, tumor, lymph node)(3)(4)
    - Evaluation and treatment of infectious processes (eg, abscess unresponsive to antibiotics, or peritoneal signs)(5)(6)

- Evaluation and treatment of suspected mesenteric ischemia(7)
- Peritoneal signs

- Repair or reconstruction of abdominal wall defects (eg, congenital defects)(3)(8)(9)(10)

− Procedure on stomach needed, as indicated by **1 or more** of the following:

- Perforation repair(4)(11)(12)
- Drainage of abscess(6)
- Gastric outlet obstruction repair(4)(13)
- Control of ulcer bleeding (eg, not controlled by endoscopy)(4)(11)(14)
- Control of non-ulcer bleeding (eg, bleeding not controlled by saline lavage or vasopressin infusion)(14)
- Removal of gastric restrictive device (eg, for band slippage, obstruction, dehiscence, or erosion; or for intractable gastroesophageal reflux or esophagitis)(15)(16)
- Segmental or wedge resection (eg, for gastrointestinal stromal tumor, benign tumor, Dieulafoy lesion)(4)(17)
- Endoscopic full-thickness resection (for subepithelial gastrointestinal lesions)(18)
- Other gastric surgery needed (eg, gastropexy for volvulus, gastrostomy, gastric bezoar with failure of enzymatic or endoscopic management)(4)(19)

- Diaphragmatic hernia repair[A](10)(20)

− Total gastrectomy needed, as indicated by **1 or more** of the following:

- Gastric cancer deemed potentially resectable for cure (eg, without evidence of locoregional involvement of the root of the mesentery, para-aortic lymph nodes, or invasion or encasement of major blood vessels, and without distal involvement of peritoneum or distant metastases)(4)(21)
- Prophylactic total gastrectomy for patient with pathogenic CDH1 gene mutation(21)(22)(23)
- Life-threatening gastric hemorrhage refractory to nonsurgical treatment (eg, endoscopic therapy, transcatheter embolization) and not amenable to less extensive procedure (eg, mucosal oversewing, partial gastrectomy)(4)(24)
- Hypertrophic gastritis (Menetrier disease) with ongoing massive protein loss despite nonsurgical therapy (eg, acid suppression, high-protein diet, octreotide, and treatment of associated cytomegalovirus or *Helicobacter pylori* infection)(4)

− Gastrectomy with biliopancreatic diversion (with or without duodenal switch) or single-anastomosis duodeno-ileal bypass needed, as indicated by **1 or more** of the following[B](27):

- Patient is candidate for biliopancreatic diversion as primary bariatric surgical procedure, as indicated by **ALL** of the following(27)(28)(29):
  - Severe obesity (eg, BMI of 60 or greater)[C] BMI Calculator
  - Patient has tried and failed to achieve and maintain sufficient weight loss with nonsurgical treatment.[D]
  - Correctable cause for obesity not identified (eg, hypothyroidism, Cushing syndrome)
  - Current substance abuse not identified
  - Not currently pregnant and no planned pregnancy within 18 months of surgery[E]
  - Expectation that patient will be able to adhere to postoperative care requirements (eg, judged to be committed and willing to participate and adhere to postoperative instructions)
  - No current untreated eating disorder
  - No serious untreated or uncontrolled medical, psychiatric, psychosocial, or cognitive condition that would interfere with adherence to postoperative instructions and self-management
  - Patient is receiving treatment in multidisciplinary program experienced in metabolic surgery that can provide appropriate care (eg, preoperative medical or mental health consultation, nutritional counseling, patient support programs).
- Patient had prior alternative bariatric procedure (eg, laparoscopic sleeve gastrectomy) with need for conversion to biliopancreatic diversion, as indicated by **ALL** of the following(26)(32)(33)(34):
  - BMI greater than 35[F] (32.5 in Asian patients)[G] BMI Calculator(31)(41)

- Insufficient weight loss or excessive weight regain 1 year or longer after prior bariatric procedure BMI Calculator[H](26)(32)(44)
- Patient remains candidate for bariatric surgery, as indicated by **ALL** of the following:
  - Current substance abuse not identified
  - Not currently pregnant and no planned pregnancy within 18 months of surgery
  - Expectation that patient will be able to adhere to postoperative care requirements (eg, judged to be committed and willing to participate and adhere to postoperative instructions)
  - No current untreated eating disorder
  - No serious untreated or uncontrolled medical, psychiatric, psychosocial, or cognitive condition that would interfere with adherence to postoperative instructions and self-management
  - Patient is receiving treatment in multidisciplinary program experienced in metabolic surgery that can provide appropriate care (eg, preoperative medical or mental health consultation, nutritional counseling, patient support programs).

− Other reoperative bariatric surgery procedure needed, as indicated by **ALL** of the following[I](16)(26)(27)(33)(42)(43):

- Revision procedure appropriate, as indicated by **1 or more** of the following:
  - Complications from, or failure of, initial procedure, as indicated by **1 or more** of the following:
    - Band slippage, obstruction, dehiscence, or erosion (from laparoscopic adjustable gastric band, nonadjustable gastric band, or vertical banded gastroplasty procedure)(44)
    - Anastomotic leak(44)
    - Anastomotic stricture or ulcer
    - Gastric pouch dilation or stricture
    - Gastric fistula
    - Sleeve stricture or dilation(44)
    - Gastroesophageal reflux disease(45)
    - Dumping syndrome (postprandial rapid stomach emptying with cramping and diarrhea) uncontrolled by dietary changes
    - Excessive weight loss
    - Metabolic derangements (eg, severe malnutrition, vitamin deficiency, refractory hypoglycemia or hypocalcemia following Roux-en-Y bariatric procedure)(44)
    - Other complication that requires surgical revision(44)
  - Insufficient weight loss or excessive weight regain 1 year or longer after prior bariatric procedure,[H] as indicated by **1 or more** of the following:
    - Adult patient with BMI of 35 or greater (32.5 or greater in Asian patients)[G] BMI Calculator
    - Adult patient with BMI of 30 to 34.9 (27.5 to 32.4 in Asian patients)[G] and clinically serious condition related to obesity (eg, type 2 diabetes, obesity hypoventilation, obstructive sleep apnea, metabolic dysfunction-associated steatotic liver disease (formerly nonalcoholic fatty liver disease), metabolic dysfunction-associated steatohepatitis (formerly nonalcoholic steatohepatitis), pseudotumor cerebri, polycystic ovary syndrome, severe osteoarthritis, treatment-resistant hypertension[J]) BMI Calculator(31)
- Patient remains candidate for bariatric surgery, as indicated by **ALL** of the following:
  - Current substance abuse not identified
  - Not currently pregnant and no planned pregnancy within 18 months of surgery
  - Expectation that patient will be able to adhere to postoperative care requirements (eg, judged to be committed and willing to participate and adhere to postoperative instructions)
  - No current untreated eating disorder
  - No serious untreated or uncontrolled medical, psychiatric, psychosocial, or cognitive condition that would interfere with adherence to postoperative instructions and self-management

- Patient is receiving treatment in multidisciplinary program experienced in metabolic surgery that can provide appropriate care (eg, preoperative medical or mental health consultation, nutritional counseling, patient support programs).

- Procedure on intestinal tract (eg, small intestine, large intestine, rectum) needed, as indicated by **1 or more** of the following(5)(46)(47)(48):
  - Clinically significant bleeding not controlled by endoscopy, embolization, or vasopressin(14)
  - Perforation(11)(12)(49)
  - Foreign body not amenable to observation with serial imaging or endoscopic removal(49)
  - Gallstone ileus(50)(51)(52)
  - Congenital abnormalities (eg, atresia, Hirschsprung disease, malrotation)(53)
  - Surgical hemorrhoidectomy, as indicated for **1 or more** of the following(48)(54):
    - Thrombosed external hemorrhoid(48)(54)
    - Symptomatic combined external and internal hemorrhoid(48)(54)
    - Internal hemorrhoid with failure or contraindication to banding or other office-based procedure(54)
    - Grade III (prolapsed but can be manually reduced) or IV (prolapsed and irreducible) hemorrhoid(48)
  - Rectal prolapse(47)(48)
  - Anal fissure with failure of medical treatment (eg, topical nitrates, oral calcium channel blocker, botulinum toxin A injection)(48)(55)
  - Abscess requiring drainage (eg, diverticular abscess)(6)
  - Obstruction or fecal incontinence (eg, diverting colostomy, anal sphincteroplasty)(56)(57)(58)
  - Endoscopic full-thickness resection (for subepithelial gastrointestinal lesions, duodenal adenomas)(18)(59)
  - Other abnormality of intestinal tract requiring surgery
- Anorectal abscess requiring operative management, as indicated by **1 or more** of the following[K](61):
  - Systemic symptoms (fever)
  - Large, complicated (eg, loculated) abscess, or abscess involving deeper structures (eg, intersphincteric, ischiorectal, or supralevator)(60)(61)
  - Abscess with associated fistula(47)(61)
  - Abscess involving the anal sphincter(60)(61)
  - Immunosuppressed patient(47)
  - Recurrent abscess(47)(60)
- Breast procedure needed, as indicated by **1 or more** of the following(62):
  - Biopsy(62)
  - Abscess drainage(62)
  - Resection of small benign lesions (eg, fibroadenoma, papilloma, recurrent cyst)(62)(63)
  - Injury repair
  - Reduction mammaplasty(64)
  - Delayed breast reconstruction after mastectomy (eg, as separate procedure, not done at time of mastectomy)[L](65)(66)
  - Removal of hardware (eg, implants, expanders)(67)
  - Treatment of recurrent breast cancer (eg, recurrence after complete mastectomy)
  - Other breast condition requiring surgery(62)
- Resection of hepatocellular carcinoma, as indicated by **ALL** of the following(68)(69):
  - Child-Pugh class A or B
  - Portal hypertension absent or mild
  - Resectable mass (eg, solitary mass without major vascular invasion)[M]
  - Adequate future liver remnant

- Procedure on liver or biliary tract needed, as indicated by **1 or more** of the following(52)(70)(71)(72):
  - Liver biopsy(73)
  - Resection of cholangiocarcinoma(70)(74)
  - Resection of metastatic carcinoma(73)(75)
  - Resection of hepatoblastoma(76)
  - Resection of hepatocellular adenoma greater than 5 cm in diameter(76)(77)
  - Drainage of intrahepatic abscess(6)
  - Cholecystostomy(78)
  - Partial hepatectomy
  - Bile duct resection, biliary tree repair or reconstruction
  - Uncontrolled bleeding
  - Other liver or biliary tract condition requiring surgery(76)
- Procedure on pancreas needed, as indicated by **1 or more** of the following(79)(80)(81):
  - Biopsy(82)
  - Drainage of pancreatic fluid collection or pseudocyst(83)(84)
  - Resection and closure of pancreaticoenteric fistula(85)
  - Drainage of obstructed dilated pancreatic duct associated with chronic pancreatitis, with or without partial pancreatic resection(79)(80)(81)(86)
  - Drainage of abscess
  - Partial resection for mass (eg, inflammatory from chronic pancreatitis, suspected or confirmed malignancy) or cyst(79)(81)(82)(84)(86)
- Procedure on spleen needed, as indicated by **1 or more** of the following(87):
  - Biopsy(88)
  - Repair[N](89)(90)
  - Partial resection (eg, for tumor, cyst, hematologic disease, trauma)(89)(91)
- Ostomy procedure needed (eg, revision, repair, closure)(92)(93)
- Drainage or closure of fistula tract needed(94)
- Intestinal transplant needed, as indicated by **1 or more** of the following(95)(96)(97)(98):
  - Intestinal failure or short gut syndrome with failure of home parenteral nutrition, as indicated by **1 or more** of the following[O]:
    - Twin, HLA identical match, or other acceptable living intestinal donor available(99)(100)
    - Frequent hospitalizations(98)
    - Impending or overt liver failure due to parenteral nutrition liver injury (eg, total bilirubin greater than 3 mg/dL (51 micromoles/L), progressive thrombocytopenia, splenomegaly, portal hypertension)(98)
    - Total bilirubin greater than 4.4 mg/dL (75 micromoles/L) despite lipid infusion modification that persists for more than 2 months(95)(97)(98)
    - Loss of, or impending loss of, venous access (eg, central venous catheter-related thrombosis affecting multiple subclavian or internal jugular veins)(97)(98)
    - Severe central venous catheter-related sepsis (ie, multiple hospitalizations per year, or a single episode of fungemia, septic shock, or acute respiratory distress syndrome)(98)
    - Child with 2 or more ICU admissions requiring mechanical ventilation or inotrope infusion due to complications of intestinal failure(95)
    - Frequent episodes of severe dehydration despite addition of IV fluid to parenteral nutrition(98)
    - Patient unwilling to accept long-term parenteral nutrition
  - Invasive intra-abdominal desmoid tumors(97)(98)
  - Congenital mucosal disorder(95)
  - Ultra-short bowel syndrome (residual bowel less than 10 cm in infants or less than 20 cm in adults)(97)

- Need for multivisceral organ transplant (eg, portomesenteric thrombosis, intestinal infarction with hepatic failure, tumor involving mesentery and other solid organ)(95)(97)(98)
- Failure of first intestinal transplant(95)(98)(101)

− Pancreas transplant needed, as indicated by **1 or more** of the following(38)(102)(103):
- Recurrent severe diabetic ketoacidosis despite optimized glycemic management(38)
- Recurrent severe hypoglycemia or hyperglycemia despite optimized glycemic management(38)
- Significant diabetic hypoglycemia unawareness
- Severe problems (eg, inability to tolerate) with exogenous insulin therapy
- Significant pancreatic destruction or dysfunction (eg, pancreatitis, cystic fibrosis, hemochromatosis)
- Significant pancreatic resection (eg, trauma, neoplasia)

− Dual liver-renal transplant in adult, as indicated by **ALL** of the following:

− Liver transplant in adult, as indicated by **ALL** of the following(104):

− Liver transplant needed, as indicated by **1 or more** of the following:
- Cardiac cirrhosis[P]
- Congenital heart disease with associated hepatic injury (eg, Fontan-associated liver disease or other single-ventricle congenital disorders)(104)(105)(106)

− Metabolic liver disorder with associated cardiac complications, including **1 or more** of the following(104)(105):
- Familial hypercholesterolemia
- Variant transthyretin amyloidosis
- Hemochromatosis
- Glycogen storage disease
- Alcohol-associated cirrhosis with concurrent alcohol-associated cardiomyopathy

− Acute liver failure (also known as fulminant liver failure), as indicated by **ALL** of the following(107):
- Acute liver disease (ie, 56 days' duration or less)[Q](109)
- Hepatic encephalopathy of any degree[R](108)
- Severe manifestation of liver disease, as indicated by **1 or more** of the following:
  - Acute need for mechanical ventilation(108)
  - Acute need for renal replacement therapy(108)
  - INR of 2.0 or more(108)

− Severe chronic liver disease, as indicated by **1 or more** of the following(109)(111)(112)(113)(114):
- Model for End-Stage Liver Disease (MELD) score greater than or equal to 15[S]

− Complication of liver disease, as indicated by **1 or more** of the following(111)(116):
- Budd-Chiari syndrome(111)
- Spur cell hemolytic anemia not attributed to acute infection or alcohol use(111)
- Chronic recurrent hepatic hydrothorax(111)
- Variceal bleeding that persists despite treatment (eg, beta-blocker therapy, band ligation)(111)(116)
- Ascites that persists or recurs despite diuresis and low-sodium diet(111)(116)
- Hepatic encephalopathy that persists despite treatment (eg, lactulose, rifaximin)(111)(116)
- Hepatorenal syndrome(116)
- Progressive protein-calorie malnutrition(116)

- Acute-on-chronic liver disease, as indicated by **1 or more** of the following(117):
  - European Association for the Study of the Liver-Chronic Liver Failure Consortium (EASL-CLIF-C) score of 2 or 3[T](117)
  - Acute-on-chronic liver failure grade of 3[U](119)
  - Multiorgan failure, as indicated by **2 or more** of the following[V](117):
    - Liver failure as indicated by bilirubin of 12 mg/dL (205 micromoles/L) or higher
    - Hepatic encephalopathy grade III or higher by West Haven criteria[R][W]
    - Renal failure as indicated by serum creatinine of 2 mg/dL (177 micromoles/L) or greater, or need for renal replacement therapy
    - Coagulation failure as indicated by INR of 2.5 or greater
    - Circulatory failure with need for vasoconstrictor or inotropic agent
    - Respiratory failure with either a $PaO_2$ to $FiO_2$ ratio between 150 and 200 mm Hg or an $SpO_2$ to $FiO_2$ ratio between 150 and 214[X]
- Hepatocellular carcinoma and **ALL** of the following(68)(69)(124):
  - Alpha-fetoprotein 1000 ng/mL (mcg/L) or less(108)
  - Imaging is negative for extrahepatic disease and macrovascular involvement (eg, portal or hepatic vein invasion).(108)(125)
  - Tumor size appropriate for transplant as indicated by a single lesion 2 to 5 cm in diameter or 2 or 3 lesions of 1 to 3 cm in diameter(108)(125)
- Cholangiocarcinoma and **ALL** of the following(126):
  - Tumor 3 cm in diameter or smaller(70)(108)(125)
  - Unresectable due to location (eg, perihilar, vital vessel involvement), extent (eg, multifocal, bilobar disease), or severe underlying hepatic disease(108)(125)
  - No metastatic or nodal disease(70)(108)(125)
  - Neoadjuvant chemoradiation planned prior to transplant(70)(108)
- Neuroendocrine tumor and **ALL** of the following(127):
  - Primary tumor and extrahepatic disease resected with curative intent 6 months or more prior to transplant(125)
  - Stable disease for 6 months or more prior to transplant
  - Tumor not amenable to resection(125)
  - No evidence of extrahepatic metastases(125)
- Colorectal liver metastases and **ALL** of the following(127)(128)(129)(130):
  - Primary tumor resected with clear margins(125)(129)
  - Histology is not signet ring cell carcinoma or undifferentiated adenocarcinoma.(129)
  - No evidence of extrahepatic metastatic disease on PET-CT scan(125)(128)
  - Liver metastases are not resectable.(125)(127)(128)
  - Molecular marker BRAF V600E is absent.(125)(128)
  - Patient is not immunotherapy candidate.(129)
  - Metastatic lesions do not progress during at least 6 months of observation following bridging chemotherapy.(125)(129)
- Polycystic liver disease and **ALL** of the following(111):
  - Surgical therapy (removal of cysts, fenestration) not effective or not possible(111)
  - Severe disease, as indicated by **1 or more** of the following:
    - Hepatic decompensation (eg, ascites, hepatic encephalopathy)(111)
    - Concurrent hemodialysis or GFR less than 20 mL/min/1.73m$^2$ (0.33 mL/sec/1.73m$^2$)  eGFR - Adult Calculator(111)
    - Prior kidney transplant(111)

- Moderate to severe protein-calorie malnutrition(111)
- Severe sarcopenia (eg, skeletal muscle index of less than 39 $cm^2/m^2$ in women or less than 50 $cm^2/m^2$ in men)(111)

− Primary or secondary sclerosing cholangitis and **ALL** of the following(111):
- Cirrhosis on imaging or liver biopsy
- In past year, 2 or more episodes of cholangitis leading to bacteremia or hypotension necessitating IV vasopressor support(111)
- Transplant necessary due to **1 or more** of the following:
  - Biliary tract stricture not responsive to alternative intervention(111)
  - Resistant organism causing cholangitis (eg, vancomycin-resistant *Enterococcus*, extended spectrum beta-lactamase (ESBL)-producing Gram-negative organisms, carbapenem-resistant *Enterobacteriaceae*, multidrug-resistant *Acinetobacter*)

○ Familial (transthyretin) amyloidosis(131)

− Hepatopulmonary syndrome and[Y] **ALL** of the following:
- Sequelae of portal hypertension (eg, ascites, varices, splenomegaly, thrombocytopenia)
- $PaO_2$ less than 60 mm Hg (8.0 kPa) (on room air) not otherwise explained by underlying pulmonary disease (eg, COPD)
- Right to left cardiac shunt demonstrated by contrast echocardiogram ("bubble study") or nuclear perfusion lung scan

− Portopulmonary hypertension and **ALL** of the following(108)(134):
- Portal hypertension
- Pulmonary hypertension on right heart catheterization with **ALL** of the following:
  - Mean pulmonary artery pressure 35 mm Hg or greater at rest
  - Pulmonary vascular resistance 3 Wood units (240 dynes*sec/$cm^5$) or greater
- Other causes of pulmonary hypertension not a significant contributor to pulmonary hypertension (eg, heart failure, valvular heart disease, parenchymal pulmonary disease)
- Satisfactory response to pulmonary hypertension treatment (eg, vasodilators, endothelin receptor antagonist), as indicated by **1 or more** of the following[Z](119)(133)(134):
  - Post-treatment mean pulmonary artery pressure is less than 35 mm Hg and pulmonary vascular resistance is less than 5 Wood units (400 dynes*sec/$cm^5$).
  - Post-treatment mean pulmonary artery pressure is more than 35 mm Hg and less than 45 mm Hg and pulmonary vascular resistance is less than 3 Wood units (240 dynes*sec/$cm^5$).

○ Wilson disease and **1 or more** of the following(108)(135)(136):
- Acute liver failure[AA]
- Acute decompensated liver disease unresponsive to medical therapy (eg, chelation, zinc)[BB]
- Progressive chronic liver failure (eg, jaundice, ascites, hepatic encephalopathy, varices)[CC]

○ Acute severe autoimmune hepatitis and **1 or more** of the following(119):
- Severe coagulopathy (INR 1.5 or greater) with severe hepatic encephalopathy (grade III or IV)
- Worsening liver function tests despite corticosteroid therapy
- New or worsening hepatic encephalopathy despite corticosteroid therapy

○ Anhepatic state[DD](108)

− Hepatic adenoma or multiple adenomas and **ALL** of the following(125):
- One or more adenoma not appropriate for resection or medical management(125)(139)
- Liver transplant necessary, as indicated by **1 or more** of the following:
  - Biopsy-proven malignant transformation of one or more adenomas(125)(139)
  - Glycogen storage disease-associated adenoma[EE](125)(139)
  - High risk for malignancy or malignant transformation (eg, increasing size, positive beta-catenin nuclear staining)(125)(139)

- Hemorrhagic complication in one or more adenoma(125)

− Hereditary hemorrhagic telangiectasia and **ALL** of the following(125):
- Intrahepatic arteriovenous malformations on imaging(125)
- High-output heart failure on echocardiogram(125)

- Acute hepatic porphyria with recurrent intractable symptoms despite pharmacotherapy (eg, prophylactic hemin or givosiran therapy)(140)
- Other hepatic disorder associated with increased mortality that can be addressed with liver transplant (eg, primary biliary cholangitis, hemochromatosis, alpha-1 antitrypsin deficiency)(131)(141)

− Repeat transplant (ie, replacement of previously placed transplant) needed, as indicated by **1 or more** of the following:
- Primary nonfunctional graft, as indicated by **ALL** of the following[FF](142):
  - Recent transplant (onset within 7 days of transplant)
  - Need for mechanical ventilation or continuous renal replacement therapy
  - AST 3000 units/L (50.1 mckat/L) or greater
  - Biochemical evidence of nonfunction, as indicated by **1 or more** of the following:
    - INR 2.5 or greater
    - Arterial pH of 7.30 or less
    - Venous pH of 7.25 or less
    - Lactate of 4 mmol/L (36 mg/dL) or greater
- Acute or chronic rejection of transplanted liver resulting in insufficient hepatic function(142)
- Hepatic artery thrombosis in transplanted liver(108)(142)
- Redevelopment of need for liver transplant (eg, recurrence of hepatic dysfunction)
- Post-transplant biliary stricture refractory to endoscopic or percutaneous therapy(142)

- No contraindications to liver transplant present

− Renal transplant in adult needed, as indicated by **ALL** of the following(104):

− End-stage renal disease, as indicated by **1 or more** of the following:
- Need for renal replacement therapy due to irreversible renal disease (ie, end-stage renal disease)(108)
- Impending end-stage renal disease (ie, diagnosed with irreversible renal disease or pathology whose natural history is progression to a need for renal replacement therapy)(108)

− No contraindications to renal transplant present, as indicated by **ALL** of the following(143):
- No multiple myeloma or monoclonal immunoglobulin deposition disease (light or heavy chain deposition) unless in stable remission
- No inability to comply with ongoing medical care
- No uncontrolled HIV infection, as indicated by **1 or more** of the following:
  - No HIV infection
  - No uncontrolled HIV infection, as indicated by **ALL** of the following:
    - CD4 T-cell count has been greater than 200/$mm^3$ (0.2 x$10^9$/L) for at least 3 months.
    - Viral load is undetectable.
    - No opportunistic infection within last 6 months
    - No history of progressive multifocal leukoencephalopathy (PMLD)
    - No history of central nervous system lymphoma
    - No cognitive impairment attributable to HIV infection
    - Patient is adherent to antiretroviral drug regimen.
- No stroke within last 6 months or transient ischemic attack within last 3 months
- No active gastrointestinal disease, including symptomatic peptic ulcers, diverticulitis, inflammatory bowel disease, or gallbladder disease

- No acute pancreatitis within last 3 months
- No acute hepatitis (eg, elevated INR or transaminitis)
- No active malignancies[GG]
- No surgical contraindications to renal transplant (eg, urologic or vascular problems)

− Pediatric dual liver-renal transplant, as indicated by **ALL** of the following:

− Pediatric liver transplant, as indicated by **ALL** of the following:

− Transplant needed for **1 or more** of the following:

− Acute liver failure (also known as fulminant liver failure), as indicated by **ALL** of the following(108)(144)(145):

- Acute liver disease (ie, 8 weeks' duration or less)[HH]
- Severe manifestations of liver disease, as indicated by **1 or more** of the following(108):
  - Acute need for mechanical ventilation
  - Acute need for renal replacement therapy
  - INR of 2.0 or more
  - INR of 1.5 to 1.9 with any degree of hepatic encephalopathy[II]

− Severe chronic liver disease, as indicated by **1 or more** of the following(112)(115):

- MELD or Pediatric Model for End-Stage Liver Disease score of 15 or higher[JJ][KK][LL][MM]

− Complication of liver disease, as indicated by **1 or more** of the following:

- Severe growth failure (eg, z score is less than 2 standard deviations below mean for age and sex)(115)
- Parenteral nutrition necessary to maintain growth or euglycemia(115)
- Ascites or hepatic hydrothorax that persists or recurs despite diuresis and low-sodium diet
- Hepatic encephalopathy that persists despite treatment (eg, lactulose, rifaximin)(115)
- Recurrent spontaneous bacterial peritonitis(115)
- Recurrent severe cholangitis (eg, 2 or more episodes within 6 months requiring IV antibiotics for 2 weeks via central access)(115)
- History of life-threatening infection (eg, bacteremia, hypotension) with need for ICU stay(115)
- Variceal bleeding that persists despite treatment (eg, beta-blocker therapy, band ligation)(115)

- Biliary atresia(147)
- Hepatocellular carcinoma with no evidence of tumor outside the liver(115)(148)(149)

− Cholangiocarcinoma and **ALL** of the following(70)(108)(126):

- Tumor less than or equal to 3 cm in diameter
- Unresectable due to location (eg, perihilar, vital vessel involvement), extent (eg, multifocal, bilobar disease), or severe underlying hepatic disease (eg, cirrhosis, primary sclerosing cholangitis)(150)
- No metastatic or nodal disease
- Neoadjuvant chemoradiation planned prior to transplant(126)

- Hepatoblastoma without metastases that is not amenable to hepatic resection(108)(115)(127)
- Epithelioid hemangioendothelioma unresponsive to therapy that is not amenable to hepatic resection(115)

− Neuroendocrine tumor and **ALL** of the following(115)(127):

- Primary tumor and extrahepatic disease resected with curative intent 6 months or more prior to transplant(115)
- Stable disease for 6 months or more prior to transplant(115)
- Tumor not amenable to resection(115)
- No evidence of extrahepatic metastases(115)

- Polycystic liver disease and **ALL** of the following(111):
  - Surgical therapy (removal of cysts, fenestration) not effective or not possible(77)
  - Severe disease, as indicated by **1 or more** of the following:
    - Hepatic decompensation (eg, ascites, hepatic encephalopathy)(111)
    - Concurrent hemodialysis or GFR less than 20 mL/min/1.73m$^2$ (0.33 mL/sec/1.73m$^2$) eGFR - Pediatric Calculator(111)
    - Prior kidney transplant(111)
    - Moderate to severe protein-calorie malnutrition(111)
    - Severe sarcopenia(111)
- Primary sclerosing cholangitis and **ALL** of the following(150)(151):
  - Cirrhosis on imaging or liver biopsy(150)
  - Transplant necessary due to **1 or more** of the following:
    - Biliary tract stricture not responsive to intervention(111)(150)
    - Intractable pruritus(150)
    - Two or more episodes of cholangitis within 1 year(111)(150)
- Familial amyloidosis(108)
- Urea cycle disorder(108)(152)
- Organic acidemia(108)(153)
- Hepatopulmonary syndrome[Y] and **ALL** of the following(108):
  - Sequelae of portal hypertension (eg, ascites, varices, splenomegaly, thrombocytopenia)
  - $PaO_2$ less than 60 mm Hg (8.0 kPa) (on room air) not otherwise explained by underlying pulmonary disease
  - Right to left cardiac shunt demonstrated by contrast echocardiogram ("bubble study") or nuclear perfusion lung scan
- Portopulmonary hypertension and **ALL** of the following(108)(134):
  - Portal hypertension
  - Pulmonary hypertension on right heart catheterization with **ALL** of the following(154)(155):
    - Mean pulmonary artery pressure greater than 35 mm Hg at rest
    - Pulmonary vascular resistance 3 Wood units (240 dynes*sec/cm$^5$) or greater
  - Other causes of pulmonary hypertension not a significant contributor to pulmonary hypertension (eg, heart failure, valvular heart disease, parenchymal pulmonary disease)
  - Satisfactory response to pulmonary hypertension treatment (eg, vasodilators, endothelial receptor blocker), as evidenced by **1 or more** of the following[Z](119)(133)(134):
    - Post-treatment mean pulmonary artery pressure less than 35 mm Hg and pulmonary vascular resistance less than 5 Wood units (400 dynes*sec/cm$^5$)
    - Post-treatment mean pulmonary artery pressure more than 35 mm Hg and less than 45 mm Hg, and pulmonary vascular resistance less than 3 Wood units (240 dynes*sec/cm$^5$)
- Wilson disease and **1 or more** of the following(108)(135):
  - Acute liver failure[AA]
  - Acute decompensated liver disease unresponsive to medical therapy (eg, chelation, zinc)[BB]
  - Progressive chronic liver failure (eg, jaundice, ascites, hepatic encephalopathy, varices)[CC]
- Acute severe autoimmune hepatitis and **1 or more** of the following(119):
  - Severe coagulopathy (INR 1.5 or greater) with severe hepatic encephalopathy (grade III or IV)
  - Worsening liver function tests despite corticosteroid therapy

        - New or worsening hepatic encephalopathy despite corticosteroid therapy
    - Anhepatic state[DD](108)
    - Acute hepatic porphyria with recurrent intractable symptoms despite pharmacotherapy (eg, prophylactic hemin or givosiran therapy)(140)
    - Other hepatic disorder associated with increased mortality that can be addressed with liver transplant (eg, glycogen storage disease, familial intrahepatic cholestasis, severe trauma, alpha-1 antitrypsin deficiency)[LL](156)(157)(158)
    - Repeat transplant (ie, replacement of previously placed transplant) needed, as indicated by **1 or more** of the following:
        - Primary nonfunctional graft, as indicated by **ALL** of the following[FF](142):
            - Recent transplant (onset within 7 days of transplant)
            - Need for mechanical ventilation or continuous renal replacement therapy
            - AST 3000 units/L (50.1 mckat/L) or greater
            - Biochemical evidence of nonfunction, as indicated by **1 or more** of the following:
                - INR 2.5 or greater
                - Arterial pH of 7.30 or less
                - Venous pH of 7.25 or less
                - Lactate of 4 mmol/L (36 mg/dL) or greater
        - Acute or chronic rejection of transplanted liver resulting in insufficient hepatic function(142)
        - Hepatic artery thrombosis in transplanted liver(108)(142)(157)
        - Redevelopment of need for liver transplant (eg, recurrence of hepatic dysfunction)
        - Post-transplant biliary stricture refractory to endoscopic or percutaneous therapy(142)
- No contraindications to liver transplant present

- Pediatric renal transplant, as indicated by **ALL** of the following:
    - Renal transplant appropriate, as indicated by **1 or more** of the following(143):
        - Need for renal replacement therapy due to irreversible renal disease (ie, end-stage renal disease)
        - Impending end-stage renal disease (ie, diagnosed with irreversible renal disease or pathology whose natural history is progression to a need for renal replacement therapy)
        - Repeat transplant (ie, replacement of previously placed transplant) needed, as indicated by **1 or more** of the following:
            - Acute or chronic rejection of transplanted kidney resulting in insufficient renal function
            - Redevelopment of need for renal transplant, as indicated by **1 or more** of the following:
                - Need for chronic renal replacement therapy due to irreversible renal disease (ie, end-stage renal disease)
                - Impending end-stage renal disease (ie, diagnosed with irreversible renal disease or pathology whose natural history is progression to a need for renal replacement therapy)
    - No contraindications present, as indicated by **ALL** of the following(143):
        - No multiple myeloma or monoclonal immunoglobulin deposition disease (light or heavy chain deposition) unless in stable remission
        - No amyloidosis with extensive extrarenal involvement (eg, cardiac amyloidosis)
        - No decompensated cirrhosis unless candidate for combined liver-renal transplant
        - No severe irreversible obstructive or restrictive lung disease (eg, oxygen-dependent irreversible disease)
        - No severe uncorrectable symptomatic heart disease (eg, New York Heart Association functional class IV heart failure, coronary artery disease, valvular disease) unless candidate for combined heart-kidney transplant or evaluated by a transplant cardiologist
        - No progressive central neurodegenerative disease (eg, Alzheimer, Parkinson, or Huntington diseases)
        - No unstable psychiatric disorder that affects decision-making
        - No ongoing substance use disorder that affects decision-making
        - No inability to comply with ongoing medical care

- No uncontrolled HIV infection, as indicated by **1 or more** of the following:
  - No HIV infection
  - HIV infection under control, as indicated by **ALL** of the following:
    - CD4 T-cell count has been greater than 200/$mm^3$ (0.2 x$10^9$/L) for at least 3 months.
    - Viral load is undetectable.
    - No opportunistic infection within last 6 months
    - No history of PMLD
    - No history of central nervous system lymphoma
    - No cognitive impairment attributable to HIV infection
    - Patient is adherent to antiretroviral drug regimen.
- No active bacterial, viral, parasitic, or fungal infection other than hepatitis C
- No stroke within last 6 months or transient ischemic attack within last 3 months
- No active gastrointestinal disease, including symptomatic peptic ulcers, diverticulitis, inflammatory bowel disease, or gallbladder disease
- No acute pancreatitis within last 3 months
- No acute hepatitis (eg, elevated INR or transaminitis)
- No active malignancies[GG]
- No surgical contraindications (eg, urologic or vascular problems)

## Alternatives to Procedure

- Alternatives may include(1)(2):
  - Nonoperative observation(11)(49)(72)(84)(89)(90)
  - Medical management of disease (eg, ulcer, abscess, injury, pain)(4)(7)(11)(14)(47)(48)(52)(55)(56)(62)(80)(83)(86)
  - For primary or metastatic malignancy: radiation, chemotherapy, immunotherapy, ablation, chemo-embolization or radio-embolization, or palliative care(4)(13)(21)(62)(68)(70)(74)(82)(159)
  - For select patients with gastric cancer: partial gastrectomy(21)
  - For select patients with hepatocellular carcinoma: liver transplant(68)(73)(160)
  - For bariatric surgery or revision: multidisciplinary nonsurgical weight loss program, including low-calorie or very low-calorie diet, supervised exercise, behavior modification, endoscopic gastroplasty, or anti-obesity pharmacotherapy (eg, phentermine/topiramate, naltrexone/bupropion, liraglutide, semaglutide)(38)(161)(162)(163)
  - For chronic intestinal failure: home parenteral nutrition, intestinal rehabilitation (eg, dietary modification, oral hydration, supplemental nutritional supplements, and antisecretory agents), bowel lengthening procedures(97)

## Operative Status Criteria

Search by CPT® code for specific procedure Benchmark Length of Stay (BLOS).

***Note: The definition of an ambulatory procedure depends on payer-provider contractual agreement or regulatory language (eg, CMS' Two-Midnight Rule). An ambulatory procedure may include one postoperative overnight stay in a facility; therefore, a Benchmark Length of Stay (BLOS) of ambulatory refers to patients discharged the day of or the day after the procedure. Depending on various patient and procedural factors, some patients undergoing a procedure with an ambulatory BLOS require inpatient care (eg, medical necessity for hospital-based care across 2 or more postoperative midnights).***

***The Ambulatory Surgery Exception Criteria GRG can help with this determination.***

- Ambulatory: Benchmark Length of Stay (BLOS) = A

- Inpatient, as indicated by **1 or more** of the following:
  - Benchmark Length of Stay (BLOS) = 2 or more days postoperative (eg, medical necessity for hospital-based care across 2 or more postoperative midnights)
  - Procedure is usually performed on ambulatory basis, but inpatient stay is needed. See Ambulatory Surgery Exception Criteria GRG.
  - Medicare patient, and specific procedure is on CMS Inpatient Only List

# Hospitalization

## General Recovery Course

| Stage | Level of Care | Clinical Status | Interventions |
|---|---|---|---|
| **1** | • OR to ICU or intermediate care[NN]<br>• Social Determinants of Health Assessment<br>• Discharge planning. See Discharge Planning Tool SR. | • **Clinical Indications met[OO]**<br>• **Procedure completed** | • Inpatient interventions as needed<br>• Possible prophylactic antiemetic for postoperative nausea and vomiting[PP]<br>• Multimodal analgesia |
| **2** | • Floor<br>• Social Determinants of Health Assessment | • **No ICU or intermediate care needs** | • Inpatient interventions continue<br>• Multimodal analgesia<br>• Transition to oral routes |
| **3** | • **Activity level acceptable**<br>• Social Determinants of Health Assessment<br>• Floor to discharge<br>• Complete discharge planning | • **Hemodynamic stability**<br>• **Operative site and other wounds acceptable**<br>• **Pain and nausea absent or adequately managed**<br>• **Temperature status acceptable**<br>• **No infection, or status acceptable**<br>• **No blood loss, or problem resolved**<br>• **Abdominal status acceptable**<br>• **Hepatic and biliary abnormalities absent or acceptable**<br>• **Inflammation absent or stable (eg, colitis)**<br>• **No transplant done, or status acceptable**<br>• **General Discharge Criteria met** | • **Intake acceptable**<br>• **No inpatient interventions needed** |

(1)(2)(3)(7)(8)(13)(46)(52)(62)(165)(166)(167)(168)(169)(170)(171)(172)

Recovery Milestones are indicated in **bold**.

**Benchmark Length of Stay (BLOS):** Access diagnosis and procedure code-specific BLOS via Search functions.

## Discharge Criteria

- Continued inpatient stay is needed until **1 or more** of the following are present:
  - Acceptable patient status for next level of care is achieved.
  - **ALL** of the following are present:
    - Hemodynamic stability, as indicated by **1 or more** of the following:
      - Hemodynamic abnormalities at baseline or acceptable for next level of care
      - Patient hemodynamically stable, as indicated by **ALL** of the following(173)(174):
        - Tachycardia absent
        - Hypotension absent
        - No evidence of inadequate perfusion (eg, no myocardial ischemia)
        - No other hemodynamic abnormalities (eg, no Orthostatic hypotension)
    - Operative site and other wounds acceptable, as indicated by **1 or more** of the following(175):
      - Wounds absent
      - Wound site clean and intact, with minimal to no drainage and without signs of infection
      - Current wound care performable at next level of care
    - Pain and nausea absent or adequately managed, as indicated by **1 or more** of the following(176)(177)(178)(179)(180):
      - No pain or nausea
      - Minimal discomfort on oral medications
      - Pain and nausea managed on regimen performable at next level of care
    - Temperature status acceptable, as indicated by **1 or more** of the following(181)(182)(183):
      - Temperature less than 100.5 degrees F (38.1 degrees C) (oral) and greater than 96.8 degrees F (36 degrees C) (rectal)
      - Temperature as expected for disease process and appropriate for management at next level of care
    - No infection, or status acceptable, as indicated by **1 or more** of the following(182)(183)(184)(185)(186):
      - No infection present
      - Infection status acceptable for next level of care, as indicated by **ALL** of the following(187):
        - WBC count normal, stable, or declining with treatment
        - Adequate treatment performable at next level of care
        - Organism and sensitivities identified, or adequate clinical response to empiric therapy
        - Repeat cultures negative or not needed
    - No blood loss, or problem resolved, as indicated by **1 or more** of the following(188)(189)(190)(191):
      - No blood loss problem
      - Repeat evaluation shows blood loss resolved sufficiently (eg, hemoglobin at acceptable level and stable)
    - Abdominal status acceptable, as indicated by **ALL** of the following(192):
      - Bowel sounds present
      - No ileus, signs of obstruction, or peritonitis
      - Abdominal distention absent or manageable at next level of care
    - Hepatic and biliary abnormalities absent or acceptable, as indicated by **1 or more** of the following(193)(194)(195):
      - No abnormalities present
      - Hepatic and biliary status acceptable for next level of care, as indicated by **ALL** of the following:
        - Liver function tests normal, stable, or improving

- Ascites absent, diminishing, or stable, with adequate respiratory function for next level of care
- Renal function acceptable
- Bilirubin stable or diminishing
- Encephalopathy absent or controlled adequately for next level of care
- No biliary obstruction, or current drainage and treatment plan appropriate for next level of care

- Inflammation absent or stable (eg, colitis)

− No transplant done, or status acceptable, as indicated by **1 or more** of the following(116)(196)(197)(198)(199)(200)(201)(202)(203)(204)(205):

- No transplant
- Status acceptable, as indicated by **ALL** of the following:
  - Infection and rejection absent or under appropriate treatment
  - Immunosuppression regimen appropriate for next level of care
  - Infection prophylaxis regimen established
  - No graft vs host disease evident

− Activity level acceptable, as indicated by **1 or more** of the following:

- Patient ambulatory and can perform ADL as appropriate for age and development
- Activity at baseline
- Activity level acceptable for next level of care

− Intake acceptable, as indicated by **1 or more** of the following(206):

- Oral hydration, medications, and diet
- Enteral hydration, medications, and diet
- Administration routes performable at next level of care

− No inpatient interventions needed; examples include:

- Wound care needed not feasible at next level of care
- Gastrointestinal decompression, such as nasogastric or other tube suction, with continuing ileus or other acute intra-abdominal process
- Drain care: drains in place, with high-volume output requiring continuing observation and care that cannot be managed at next level of care
- Repeat urgent or emergent surgery for bleeding, obstruction, abscess, leak, fistula, or other lesions
- Urgent CT scan, ultrasound, angiogram, or endoscopic procedure to evaluate acute abdominal process

− General Discharge Criteria GRG met or Pediatric General Discharge Criteria GRG met (if either is relevant or necessary for patient's condition)

# Case Management

See Surgical Admission Case Management GRG GRG for further information.

# Discharge Destination

- Post-hospital levels of admission may include:
  - Home.
  - Home healthcare. See Surgical Admission Home Care GRG HC or Geriatric Admission Home Care GRG HC for further information.
  - Recovery facility care. See Surgical Admission Recovery Facility Care GRG RFC or Geriatric Admission Recovery Facility Care GRG RFC for further information.
  - Inpatient rehabilitation facility. See Inpatient Rehabilitation Facility (IRF) Admission Recovery Facility Care GRG RFC for further information.

# Evidence Summary

## Criteria

The evidence for the clinical indications found in this guideline includes 93 published peer reviewed articles, 30 specialty society or other evidence-based guidelines, 1 Cochrane systematic review, and 25 book sections.

## Rationale

Use of this MCG care guideline helps the clinician identify, for a given procedure, which patient-specific factors and clinical conditions are appropriate for that procedure. The evidence-based clinical criteria assist the clinician in the decision to appropriately perform a procedure, evaluating whether the potential benefits of a procedure outweigh the potential risks. For Medicare enrollees, surgical MCG care guidelines also identify which procedures CMS has designated as inpatient only.

Use of these evidence-based clinical criteria to support decision making around the need for a given procedure is of benefit to the patient, as all procedures come with inherent risk that must be balanced by anticipated clinical benefit. Utilizing evidence-based clinical criteria enables a more accurate and patient-specific decision-making process. In addition, the use of evidence-based guidelines can help reduce unwarranted variation in care, such as divergent clinical thresholds to perform a procedure for clinically similar patients that vary across geographic regions, between facilities, and among individual clinicians.

## Related CMS Coverage Guidance

This guideline supplements but does not replace, modify, or supersede existing Medicare regulations or applicable National Coverage Determinations (NCDs) or Local Coverage Determinations (LCDs).

**Code of Federal Regulations (CFR):** 42 CFR 412.3(207); 42 CFR 419.22(208); 42 CFR 422.101(209)

**Internet-Only Manual (IOM) Citations:** CMS IOM Publication 100-02, Medicare Benefit Policy Manual, Chapter 1 - Inpatient Hospital Services Covered Under Part A(210); CMS IOM Publication 100-02, Medicare Benefit Policy Manual, Chapter 6 - Hospital Services Covered Under Part B(211); CMS IOM Publication 100-02, Medicare Benefit Policy Manual, Chapter 15 - Covered Medical and Other Health Services(212); CMS IOM Publication 100-08, Medicare Program Integrity Manual, Chapter 6, Section 6.5 - Medical Review of Inpatient Hospital Claims for Part A Payment(213)

**Medicare Coverage Determinations:** Medicare Coverage Database(214)

# References

1. Landmann A, Bonds M, Postier R. Acute abdomen. In: Townsend CM, Beauchamp RD, Evers BM, Mattox KL, editors. Sabiston Textbook of Surgery. 21st ed. Elsevier; 2022:1134-1149. [ Context Link 1, 2, 3, 4 ]
2. Carmichael SP, Mowery NT, Martin RS, Meredith JW. Management of acute trauma. In: Townsend CM, Beauchamp RD, Evers BM, Mattox KL, editors. Sabiston Textbook of Surgery. 21st ed. Elsevier; 2022:386-428. [ Context Link 1, 2, 3, 4 ]
3. Chung DH. Pediatric surgery. In: Townsend CM, Beauchamp RD, Evers BM, Mattox KL, editors. Sabiston Textbook of Surgery. 21st ed. Elsevier; 2022:1844-1882. [ Context Link 1, 2, 3 ]
4. Mahvi DA, Mahvi DM. Stomach. In: Townsend CM, Beauchamp RD, Evers BM, Mattox KL, editors. Sabiston Textbook of Surgery. 21st ed. Elsevier; 2022:1196-1239. [ Context Link 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 ]

5. Gan T, Evers M. Small intestine. In: Townsend CM, Beauchamp RD, Evers BM, Mattox KL, editors. Sabiston Textbook of Surgery. 21st ed. Elsevier; 2022:1240-1300. [ Context Link 1, 2 ]
6. Santos AP, Onkendi E, Dissanaike S. Surgical infections and antibiotic use. In: Townsend CM, Beauchamp RD, Evers BM, Mattox KL, editors. Sabiston Textbook of Surgery. 21st ed. Elsevier; 2022:223-237. [ Context Link 1, 2, 3, 4 ]
7. Bala M, et al. Acute mesenteric ischemia: updated guidelines of the World Society of Emergency Surgery. World Journal of Emergency Surgery 2022;17(1):Online. DOI: 10.1186/s13017-022-00443-x. [ Context Link 1, 2, 3 ] View abstract...
8. Privratsky AM, Barreto JC, Turnage RH. Abdominal wall, umbilicus, peritoneum, mesenteries, omentum and retroperitoneum. In: Townsend CM, Beauchamp RD, Evers BM, Mattox KL, editors. Sabiston Textbook of Surgery. 21st ed. Elsevier; 2022:1080-1104. [ Context Link 1, 2 ]
9. Bittner R, et al. Update of Guidelines for laparoscopic treatment of ventral and incisional abdominal wall hernias (International Endohernia Society (IEHS))-Part A. Surgical Endoscopy 2019;33(10):3069-3139. DOI: 10.1007/s00464-019-06907-7. [ Context Link 1 ] View abstract...
10. Bridges CJ, Hasson RM. Congenital hernias in adults: bochdalek hernias. Thoracic Surgery Clinics 2024;34(2):155-162. DOI: 10.1016/j.thorsurg.2024.01.007. [ Context Link 1, 2, 3 ] View abstract...
11. Tarasconi A, et al. Perforated and bleeding peptic ulcer: WSES guidelines. World Journal of Emergency Surgery 2020;15:3. DOI: 10.1186/s13017-019-0283-9. (Reaffirmed 2025 Jul) [ Context Link 1, 2, 3, 4, 5 ] View abstract...
12. Wang A, et al. Surgical management of peptic ulcer disease. Current Problems in Surgery 2020;57(2):100728. DOI: 10.1016/j.cpsurg.2019.100728. [ Context Link 1, 2 ] View abstract...
13. Upchurch E, Ragusa M, Cirocchi R. Stent placement versus surgical palliation for adults with malignant gastric outlet obstruction. Cochrane Database of Systematic Reviews 2018, Issue 5. Art. No.: CD012506. DOI: 10.1002/14651858.CD012506.pub2. [ Context Link 1, 2, 3 ] View abstract...
14. Chiang KJ, Saillant NN, Hodin R. Acute gastrointestinal hemorrhage. In: Townsend CM, Beauchamp RD, Evers BM, Mattox KL, editors. Sabiston Textbook of Surgery. 21st ed. Elsevier; 2022:1150-1166. [ Context Link 1, 2, 3, 4 ]
15. Lazzati A, et al. Natural history of adjustable gastric banding: lifespan and revisional rate: a nationwide study on administrative data on 53,000 patients. Annals of Surgery 2017;265(3):439-445. DOI: 10.1097/SLA.0000000000001879. [ Context Link 1 ] View abstract...
16. Kichler K, Rosenthal RJ, DeMaria E, Higa K. Reoperative surgery for nonresponders and complicated sleeve gastrectomy operations in patients with severe obesity. An international expert panel consensus statement to define best practice guidelines. Surgery for Obesity and Related Diseases 2019;15(2):173-186. DOI: 10.1016/j.soard.2018.11.006. [ Context Link 1, 2, 3 ] View abstract...
17. von Mehren M, et al. Gastrointestinal Stromal Tumors (GISTs). NCCN Clinical Practice Guidelines in Oncology [Internet] National Comprehensive Cancer Network (NCCN). v. 1.2025; 2025 Apr 17 Accessed at: https://www.nccn.org/. [accessed 2025 Apr 29] [ Context Link 1 ]
18. D'Souza LS, Yang D, Diehl D. AGA clinical practice update on endoscopic full-thickness resection for the management of gastrointestinal subepithelial lesions: commentary. Gastroenterology 2024;166(2):345-349. DOI: 10.1053/j.gastro.2023.11.016. [ Context Link 1, 2 ] View abstract...
19. Bauman ZM, Evans CH. Volvulus. Surgical Clinics of North America 2018;98(5):973-993. DOI: 10.1016/j.suc.2018.06.005. [ Context Link 1 ] View abstract...
20. Giuffrida M, et al. Management of complicated diaphragmatic hernia in the acute setting: a WSES position paper. World Journal of Emergency Surgery 2023;18(1):Online. DOI: 10.1186/s13017-023-00510-x. [ Context Link 1, 2, 3 ] View abstract...
21. Ajani JA, et al. Gastric Cancer. NCCN Clinical Practice Guidelines in Oncology [Internet] National Comprehensive Cancer Network (NCCN). v. 2.2025; 2025 Apr 04 Accessed at: https://www.nccn.org/guidelines/. [accessed 2025 Apr 29] [ Context Link 1, 2, 3, 4 ]
22. Blair VR, et al. Hereditary diffuse gastric cancer: updated clinical practice guidelines. Lancet Oncology 2020;21(8):e386-e397. DOI: 10.1016/S1470-2045(20)30219-9. [ Context Link 1 ] View abstract...
23. Vos EL, et al. Indications for total gastrectomy in CDH1 mutation carriers and outcomes of risk-reducing minimally invasive and open gastrectomies. JAMA Surgery 2020;155(11):1050-1057. DOI: 10.1001/jamasurg.2020.3356. [ Context Link 1 ] View abstract...
24. Chiu PW, Lau JY. What if endoscopic hemostasis fails?: Alternative treatment strategies: surgery. Gastroenterology Clinics of North America 2014;43(4):753-763. DOI: 10.1016/j.gtc.2014.08.006. [ Context Link 1 ] View abstract...

25. Spinos D, Skarentzos K, Esagian SM, Seymour KA, Economopoulos KP. The effectiveness of single-anastomosis duodenoileal bypass with sleeve gastrectomy/one anastomosis duodenal switch (SADI-S/OADS): an updated systematic review. Obesity Surgery 2021;31(4):1790-1800. DOI: 10.1007/s11695-020-05188-7. [ Context Link 1 ] View abstract...
26. Andalib A, Alamri H, Almuhanna Y, Bouchard P, Demyttenaere S, Court O. Short-term outcomes of revisional surgery after sleeve gastrectomy: a comparative analysis of re-sleeve, Roux en-Y gastric bypass, duodenal switch (Roux en-Y and single-anastomosis). Surgical Endoscopy 2021;35(8):4644-4652. DOI: 10.1007/s00464-020-07891-z. [ Context Link 1, 2, 3, 4, 5, 6 ] View abstract...
27. Mechanick JI, et al. Clinical practice guidelines for the perioperative nutrition, metabolic, and nonsurgical support of patients undergoing bariatric procedures - 2019 update: cosponsored by American Association of Clinical Endocrinologists/American College of Endocrinology, the Obesity Society, American Society for Metabolic & Bariatric Surgery, Obesity Medicine Association, and American Society of Anesthesiologists. Endocrine Practice 2019;25(12):1346-1359. DOI: 10.4158/GL-2019-0406. (Reaffirmed 2025 Mar) [ Context Link 1, 2, 3, 4, 5, 6, 7 ] View abstract...
28. Armstrong SC, Bolling CF, Michalsky MP, Reichard KW, Section on Obesity, Section on Surgery. Pediatric metabolic and bariatric surgery: evidence, barriers, and best practices. Pediatrics 2019;144(6):e20193223. DOI: 10.1542/peds.2019-3223. (Reaffirmed 2025 Jun) [ Context Link 1 ] View abstract...
29. Bolling CF, Armstrong SC, Reichard KW, Michalsky MP, Section on Obesity, Section on Surgery. Metabolic and bariatric surgery for pediatric patients with severe obesity. Pediatrics 2019;144(6):e20193224. DOI: 10.1542/peds.2019-3224. (Reaffirmed 2025 Jun) [ Context Link 1 ] View abstract...
30. Rubino F, et al. Metabolic surgery in the treatment algorithm for Type 2 diabetes: a joint statement by International Diabetes Organizations. Obesity Surgery 2017;27(1):2-21. DOI: 10.1007/s11695-016-2457-9. [ Context Link 1, 2 ] View abstract...
31. Eisenberg D, et al. 2022 American Society for Metabolic and Bariatric Surgery (ASMBS) and International Federation for the Surgery of Obesity and Metabolic Disorders (IFSO): indications for metabolic and bariatric surgery. Surgery for Obesity and Related Diseases 2022;Online. DOI: 10.1016/j.soard.2022.08.013. (Reaffirmed 2025 Jul) [ Context Link 1, 2, 3, 4 ] View abstract...
32. Spivak H, Giorgi M, Luhrs A. Conversion of gastric sleeve to Roux-en-Y gastric bypass and biliopancreatic diversion/duodenal switch: safe and viable options. Surgery for Obesity and Related Diseases 2023;19(2):131-135. DOI: 10.1016/j.soard.2022.10.024. [ Context Link 1, 2 ] View abstract...
33. Biertho L, et al. Second-stage duodenal switch for sleeve gastrectomy failure: A matched controlled trial. Surgery for Obesity and Related Diseases 2018;14(10):1570-1579. DOI: 10.1016/j.soard.2018.05.008. [ Context Link 1, 2, 3, 4, 5 ] View abstract...
34. Chierici A, Chevalier N, Iannelli A. Postoperative morbidity and weight loss after revisional bariatric surgery for primary failed restrictive procedure: A systematic review and network meta-analysis. International Journal of Surgery 2022;102:106677. DOI: 10.1016/j.ijsu.2022.106677. [ Context Link 1 ] View abstract...
35. Wang A, et al. Safety of primary versus revisional biliopancreatic diversion with duodenal switch in patients with super obesity using the MBSAQIP database. Obesity Surgery 2022;32(5):1459-1459. DOI: 10.1007/s11695-022-05953-w. [ Context Link 1 ] View abstract...
36. Vanetta C, Dreifuss NH, Schlottmann F, Baz C, Masrur MA. Bariatric surgery conversions in MBSAQIP centers: current indications and outcomes. Obesity Surgery 2022;32(10):3248-3256. DOI: 10.1007/s11695-022-06229-z. [ Context Link 1, 2 ] View abstract...
37. WHO Expert Consultation. Appropriate body-mass index for Asian populations and its implications for policy and intervention strategies. Lancet 2004;363(9403):157-63. DOI: 10.1016/S0140-6736(03)15268-3. [ Context Link 1 ] View abstract...
38. American Diabetes Association. Standards of care in diabetes - 2025. Diabetes Care 2025;48(S1):S1-S352. (Reaffirmed 2025 Mar) [ Context Link 1, 2, 3, 4, 5 ]
39. Kasama K, et al. IFSO-APC consensus statements 2011. Obesity Surgery 2012;22(5):677-84. DOI: 10.1007/s11695-012-0610-7. [ Context Link 1 ] View abstract...
40. Lakdawala M, Bhasker A, Asian Consensus Meeting on Metabolic Surgery (ACMOMS). report: Asian consensus meeting on metabolic surgery. Recommendations for the use of bariatric and gastrointestinal metabolic surgery for treatment of obesity and type II diabetes mellitus in the Asian population: August 9th and 10th, 2008, Trivandrum, India. Obesity Surgery 2010;20(7):929-36. DOI: 10.1007/s11695-010-0162-7. [ Context Link 1 ] View abstract...
41. Jones DW, et al. 2025 AHA/ACC/AANP/AAPA/ABC/ACCP/ACPM/AGS/AMA/ASPC/NMA/PCNA/SGIM guideline for the prevention, detection, evaluation and management of high blood pressure in adults: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. Circulation 2025;DOI: 10.1161/CIR.0000000000001356. [ Context Link 1, 2 ] View abstract...
42. Mahawar KK, et al. The first consensus statement on revisional bariatric surgery using a modified Delphi approach. Surgical Endoscopy 2020;34(4):1648-1657. DOI: 10.1007/s00464-019-06937-1. [ Context Link 1, 2 ] View abstract...

43. Mirkin K, Alli VV, Rogers AM. Revisional bariatric surgery. Surgical Clinics of North America 2021;101(2):213-222. DOI: 10.1016/j.suc.2020.12.008. [ Context Link 1, 2 ] View abstract...
44. Richards WO, Khaitan L, Torquati A. Morbid obesity. In: Townsend CM, Beauchamp RD, Evers BM, Mattox KL, editors. Sabiston Textbook of Surgery. 21st ed. Elsevier; 2022:1167-1195.e1. [ Context Link 1, 2, 3, 4, 5, 6 ]
45. Salminen P, et al. IFSO consensus on definitions and clinical practice guidelines for obesity management-an international Delphi study. Obesity Surgery 2024;34(1):30-42. DOI: 10.1007/s11695-023-06913-8. [ Context Link 1 ] View abstract...
46. Galandiuk S, Netz U, Morpurgo E, Tosato SM, Abu-Freha N, Ellis CT. Colon and rectum. In: Townsend CM, Beauchamp RD, Evers BM, Mattox KL, editors. Sabiston Textbook of Surgery. 21st ed. Elsevier; 2022:1320-1400.e1. [ Context Link 1, 2 ]
47. Hyman N, Umanskiy K. Anus. In: Townsend CM, Beauchamp RD, Evers BM, Mattox KL, editors. Sabiston Textbook of Surgery. 21st ed. Elsevier; 2022:1401-1424. [ Context Link 1, 2, 3, 4, 5, 6, 7 ]
48. Wald A, et al. ACG Clinical Guidelines: management of benign anorectal disorders. American Journal of Gastroenterology 2021;116(10):1987-2008. DOI: 10.14309/ajg.0000000000001507. [ Context Link 1, 2, 3, 4, 5, 6, 7, 8 ] View abstract...
49. Holtestaul T, Franko J, Escobar MA, Barlow M. Pediatric ingestions. Surgical Clinics of North America 2022;102(5):779-795. DOI: 10.1016/j.suc.2022.07.009. [ Context Link 1, 2, 3 ] View abstract...
50. Kumar S, et al. Gallstone ileus as an infrequent cause of bowel obstruction: a review of small cohort. Cureus 2024;16(4):e58438. DOI: 10.7759/cureus.58438. [ Context Link 1 ] View abstract...
51. Khurshid MH, et al. A little goes a long way: A comparison of enterolithotomy versus single-stage cholecystectomy in the management of gallstone ileus. Journal of Trauma and Acute Care Surgery 2024;DOI: 10.1097/TA.0000000000004497. [ Context Link 1 ] View abstract...
52. Radkani P, Hawksworth J, Fishbein T. Biliary system. In: Townsend CM, Beauchamp RD, Evers BM, Mattox KL, editors. Sabiston Textbook of Surgery. 21st ed. Elsevier; 2022:1489-1527. [ Context Link 1, 2, 3, 4 ]
53. Bethell GS, Long AM, Knight M, Hall NJ, BAPS-CASS. Congenital duodenal obstruction in the UK: a population-based study. Archives of Disease in Childhood--Fetal and Neonatal Edition 2020;105(2):178-183. DOI: 10.1136/archdischild-2019-317085. [ Context Link 1 ] View abstract...
54. Hawkins AT, et al. The American Society of Colon and Rectal Surgeons Clinical Practice Guidelines for the management of hemorrhoids. Diseases of the Colon and Rectum 2024;67(5):614-623. DOI: 10.1097/DCR.0000000000003276. (Reaffirmed 2025 Jun) [ Context Link 1, 2, 3, 4 ] View abstract...
55. Davids JS, et al. The American Society of Colon and Rectal Surgeons Clinical Practice Guidelines for the Management of Anal Fissures. Diseases of the Colon and Rectum 2023;66(2):190-199. DOI: 10.1097/DCR.0000000000002664. (Reaffirmed 2025 Jul) [ Context Link 1, 2 ] View abstract...
56. Bordeianou LG, et al. The American Society of Colon and Rectal Surgeons Clinical Practice guidelines for the management of fecal incontinence. Diseases of the Colon and Rectum 2023;66(5):647-661. DOI: 10.1097/DCR.0000000000002776. (Reaffirmed 2025 Jul) [ Context Link 1, 2 ]
57. Ahmed O, Lee JH, Thompson CC, Faulx A. AGA clinical practice update on the optimal management of the malignant alimentary tract obstruction: expert review. Clinical Gastroenterology and Hepatology 2021;19(9):1780-1788. DOI: 10.1016/j.cgh.2021.03.046. (Reaffirmed 2025 Jul) [ Context Link 1 ] View abstract...
58. Mustain WC, Turnage RH. Intestinal obstruction. In: Feldman M, Friedman LS, Brandt LJ, editors. Sleisenger & Fordtran's Gastrointestinal and Liver Disease. 11th ed. Philadelphia, PA: Elsevier; 2021:2021-2038.e3. [ Context Link 1 ]
59. Bourke MJ, Lo SK, Buerlein RCD, Das KK. AGA clinical practice update on nonampullary duodenal lesions: expert review. Gastroenterology 2025;168(1):169-175. DOI: 10.1053/j.gastro.2024.10.008. [ Context Link 1 ] View abstract...
60. Cohee MW, Hurff A, Gazewood JD. Benign anorectal conditions: evaluation and management. American Family Physician 2020;101(1):24-33. [ Context Link 1, 2, 3, 4 ] View abstract...
61. Gaertner WB, et al. The American Society of Colon and Rectal Surgeons clinical practice guidelines for the management of anorectal abscess, fistula-in-ano, and rectovaginal fistula. Diseases of the Colon and Rectum 2022;65(8):964-985. DOI: 10.1097/DCR.0000000000002473. (Reaffirmed 2025 Jul) [ Context Link 1, 2, 3, 4 ] View abstract...
62. Klimberg VS, Hunt KK. Diseases of the breast. In: Townsend CM, Beauchamp RD, Evers BM, Mattox KL, editors. Sabiston Textbook of Surgery. 21st ed. Elsevier; 2022:809-855. [ Context Link 1, 2, 3, 4, 5, 6, 7, 8 ]

63. Waldman RA, Finch J, Grant-Kels JM, Stevenson C, Whitaker-Worth D. Skin diseases of the breast and nipple: Benign and malignant tumors. Journal of the American Academy of Dermatology 2019;80(6):1467-1481. DOI: 10.1016/j.jaad.2018.08.066. [ Context Link 1 ] View abstract...
64. Perdikis G, et al. American Society of Plastic Surgeons evidence-based clinical practice guideline revision: reduction mammaplasty. Plastic and Reconstructive Surgery 2022;149(3):392e-409e. DOI: 10.1097/PRS.0000000000008860. (Reaffirmed 2025 Jul) [ Context Link 1 ] View abstract...
65. Popowich B, Kostaras X, Temple-Oberle C. Breast reconstruction after therapeutic or prophylactic mastectomy for breast cancer: A comparison of guideline recommendations. European Journal of Surgical Oncology 2020;46(6):1046-1051. DOI: 10.1016/j.ejso.2020.01.024. [ Context Link 1, 2, 3 ] View abstract...
66. Anbiyaiee A, Abouali Galeh Dari M, Anbiyaee O, Anbiyaiee A. Breast reconstruction after mastectomy in women with breast cancer: a systematic and meta-analysis review. World Journal of Plastic Surgery 2020;9(1):3-9. DOI: 10.29252/wjps.9.1.3. [ Context Link 1 ] View abstract...
67. Tanna N, et al. Not all breast explants are equal: contemporary strategies in breast explantation surgery. Plastic and Reconstructive Surgery 2021;147(4):808-818. DOI: 10.1097/PRS.0000000000007784. [ Context Link 1 ] View abstract...
68. Benson AB III, et al. Hepatocellular Carcinoma. NCCN Clinical Practice Guidelines in Oncology [Internet] National Comprehensive Cancer Network (NCCN). v. 4.2024; 2025 Jan 10 Accessed at: https://www.nccn.org/. [accessed 2025 Jan 16] [ Context Link 1, 2, 3, 4, 5, 6 ]
69. Singal AG, et al. AASLD practice guidance on prevention, diagnosis, and treatment of hepatocellular carcinoma. Hepatology 2023;Online. DOI: 10.1097/HEP.0000000000000466. (Reaffirmed 2025 Jun) [ Context Link 1, 2 ] View abstract...
70. Benson AB III, et al. Biliary Tract Cancers. NCCN Clinical Practice Guidelines in Oncology [Internet] National Comprehensive Cancer Network (NCCN). v. 2.2025; 2024 Jul 02 Accessed at: https://www.nccn.org/. [accessed 2025 Jul 11] [ Context Link 1, 2, 3, 4, 5, 6, 7 ]
71. Dudeja V, Ferrantella A, Fong Y. The liver. In: Townsend CM, Beauchamp RD, Evers BM, Mattox KL, editors. Sabiston Textbook of Surgery. 21st ed. Elsevier; 2022:1425-1488. [ Context Link 1 ]
72. Coccolini F, et al. Liver trauma: WSES 2020 guidelines. World Journal of Emergency Surgery 2020;15(1):24. DOI: 10.1186/s13017-020-00302-7. (Reaffirmed 2025 Jul) [ Context Link 1, 2 ] View abstract...
73. Vogel A, et al. Hepatocellular carcinoma: ESMO Clinical Practice Guideline for diagnosis, treatment and follow-up. Annals of Oncology 2025;36(5):p491-506. DOI: 10.1016/j.annonc.2025.02.006. (Reaffirmed 2025 Jun) [ Context Link 1, 2, 3 ] View abstract...
74. European Association for the Study of the Liver. Electronic address: easloffice@easloffice.eu, European Association for the Study of the Liver. EASL-ILCA clinical practice guidelines on intrahepatic cholangiocarcinoma. Journal of Hepatology 2023;79(1):181-208. DOI: 10.1016/j.jhep.2023.03.010. [ Context Link 1, 2 ] View abstract...
75. Vreeland TJ, et al. SAGES/AHPBA guidelines for the use of minimally invasive surgery for the surgical treatment of colorectal liver metastases (CRLM). Surgical Endoscopy 2023;37(4):2508-2516. DOI: 10.1007/s00464-023-09895-x. [ Context Link 1 ] View abstract...
76. DiBisceglie AM, Befeler AS. Hepatic tumors and cysts. In: Feldman M, Friedman LS, Brandt LJ, editors. Sleisenger & Fordtran's Gastrointestinal and Liver Disease. 11th ed. Philadelphia, PA: Elsevier; 2021:1509-1532.e7. [ Context Link 1, 2, 3 ]
77. Frenette C, Mendiratta-Lala M, Salgia R, Wong RJ, Sauer BG, Pillai A. ACG Clinical Guideline: Focal Liver Lesions. American Journal of Gastroenterology 2024;119(7):1235-1271. DOI: 10.14309/ajg.0000000000002857. (Reaffirmed 2025 Jul) [ Context Link 1, 2 ] View abstract...
78. Andersson KL, Friedman LS. Acalculous biliary pain, acute acalculous cholecystitis, cholesterolosis, adenomyomatosis, and gallbladder polyps. In: Feldman M, Friedman LS, Brandt LJ, editors. Sleisenger & Fordtran's Gastrointestinal and Liver Disease. 11th ed. Philadelphia, PA: Elsevier; 2021:1064-1076.e3. [ Context Link 1 ]
79. Kempeneers MA, et al. International consensus guidelines for surgery and the timing of intervention in chronic pancreatitis. Pancreatology 2020;20(2):149-157. DOI: 10.1016/j.pan.2019.12.005. [ Context Link 1, 2, 3 ] View abstract...
80. Gardner TB, Adler DG, Forsmark CE, Sauer BG, Taylor JR, Whitcomb DC. ACG clinical guideline: chronic pancreatitis. American Journal of Gastroenterology 2020;115(3):322-339. DOI: 10.14309/ajg.0000000000000535. (Reaffirmed 2025 Jul) [ Context Link 1, 2, 3 ] View abstract...
81. Nathan JD, et al. The role of surgical management in chronic pancreatitis in children: a position paper from the North American Society for Pediatric Gastroenterology, Hepatology, and Nutrition Pancreas Committee. Journal of Pediatric Gastroenterology and Nutrition 2022;74(5):706-719. DOI: 10.1097/MPG.0000000000003439. [ Context Link 1, 2, 3 ] View abstract...

82. Tempero MA, et al. Pancreatic Adenocarcinoma. NCCN Clinical Practice Guidelines in Oncology [Internet] National Comprehensive Cancer Network (NCCN). v. 2.2025; 2025 Feb 03 Accessed at: https://www.nccn.org/. [accessed 2025 Feb 18] [ Context Link 1, 2, 3 ]
83. Leppaniemi A, et al. 2019 WSES guidelines for the management of severe acute pancreatitis. World Journal of Emergency Surgery 2019;14:27. DOI: 10.1186/s13017-019-0247-0. (Reaffirmed 2025 Jul) [ Context Link 1, 2 ] View abstract...
84. Elta GH, Enestvedt BK, Sauer BG, Lennon AM. ACG clinical guideline: diagnosis and management of pancreatic cysts. American Journal of Gastroenterology 2018;113(4):464-479. DOI: 10.1038/ajg.2018.14. (Reaffirmed 2025 Jul) [ Context Link 1, 2, 3 ] View abstract...
85. Meierhofer C, Fuegger R, Biebl M, Schoefl R. Pancreatic fistulas: current evidence and strategy-a narrative review. Journal of Clinical Medicine 2023;12(15):Online. DOI: 10.3390/jcm12155046. [ Context Link 1 ] View abstract...
86. Vege SS, Chari ST. Chronic pancreatitis. New England Journal of Medicine 2022;386(9):869-878. DOI: 10.1056/NEJMcp1809396. [ Context Link 1, 2, 3 ] View abstract...
87. Nassar AK, Hawn M. The spleen. In: Townsend CM, Beauchamp RD, Evers BM, Mattox KL, editors. Sabiston Textbook of Surgery. 21st ed. Elsevier; 2022:1566-1582. [ Context Link 1 ]
88. Broccoli A, et al. Ultrasound-guided core needle biopsy of nodular lesions of the spleen in hematology clinical practice. Oncologist 2025;30(6):DOI: 10.1093/oncolo/oyaf142. [ Context Link 1 ] View abstract...
89. Coccolini F, et al. Splenic trauma: WSES classification and guidelines for adult and pediatric patients. World Journal of Emergency Surgery 2017;12:40. DOI: 10.1186/s13017-017-0151-4. [ Context Link 1, 2, 3, 4 ] View abstract...
90. Williams RF, et al. Updated APSA guidelines for the management of blunt liver and spleen injuries. Journal of Pediatric Surgery 2023;58(8):1411-1418. DOI: 10.1016/j.jpedsurg.2023.03.012. [ Context Link 1, 2, 3 ] View abstract...
91. Costi R, Castro Ruiz C, Romboli A, Wind P, Violi V, Zarzavadjian Le Bian A. Partial splenectomy: Who, when and how. A systematic review of the 2130 published cases. Journal of Pediatric Surgery 2019;54(8):1527-1538. DOI: 10.1016/j.jpedsurg.2018.11.010. [ Context Link 1 ] View abstract...
92. Murken DR, Bleier JIS. Ostomy-related complications. Clinics in Colon and Rectal Surgery 2019;32(3):176-182. DOI: 10.1055/s-0038-1676995. [ Context Link 1 ] View abstract...
93. Raza A, Araghizadeh F. Ileostomies, colostomies, pouches, and anastomoses. In: Feldman M, Friedman LS, Brandt LJ, editors. Sleisenger & Fordtran's Gastrointestinal and Liver Disease. 11th ed. Philadelphia, PA: Elsevier; 2021:1930-1943 e4. [ Context Link 1 ]
94. Emile SH, Khan SM, Adejumo A, Koroye O. Ligation of intersphincteric fistula tract (LIFT) in treatment of anal fistula: An updated systematic review, meta-analysis, and meta-regression of the predictors of failure. Surgery 2020;167(2):484-492. DOI: 10.1016/j.surg.2019.09.012. [ Context Link 1 ] View abstract...
95. Kaufman SS, et al. New insights into the indications for intestinal transplantation: Consensus in the year 2019. Transplantation 2020;104(5):937-946. DOI: 10.1097/TP.0000000000003065. [ Context Link 1, 2, 3, 4, 5, 6, 7 ] View abstract...
96. Kahn AB, Tulla KA, Tzvetanov IG. Indications of intestinal transplantation. Gastroenterology Clinics of North America 2019;48(4):575-583. DOI: 10.1016/j.gtc.2019.08.010. [ Context Link 1, 2 ] View abstract...
97. Pironi L, et al. ESPEN guideline on chronic intestinal failure in adults - Update 2023. Clinical Nutrition 2023;42(10):1940-2021. DOI: 10.1016/j.clnu.2023.07.019. (Reaffirmed 2025 Jun) [ Context Link 1, 2, 3, 4, 5, 6, 7 ] View abstract...
98. Lee EJ, Mazariegos GV, Bond GJ. Pediatric intestinal transplantation. Seminars in Pediatric Surgery 2022;31(3):151181. DOI: 10.1016/j.sempedsurg.2022.151181. [ Context Link 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 ] View abstract...
99. Di Cocco P, et al. Living donor intestinal transplantation. Gastroenterology Clinics of North America 2024;53(3):441-452. DOI: 10.1016/j.gtc.2023.12.005. [ Context Link 1 ] View abstract...
100. Gruessner RWG. 25 years of a standardized technique for living donor intestinal transplantation: a systematic review. Transplantation Proceedings 2022;54(7):1944-1953. DOI: 10.1016/j.transproceed.2022.05.022. [ Context Link 1 ] View abstract...
101. Smullin CP, et al. Intestinal re-transplantation. Gastroenterology Clinics of North America 2024;53(3):453-459. DOI: 10.1016/j.gtc.2024.01.004. [ Context Link 1 ] View abstract...
102. Becker Y. Kidney and pancreas transplantation. In: Townsend CM, Beauchamp RD, Evers BM, Mattox KL, editors. Sabiston Textbook of Surgery. 21st ed. Elsevier; 2022:627-643. [ Context Link 1 ]

103. Holt RIG, et al. The management of type 1 diabetes in adults. a consensus report by the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD). Diabetes Care 2021;44(11):2589-2625. DOI: 10.2337/dci21-0043. [ Context Link 1 ] View abstract...

104. Kittleson MM, et al. Dual-organ transplantation: indications, evaluation, and outcomes for heart-kidney and heart-liver transplantation: a scientific statement from the American Heart Association. Circulation 2023;148(7):622-636. DOI: 10.1161/CIR.0000000000001155. [ Context Link 1, 2, 3, 4 ] View abstract...

105. Miklin DJ, Mendoza M, DePasquale EC. Two is better than one: when to consider multiorgan transplant. Current Opinion in Organ Transplantation 2022;27(1):86-91. DOI: 10.1097/MOT.0000000000000951. [ Context Link 1, 2, 3 ] View abstract...

106. Reardon LC, et al. Orthotopic heart and combined heart liver transplantation: the ultimate treatment option for failing Fontan physiology. Current Transplantation Reports 2021;8(1):9-20. DOI: 10.1007/s40472-021-00315-4. [ Context Link 1 ] View abstract...

107. Lee WM, Stravitz RT, Larson AM. The management of acute liver failure: update 2011. Hepatology 2012;55(3):1-22. DOI: 10.1002/hep.25551. (Reaffirmed 2025 Jun) [ Context Link 1, 2 ] View abstract...

108. Organ Procurement and Transplantation Network. Policy 9: Allocation of Livers and Liver-Intestines [Internet] U.S. Department of Health & Human Services. 2025 Mar 27 Accessed at: https://optn.transplant.hrsa.gov/. [accessed 2025 Sep 17] [ Context Link 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39 ]

109. Organ Procurement and Transplantation Network. Policy 5: Organ offers, acceptance, and verification [Internet] U.S. Department of Health & Human Services. 2025 Mar 27 Accessed at: https://optn.transplant.hrsa.gov/. [accessed 2025 Sep 17] [ Context Link 1, 2 ]

110. American Association for the Study of Liver Diseases, European Association for the Study of the Liver. Hepatic encephalopathy in chronic liver disease: 2014 practice guideline by the European Association for the Study of the Liver and the American Association for the Study of Liver Diseases. Journal of Hepatology 2014;61(3):642-659. DOI: 10.1016/j.jhep.2014.05.042. (Reaffirmed 2025 Jun) [ Context Link 1, 2, 3 ] View abstract...

111. Guidance to Liver Transplant Programs and the National Liver Review Board for: Adult MELD. [Internet] Health Resources and Services Administration U.S. Department of Health and Human Services. 2025 Jul 01 Accessed at: https://optn.transplant.hrsa.gov/. [accessed 2025 Sep 12] [ Context Link 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28 ]

112. Carrion AF, Martin P. Liver transplantation. In: Feldman M, Friedman LS, Brandt LJ, editors. Sleisenger & Fordtran's Gastrointestinal and Liver Disease. 11th ed. Philadelphia, PA: Elsevier; 2021:1533-1550.e4. [ Context Link 1, 2 ]

113. Karp SJ, Alexopoulos S. Liver transplantation. In: Townsend CM, Beauchamp RD, Evers BM, Mattox KL, editors. Sabiston Textbook of Surgery. 21st ed. Elsevier; 2022:614-626. [ Context Link 1 ]

114. Martin P, DiMartini A, Feng S, Brown R, Fallon M. Evaluation for liver transplantation in adults: 2013 practice guideline by the American Association for the Study of Liver Diseases and the American Society of Transplantation. Hepatology 2014;59(3):1144-1165. (Reaffirmed 2025 Jun) [ Context Link 1, 2 ] View abstract...

115. Guidance to Liver Transplant Programs and the National Liver Review Board for: Pediatric MELD/PELD Exception Review. [Internet] Health Resources and Services Administration U.S. Department of Health and Human Services. 2023 Jul 13 Accessed at: https://optn.transplant.hrsa.gov/. [accessed 2025 Oct 03] [ Context Link 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19 ]

116. Fontana RJ. Liver failure and transplantation. In: Goldman L, Cooney KA, editors. Goldman-Cecil Medicine. 27th ed. Elsevier; 2024:1043-1049. [ Context Link 1, 2, 3, 4, 5, 6, 7 ]

117. European Association for the Study of the Liver. EASL Clinical Practice Guidelines on acute-on-chronic liver failure. Journal of Hepatology 2023;79(2):461-491. DOI: 10.1016/j.jhep.2023.04.021. (Reaffirmed 2025 Jul) [ Context Link 1, 2, 3 ] View abstract...

118. Bajaj JS, et al. Acute-on-chronic liver failure clinical guidelines. American Journal of Gastroenterology 2022;117(2):225-252. DOI: 10.14309/ajg.0000000000001595. [ Context Link 1 ] View abstract...

119. European Association for the Study of the Liver. EASL Clinical Practice Guidelines on liver transplantation. Journal of Hepatology 2024;81(6):1040-1086. DOI: 10.1016/j.jhep.2024.07.032. (Reaffirmed 2025 Jun) [ Context Link 1, 2, 3, 4, 5, 6, 7 ] View abstract...

120. Karvellas CJ, et al. AASLD Practice Guidance on Acute-on-chronic liver failure and the management of critically ill patients with cirrhosis. Hepatology 2024;79(6):1463-1502. DOI: 10.1097/HEP.0000000000000671. [ Context Link 1, 2 ] View abstract...

121. Wick KD, Matthay MA, Ware LB. Pulse oximetry for the diagnosis and management of acute respiratory distress syndrome. Lancet. Respiratory Medicine 2022;10(11):1086-1098. DOI: 10.1016/S2213-2600(22)00058-3. [ Context Link 1, 2, 3 ] View abstract...

122. Pandharipande PP, et al. Derivation and validation of Spo2/Fio2 ratio to impute for Pao2/Fio2 ratio in the respiratory component of the Sequential Organ Failure Assessment score. Critical Care Medicine 2009;37(4):1317-1321. DOI: 10.1097/CCM.0b013e31819cefa9. [ Context Link 1 ] View abstract...

123. Jamali H, et al. Racial disparity in oxygen saturation measurements by pulse oximetry: evidence and implications. Annals of the American Thoracic Society 2022;19(12):1951-1964. DOI: 10.1513/AnnalsATS.202203-270CME. [ Context Link 1 ] View abstract...

124. Mehta N, et al. Liver transplantation for hepatocellular carcinoma. working group report from the ILTS Transplant Oncology Consensus Conference. Transplantation 2020;104(6):1136-1142. DOI: 10.1097/TP.0000000000003174. [ Context Link 1 ] View abstract...

125. Guidance to Liver Transplant Programs and the National Liver Review Board for: Adult MELD Exceptions for Transplant Oncology. [Internet] Health Resources and Services Administration U.S. Department of Health and Human Services. 2025 Jul 01 Accessed at: https://optn.transplant.hrsa.gov/. [accessed 2025 Oct 03] [ Context Link 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22 ]

126. Sapisochin G, et al. Liver transplantation for cholangiocarcinoma and mixed hepatocellular cholangiocarcinoma: working group report from the ILTS Transplant Oncology Consensus Conference. Transplantation 2020;104(6):1125-1130. DOI: 10.1097/TP.0000000000003212. [ Context Link 1, 2, 3 ] View abstract...

127. Hibi T, et al. Liver transplantation for colorectal and neuroendocrine liver metastases and hepatoblastoma. Working Group Report from the ILTS Transplant Oncology Consensus Conference. Transplantation 2020;104(6):1131-1135. DOI: 10.1097/TP.0000000000003118. [ Context Link 1, 2, 3, 4, 5 ] View abstract...

128. Adam R, et al. Liver transplantation plus chemotherapy versus chemotherapy alone in patients with permanently unresectable colorectal liver metastases (TransMet): results from a multicentre, open-label, prospective, randomised controlled trial. Lancet 2024;404(10458):1107-1118. DOI: 10.1016/S0140-6736(24)01595-2. [ Context Link 1, 2, 3, 4 ] View abstract...

129. Bonney GK, et al. Liver transplantation for non-resectable colorectal liver metastases: the International Hepato-Pancreato-Biliary Association consensus guidelines. Lancet. Gastroenterology & Hepatology 2021;6(11):933-946. DOI: 10.1016/S2468-1253(21)00219-3. [ Context Link 1, 2, 3, 4, 5 ] View abstract...

130. Schepers EJ, Hartman SJ, Whitrock JN, Quillin RC. Liver transplantation for colorectal liver metastases. Surgical Clinics of North America 2024;104(1):227-242. DOI: 10.1016/j.suc.2023.08.003. [ Context Link 1 ] View abstract...

131. Sirrs S, Hannah-Shmouni F, Nantel S, Neuberger J, Yoshida EM. Transplantation as disease modifying therapy in adults with inherited metabolic disorders. Journal of Inherited Metabolic Disease 2018;41(5):885-896. DOI: 10.1007/s10545-018-0141-z. [ Context Link 1, 2 ] View abstract...

132. Cartin-Ceba R, Krowka MJ. Pulmonary complications of portal hypertension. Clinics in Liver Disease 2019;23(4):683-711. DOI: 10.1016/j.cld.2019.06.003. [ Context Link 1 ] View abstract...

133. Krowka MJ, et al. International Liver Transplant Society Practice Guidelines: diagnosis and management of hepatopulmonary syndrome and portopulmonary hypertension. Transplantation 2016;100(7):1440-1452. DOI: 10.1097/TP.0000000000001229. [ Context Link 1, 2, 3 ] View abstract...

134. DuBrock HM. Portopulmonary hypertension: management and liver transplantation evaluation. Chest 2023;164(1):206-214. DOI: 10.1016/j.chest.2023.01.009. [ Context Link 1, 2, 3, 4, 5 ] View abstract...

135. Schilsky ML, et al. A multidisciplinary approach to the diagnosis and management of Wilson disease: 2022 Practice Guidance on Wilson disease from the American Association for the Study of Liver Diseases. Hepatology 2022;DOI: 10.1002/hep.32801. [ Context Link 1, 2, 3, 4, 5, 6, 7 ] View abstract...

136. Ferrarese A, Cazzagon N, Burra P. Liver transplantation for Wilson disease: Current knowledge and future perspectives. Liver Transplantation 2024;30(12):1289-1303. DOI: 10.1097/LVT.0000000000000422. [ Context Link 1 ] View abstract...

137. Orozco G, et al. Liver transplantation for severe hepatic trauma: A multicenter analysis from the UNOS data set. Journal of Trauma and Acute Care Surgery 2024;96(5):763-768. DOI: 10.1097/TA.0000000000004220. [ Context Link 1 ] View abstract...

138. Kaltenborn A, et al. Long-term outcome analysis of liver transplantation for severe hepatic trauma. Journal of Trauma and Acute Care Surgery 2013;75(5):864-869. DOI: 10.1097/TA.0b013e3182a8fe8a. [ Context Link 1 ] View abstract...

139. Dasari BVM, et al. Liver transplantation for hepatocellular adenomas: UK NHSBT-liver advisory group guidelines for patient selection. HPB 2025;27(10):1243-1247. DOI: 10.1016/j.hpb.2025.07.001. [ Context Link 1, 2, 3, 4, 5 ] View abstract...

140. Wang B, Bonkovsky HL, Lim JK, Balwani M. AGA clinical practice update on diagnosis and management of acute hepatic porphyrias: expert review. Gastroenterology 2023;164(3):484-491. DOI: 10.1053/j.gastro.2022.11.034. (Reaffirmed 2025 Jul) [ Context Link 1, 2 ] View abstract...

141. Lindor KD, Bowlus CL, Boyer J, Levy C, Mayo M. Primary biliary cholangitis: 2018 practice guidance from the American Association for the Study of Liver Diseases. Hepatology 2019;69(1):394-419. DOI: 10.1002/hep.30145. (Reaffirmed 2025 Jun) [ Context Link 1 ] View abstract...

142. Likhitsup A, Fontana RJ. Indications and outcomes with liver retransplantation in 2025. Digestive Diseases and Sciences 2025;70(1):29-38. DOI: 10.1007/s10620-024-08741-x. [ Context Link 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 ] View abstract...

143. Chadban SJ, et al. KDIGO clinical practice guideline on the evaluation and management of candidates for kidney transplantation. Transplantation 2020;104(4S1 Suppl 1):S11-S103. DOI: 10.1097/TP.0000000000003136. [ Context Link 1, 2, 3, 4 ] View abstract...

144. Suchy FJ, Feldman AG. Acute hepatic failure. In: Kliegman RM, et al., editors. Nelson Textbook of Pediatrics. 22nd ed. Elsevier; 2025:2494-2499. [ Context Link 1 ]

145. Spengler E, Fontana RJ. Acute liver failure. In: Friedman LS, Martin P, editors. Handbook of Liver Disease. 4th ed. Philadelphia, PA 19103-2899: Elsevier; 2018:18-33. [ Context Link 1 ]

146. Squires JE, McKiernan PJ, Squires RH, Pediatric Organ Dysfunction Information Update Mandate (PODIUM) Collaborative. Acute liver dysfunction criteria in critically ill children: the PODIUM consensus conference. Pediatrics 2022;149(1 Suppl 1):S59-S65. DOI: 10.1542/peds.2021-052888I. [ Context Link 1, 2, 3 ] View abstract...

147. Sundaram SS, Mack CL, Feldman AG, Sokol RJ. Biliary atresia: Indications and timing of liver transplantation and optimization of pretransplant care. Liver Transplantation 2017;23(1):96-109. DOI: 10.1002/lt.24640. [ Context Link 1 ] View abstract...

148. Ziogas IA, et al. Surgical management of pediatric hepatocellular carcinoma: An analysis of the National Cancer Database. Journal of Pediatric Surgery 2021;56(4):772-777. DOI: 10.1016/j.jpedsurg.2020.06.013. [ Context Link 1 ] View abstract...

149. Sindhi R, et al. Liver transplantation for pediatric liver cancer. Cancers (Basel) 2020;12(3):720. DOI: 10.3390/cancers12030720. [ Context Link 1 ] View abstract...

150. Bowlus CL, et al. AASLD practice guidance on primary sclerosing cholangitis and cholangiocarcinoma. Hepatology 2022;Online. DOI: 10.1002/hep.32771. (Reaffirmed 2025 Jun) [ Context Link 1, 2, 3, 4, 5, 6 ] View abstract...

151. Chapman MH, et al. British Society of Gastroenterology and UK-PSC guidelines for the diagnosis and management of primary sclerosing cholangitis. Gut 2019;68(8):1356-1378. DOI: 10.1136/gutjnl-2018-317993. [ Context Link 1 ] View abstract...

152. Summar ML, Mew NA. Inborn errors of metabolism with hyperammonemia: urea cycle defects and related disorders. Pediatric Clinics of North America 2018;65(2):231-246. DOI: 10.1016/j.pcl.2017.11.004. [ Context Link 1 ] View abstract...

153. Schillaci LP, DeBrosse SD, McCandless SE. Inborn errors of metabolism with acidosis: organic acidemias and defects of pyruvate and ketone body metabolism. Pediatric Clinics of North America 2018;65(2):209-230. DOI: 10.1016/j.pcl.2017.11.003. [ Context Link 1 ] View abstract...

154. Rosenzweig EB, et al. Paediatric pulmonary arterial hypertension: updates on definition, classification, diagnostics and management. European Respiratory Journal 2019;53(1):1801916. DOI: 10.1183/13993003.01916-2018. [ Context Link 1 ] View abstract...

155. Hansmann G, et al. 2019 updated consensus statement on the diagnosis and treatment of pediatric pulmonary hypertension: The European Pediatric Pulmonary Vascular Disease Network (EPPVDN), endorsed by AEPC, ESPR and ISHLT. Journal of Heart and Lung Transplantation 2019;38(9):879-901. DOI: 10.1016/j.healun.2019.06.022. [ Context Link 1 ] View abstract...

156. Pediatric MELD/PELD Exception Review. Guidance to Liver Transplant Programs and the National Liver Review Board [Internet] Organ Procurement and Transplantation Network and U.S. Department of Health & Human Services. 2023 Jul Accessed at: https://optn.transplant.hrsa.gov/. [accessed 2025 Sep 16] [ Context Link 1 ]

157. Smith SK, Miloh T. Pediatricliiver transplantation. Clinics in Liver Disease 2022;26(3):521-535. DOI: 10.1016/j.cld.2022.03.010. [ Context Link 1, 2 ] View abstract...

158. Oishi K, Arnon R, Wasserstein MP, Diaz GA. Liver transplantation for pediatric inherited metabolic disorders: Considerations for indications, complications, and perioperative management. Pediatric Transplantation 2016;20(6):756-769. DOI: 10.1111/petr.12741. [ Context Link 1 ] View abstract...

159. Walling AM, et al. Palliative Care. NCCN Clinical Practice Guidelines in Oncology [Internet] National Comprehensive Cancer Network (NCCN). v.2.2025; 2025 Mar 31 Accessed at: https://www.nccn.org/. [accessed 2025 Apr 29] [ Context Link 1 ]

160. Taddei TH, Brown DB, Yarchoan M, Mendiratta-Lala M, Llovet JM. Critical Update: AASLD Practice Guidance on prevention, diagnosis, and treatment of hepatocellular carcinoma. Hepatology 2025;DOI: 10.1097/HEP.0000000000001269. (Reaffirmed 2025 Jun) [ Context Link 1 ] View abstract...

161. Elmaleh-Sachs A, Schwartz JL, Bramante CT, Nicklas JM, Gudzune KA, Jay M. Obesity management in adults: a review. Journal of the American Medical Association 2023;330(20):2000-2015. DOI: 10.1001/jama.2023.19897. [ Context Link 1 ] View abstract...

162. Schmitz SH, Aronne LJ. The effective use of anti-obesity medications. Gastroenterology Clinics of North America 2023;52(4):661-680. DOI: 10.1016/j.gtc.2023.08.003. [ Context Link 1 ] View abstract...

163. Bakheet N, Badurdeen D, Sartoretto A, Kumbhari V. Endoluminal bariatric and metabolic therapies: state-of-the-art. Current Opinion in Gastroenterology 2023;39(5):362-369. DOI: 10.1097/MOG.0000000000000967. [ Context Link 1 ] View abstract...

164. Ban KA, et al. Evidence review conducted for the Agency for Healthcare Research and Quality Safety Program for Improving Surgical Care and Recovery: focus on anesthesiology for colorectal surgery. Anesthesia and Analgesia 2019;128(5):879-889. DOI: 10.1213/ANE.0000000000003366. [ Context Link 1 ] View abstract...

165. Poulose BK, Carbonell AM, Rosen MJ. Hernias. In: Townsend CM, Beauchamp RD, Evers BM, Mattox KL, editors. Sabiston Textbook of Surgery. 21st ed. Elsevier; 2022:1105-1133. [ Context Link 1 ]

166. Derderian SC, Rove KO. Enhanced recovery after surgery among adolescents undergoing bariatric surgery. Seminars in Pediatric Surgery 2020;29(1):150885. DOI: 10.1016/j.sempedsurg.2020.150885. [ Context Link 1 ] View abstract...

167. Gustafsson UO, et al. Guidelines for perioperative care in elective colorectal surgery: enhanced recovery after surgery (ERAS®) society recommendations: 2018. World Journal of Surgery 2019;43(3):659-695. DOI: 10.1007/s00268-018-4844-y. (Reaffirmed 2025 Jul) [ Context Link 1 ] View abstract...

168. Dang JT, et al. Canadian consensus statement: enhanced recovery after surgery in bariatric surgery. Surgical Endoscopy 2020;34(3):1366-1375. DOI: 10.1007/s00464-019-06911-x. [ Context Link 1 ] View abstract...

169. Grant MC, et al. Evidence review conducted for the Agency for Healthcare Research and Quality Safety Program for Improving Surgical Care and Recovery: focus on anesthesiology for bariatric surgery. Anesthesia and Analgesia 2019;129(1):51-60. DOI: 10.1213/ANE.0000000000003696. [ Context Link 1 ] View abstract...

170. Temple-Oberle C, et al. Consensus review of optimal perioperative care in breast reconstruction: enhanced recovery after surgery (ERAS) Society Recommendations. Plastic and Reconstructive Surgery 2017;139(5):1056e-71e. DOI: 10.1097/PRS.0000000000003242. (Reaffirmed 2025 Jun) [ Context Link 1 ] View abstract...

171. Persing S, Manahan M, Rosson G. Enhanced recovery after surgery pathways in breast reconstruction. Clinics in Plastic Surgery 2020;47(2):221-243. DOI: 10.1016/j.cps.2019.12.002. [ Context Link 1 ] View abstract...

172. Stenberg E, et al. Guidelines for perioperative care in bariatric surgery: Enhanced Recovery After Surgery (ERAS) Society Recommendations: A 2021 Update. World Journal of Surgery 2022;46(4):729-751. DOI: 10.1007/s00268-021-06394-9. (Reaffirmed 2025 Mar) [ Context Link 1 ] View abstract...

173. Schriger DL. Approach to the patient with abnormal vital signs. In: Goldman L, Cooney KA, editors. Goldman-Cecil Medicine. 27th ed. Elsevier; 2024:32-35. [ Context Link 1 ]

174. Ramgopal S, Sepanski RJ, Martin-Gill C. Empirically derived age-based vital signs for children in the out-of-hospital setting. Annals of Emergency Medicine 2023;81(4):402-412. DOI: 10.1016/j.annemergmed.2022.09.019. [ Context Link 1 ] View abstract...

175. Yepuri N, Pruekprasert N, Cooney RN. Surgical complications. In: Townsend CM, Beauchamp RD, Evers BM, Mattox KL, editors. Sabiston Textbook of Surgery. 21st ed. Elsevier; 2022:238-283. [ Context Link 1 ]

176. Swarm RA, et al. Adult Cancer Pain. NCCN Clinical Practice Guidelines in Oncology [Internet] National Comprehensive Cancer Network (NCCN). v. 2.2025; 2025 May 21 Accessed at: https://www.nccn.org/. [accessed 2025 Jun 04] [ Context Link 1 ]

177. Cohen SP. Pain. In: Goldman L, Cooney KA, editors. Goldman-Cecil Medicine. 27th ed. Elsevier; 2024:133-141.e1. [ Context Link 1 ]

178. Peterson SJB, Weisman SJ. Pediatric pain management. In: Kliegman RM, et al., editors. Nelson Textbook of Pediatrics. 22nd ed. Elsevier; 2025:677-700. [ Context Link 1 ]

179. Berger MJ, et al. Antiemesis. NCCN Clinical Practice Guidelines in Oncology [Internet] National Comprehensive Cancer Network (NCCN). v. 2.2025; 2025 May 12 Accessed at: https://www.nccn.org/. [accessed 2025 May 19] [ Context Link 1 ]

180. Fourth consensus guidelines for the management of postoperative nausea and vomiting: erratum. Anesthesia and Analgesia 2020;131(5):e241. DOI: 10.1213/ANE.0000000000005245. [ Context Link 1 ] View abstract...

181. Nield LS, Kamat D. Fever. In: Kliegman RM, et al., editors. Nelson Textbook of Pediatrics. 22nd ed. Elsevier; 2025:1640-1642. [ Context Link 1 ]

182. Melia MT. Approach to fever or suspected infection in the normal host. In: Goldman L, Cooney KA, editors. Goldman-Cecil Medicine. 27th ed. Elsevier; 2024:1845-1851. [ Context Link 1, 2 ]

183. Sifri CD. Approach to fever and suspected infection in the immunocompromised host. In: Goldman L, Cooney KA, editors. Goldman-Cecil Medicine. 27th ed. Elsevier; 2024:1851-1862. [ Context Link 1, 2 ]

184. Hooper DC, Shenoy ES, Elshaboury RH. Treatment and prophylaxis of bacterial infections. In: Loscalzo J, Fauci A, Kasper D, Hauser S, Longo D, Jameson JL, editors. Harrison's Principles of Internal Medicine. 21st ed. McGraw Hill Education; 2022:1148-1163. [ Context Link 1 ]

185. Blum FC, Biros MH. Fever in the adult patient. In: Walls RM, editor. Rosen's Emergency Medicine: Concepts and Clinical Practice. 10th ed. Elsevier; 2023:90-95.e1. [ Context Link 1 ]

186. Mick NW. Pediatric fever. In: Walls RM, editor. Rosen's Emergency Medicine: Concepts and Clinical Practice. 10th ed. Elsevier; 2023:2067-2077.e2. [ Context Link 1 ]

187. Singh M, Fernandez-Frackelton M. Bacteria. In: Walls RM, editor. Rosen's Emergency Medicine: Concepts and Clinical Practice. 10th ed. Elsevier; 2023:1586-1609.e3. [ Context Link 1 ]

188. Gaddy JD, Dupre AA. Disorders of hemostasis. In: Walls RM, editor. Rosen's Emergency Medicine: Concepts and Clinical Practice. 10th ed. Elsevier; 2023:1486-1499.e2. [ Context Link 1 ]

189. Dyke C, et al. Universal definition of perioperative bleeding in adult cardiac surgery. Journal of Thoracic and Cardiovascular Surgery 2014;147(5):1458-1463.e1. DOI: 10.1016/j.jtcvs.2013.10.070. [ Context Link 1 ] View abstract...

190. Bartoszko J, et al. Comparison of two major perioperative bleeding scores for cardiac surgery trials: universal definition of perioperative bleeding in cardiac surgery and European coronary artery bypass grafting bleeding severity grade. Anesthesiology 2018;129(6):1092-1100. DOI: 10.1097/ALN.0000000000002179. [ Context Link 1 ] View abstract...

191. Levy JH, et al. Consensus statement: hemostasis trial outcomes in cardiac surgery and mechanical support. Annals of Thoracic Surgery 2022;113(3):1026-1035. DOI: 10.1016/j.athoracsur.2021.09.080. [ Context Link 1 ] View abstract...

192. Martinez JP. Abdominal pain. In: Walls RM, editor. Rosen's Emergency Medicine: Concepts and Clinical Practice. 10th ed. Elsevier; 2023:211-220.e1. [ Context Link 1 ]

193. Ghany MG, Hoofnagle JH. Approach to the patient with liver disease. In: Loscalzo J, Fauci A, Kasper D, Hauser S, Longo D, Jameson JL, editors. Harrison's Principles of Internal Medicine. 21st ed. McGraw Hill Education; 2022:2546-2553. [ Context Link 1 ]

194. Befeler AS, Bacon BR. Cirrhosis and its complications. In: Loscalzo J, Fauci A, Kasper D, Hauser S, Longo D, Jameson JL, editors. Harrison's Principles of Internal Medicine. 21st ed. McGraw Hill Education; 2022:2624-2633. [ Context Link 1 ]

195. Greenberger NJ, Paumgartner G, Pratt DS. Diseases of the gallbladder and bile ducts. In: Loscalzo J, Fauci A, Kasper D, Hauser S, Longo D, Jameson JL, editors. Harrison's Principles of Internal Medicine. 21st ed. McGraw Hill Education; 2022:2641-2652. [ Context Link 1 ]

196. Loren AW, et al. Hematopoietic Cell Transplantation. NCCN Clinical Practice Guidelines in Oncology [Internet] National Comprehensive Cancer Network (NCCN). v. 2.2025; 2025 Jun 03 Accessed at: https://www.nccn.org/. [accessed 2025 Jun 05] [ Context Link 1 ]

197. Lehrnbecher T, et al. Guideline for the management of fever and neutropenia in pediatric patients with cancer and hematopoietic cell transplantation recipients: 2023 update. Journal of Clinical Oncology 2023;41(9):1774-1785. DOI: 10.1200/JCO.22.02224. [ Context Link 1 ] View abstract...

198. Phelan RA, Margolis D. Graft-versus-host disease, rejection, and venoocclusive disease. In: Kliegman RM, et al., editors. Nelson Textbook of Pediatrics. 22nd ed. Elsevier; 2025:1357-1360. [ Context Link 1 ]

199. Cooper JE, Stites E, Davis S, Wiseman AC. Prophylaxis and treatment of kidney transplant rejection. In: Johnson RJ, Floege J, Tonelli M, editors. Comprehensive Clinical Nephrology. 7th ed. Elsevier; 2024:1202-1212.e2. [ Context Link 1 ]

200. Hooper DK, Varnell CD. Renal transplantation. In: Kliegman RM, et al., editors. Nelson Textbook of Pediatrics. 22nd ed. Elsevier; 2025:3253-3259. [ Context Link 1 ]

201. Koval CE, Phelan MP. The solid organ transplant patient. In: Walls RM, editor. Rosen's Emergency Medicine: Concepts and Clinical Practice. 10th ed. Elsevier; 2023:2361-2371.e3. [ Context Link 1 ]

202. Reyes JD, Hsu EK. Liver transplantation. In: Kliegman RM, et al., editors. Nelson Textbook of Pediatrics. 22nd ed. Elsevier; 2025:2507-2508. [ Context Link 1 ]

203. Shudo Y, Hiesinger W, Woo YJ. Heart Transplantation. In: Sellke FW, del Nido PJ, Swanson SJ, editors. Sabiston and Spencer Surgery of the Chest. 10th ed. Philadelphia, PA 19103-2899: Elsevier; 2024:1946-1970. [ Context Link 1 ]

204. Smith AB, Clark B, Racine C, Jensen M. Perioperative care of patients undergoing kidney transplantation. In: Knechtle SJ, Marson LP, editors. Kidney Transplantation: Principles and Practice. 9th ed. Elsevier; 2026:201-214. [ Context Link 1 ]

205. Starling RC. Cardiac transplantation. In: Libby P, Bonow RO, Mann DL, Tomaselli GF, Bhatt DL, Solomon SD, editors. Braunwald's Heart Disease: A Textbook of Cardiovascular Medicine. 12th ed. Elsevier; 2022:1132-1143. [ Context Link 1 ]

206. Hoffer LJ, Bistrian BR, Driscoll DF. Enteral and parenteral nutrition. In: Loscalzo J, Fauci A, Kasper D, Hauser S, Longo D, Jameson JL, editors. Harrison's Principles of Internal Medicine. 21st ed. McGraw Hill Education; 2022:2539-2546. [ Context Link 1 ]

207. Centers for Medicare and Medicaid Services. "Admissions." 42 CFR 412.3 Washington, DC 2025 Jul [accessed 2025 Jul 22] Accessed at: https://www.ecfr.gov/current/title-42/chapter-IV/subchapter-B/part-412. [ Context Link 1 ]

208. Centers for Medicare and Medicaid Services. "Hospital services excluded from payment under the hospital outpatient prospective payment system." 42 CFR 419.22 Washington, DC 2023 Jul [accessed 2025 Jul 22] Accessed at: https://www.ecfr.gov/. [ Context Link 1 ]

209. Centers for Medicare and Medicaid Services. "Requirements relating to basic benefits." 42 CFR 422.101 Washington, DC 2025 Jun 03 [accessed 2025 Jul 23] Accessed at: https://www.ecfr.gov/. [ Context Link 1 ]

210. Centers for Medicare and Medicaid Services. Medicare Benefit Policy Manual. Chapter 1 - Inpatient Hospital Services Covered Under Part A Rev. 10892 [Internet] Centers for Medicare and Medicaid Services. 2021 Aug Accessed at: https://www.cms.gov/manuals/. [accessed 2025 Sep 09] [ Context Link 1 ]

211. Centers for Medicare and Medicaid Services. Medicare Benefit Policy Manual. Chapter 6 - Hospital Services Covered Under Part B Rev. 12425 [Internet] Centers for Medicare and Medicaid Services. 2023 Dec Accessed at: http://www.cms.gov/manuals/. [accessed 2025 Sep 09] [ Context Link 1 ]

212. Centers for Medicare and Medicaid Services. Medicare Benefit Policy Manual. Chapter 15 - Covered Medical and Other Health Services Rev. 13108 [Internet] Centers for Medicare and Medicaid Services. 2025 Apr 11 Accessed at: https://www.cms.gov/manuals/. [accessed 2025 Sep 09] [ Context Link 1 ]

213. Centers for Medicare and Medicaid Services. Medicare Program Integrity Manual. Chapter 6, Section 6.5 - Medical Review of Inpatient Hospital Claims for Part A Payment Rev. 10365 [Internet] Centers for Medicare and Medicaid Services. 2020 Oct 02 Accessed at: https://www.cms.gov/medicare/regulations-guidance/manuals/internet-only-manuals-ioms. [accessed 2025 Sep 09] [ Context Link 1 ]

214. Medicare Coverage Database. [Internet] Centers for Medicare and Medicaid Services. Accessed at: https://www.cms.gov/medicare-coverage-database/search.aspx? Updated 2025 [accessed 2025 Oct 23] [ Context Link 1 ]

# Footnotes

[A] Primary repair is recommended for congenital Morgagni and Bochdalek diaphragmatic hernias even in the absence of symptoms due to the high risk of strangulation.(10) Acquired diaphragmatic hernias usually occur following traumatic injury and may present with either immediate or delayed complications of abdominal organ incarceration, or compression of the lungs or heart.(20) A clinical guideline recommends surgical repair for traumatic diaphragmatic hernias.(20) [ A in Context Link 1 ]

[B] Biliopancreatic diversion is a complex operation entailing the removal of about 70% of the stomach using a double anastomosis to bypass most of the small intestine. Single-anastomosis duodeno-ileal bypass with sleeve gastrectomy is a modification of the original biliopancreatic diversion that uses only a single anastomosis for the bypass, which reduces perioperative risk.(25)(26) [ B in Context Link 1 ]

[C] Although effective, due to a higher risk of nutritional deficiencies and higher complication rates, it is recommended that biliopancreatic diversion (with or without duodenal switch) for primary bariatric surgery be considered only in patients with a BMI of 60 or greater.(30) [ C in Context Link 1 ]

[D] Multiple specialty society guidelines recommend against requiring a mandated weight loss goal as a prerequisite for bariatric surgery as it has not been found to be associated with improved surgical outcomes or postoperative weight loss.(27)(31) [ D in Context Link 1 ]

[E] Sometimes a pregnancy test is performed the day of surgery. [ E in Context Link 1 ]

[F] Cohort studies and database analyses show that the use of biliopancreatic diversion as a revisional bariatric procedure is usually reserved for patients who remain at a very high BMI after their primary bariatric procedure, due to a greater risk of postoperative nutritional deficiencies and higher complication rates.(26)(33)(35)(36) Analysis of the 2020 Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program database reported a mean BMI of 45.9 for 596 patients undergoing revision of either sleeve gastrectomy or gastric bypass to biliopancreatic diversion.(36) [ F in Context Link 1 ]

[G] A World Health Organization evidence review concluded that lower BMI thresholds should be used for Asian adults based on epidemiologic studies showing a higher risk of type 2 diabetes and cardiovascular disease at a lower BMI.(37) These findings have been demonstrated in adults from different Asian regions and have led to recommendations from US, international, and Asian regional specialty society guidelines that lower BMI thresholds for bariatric surgery should be used for Asian adults.(27)(30)(31)(38)(39)(40) [ G in Context Link 1, 2, 3 ]

[H] Consensus guidelines do not define threshold criteria to define the degree of insufficient weight loss or the amount of excessive weight regained following primary bariatric surgery that would justify reoperative bariatric surgery.(16)(27)(42) However, 50% excess weight loss has been used historically as a threshold defining a successful response to bariatric surgery.(43) Loss of less than 50% of excess weight or regaining more than 20% to 25% of excess weight, 1 year or longer after the primary bariatric procedure, has been used as criteria for reoperation in some studies.(26)(33) Excess weight is the difference between the patient's weight before the previous procedure and the target weight that corresponds to a BMI of 25. Another way to calculate the target weight is to multiply the square of the patient's height in meters by 25.(33) [ H in Context Link 1, 2 ]

[I] Reoperative bariatric surgery may be characterized as a conversion (new or different type of procedure), correction (intended to resolve a complication or anatomic defect), or reversal (restoration of normal anatomy).(27) [ I in Context Link 1 ]

[J] Resistant hypertension is defined as a blood pressure above goal despite treatment with 3 antihypertensive medications with complementary mechanisms, including a diuretic at maximally tolerated doses, or blood pressure at goal but requiring 4 or more medications for control.(41) [ J in Context Link 1 ]

[K] Most superficial perianal abscesses can be incised and drained under local anesthesia in the office setting.(47)(60) [ K in Context Link 1 ]

[L] Breast reconstruction may be performed as an autologous flap reconstruction, via placement of an implant, or as a combination procedure and may be performed either at the time of mastectomy or as a delayed interval procedure.(65) Most specialty society guidelines recommend an interval (as opposed to immediate) procedure for patients undergoing postmastectomy radiation.(65) [ L in Context Link 1 ]

[M] Resection for select patients with limited multifocal disease or with a resectable area of major vascular invasion is controversial but may be considered.(68) Some patients with unresectable masses may be better surgical candidates following systemic therapy or, alternatively, may be candidates for liver transplant.(68) [ M in Context Link 1 ]

[N] Most patients with splenic injury can be treated with nonoperative management. Indications for surgical intervention include hemodynamic instability unresponsive to resuscitation, splenic bleeding unresponsive to catheter-directed embolization, stable but moderate to severe lesion where embolization is not available, or if associated traumatic injury that requires surgical exploration is present.(89)(90) [ N in Context Link 1 ]

[O] In adults, common etiologies of short gut syndrome include mesenteric ischemia, Crohn disease, trauma, and surgical resection. In infants and children, common etiologies include necrotizing enterocolitis, gastroschisis, volvulus, and intestinal atresia.(95)(96)(98) [ O in Context Link 1 ]

[P] Hepatic congestion from primary heart failure can cause hepatic congestion and inflammation, ultimately leading to hepatic fibrosis and cirrhosis. Cardiac causes include restrictive or dilated cardiomyopathy, hypertrophic cardiomyopathy, and congenital heart disease.(105) [ P in Context Link 1 ]

[Q] The standard medical definition of acute liver failure is the onset of acute liver disease of less than 26 weeks' duration with an INR greater than 1.5 attributable to liver disease plus any degree of hepatic encephalopathy.(107) However, for purposes of liver transplant, the Organ Procurement and Transplantation Network

defines acute liver failure (also known as fulminant liver failure) as the onset of hepatic encephalopathy within 56 days (8 weeks) of the first signs or symptoms of liver disease.(108) [ Q in Context Link 1 ]

[R] Hepatic encephalopathy is graded by West Haven criteria for patients age 3 years or older.(110) A calculator for West Haven criteria is available at www.mdcalc.com/hepatic-encephalopathy-grades-stages. [ R in Context Link 1, 2 ]

[S] The Model for End-Stage Liver Disease (MELD) score is used for patients age 12 years or older and may be calculated at the Organ Procurement and Transplantation Network website at https://optn.transplant.hrsa.gov/resources/allocation-calculators/meld-calculator/.(108) In cases in which the calculated MELD score or Pediatric Model for End-Stage Liver Disease (PELD) score does not reflect the urgent need for a liver transplant, an appeal may be made to the Regional Review Board for a score exception.(108)(111)(115) Examples of conditions eligible for MELD or PELD score exclusions include hepatopulmonary syndrome, primary hyperoxaluria, metabolic disorders (eg, organic acidemia, urea cycle disorder), hepatocellular carcinoma, and cystic fibrosis with $FEV_1$ less than 40% predicted.(108)(111)(115) [ S in Context Link 1 ]

[T] A specialty society guideline notes that the European Association for the Study of the Liver-Chronic Liver Failure Consortium (EASL-CLIF-C) score may be used to help prioritize patients for liver transplant.(118) A calculator is available at https://efclif.com/research-infrastructure/score-calculators/clif-c-of-aclf-ad/#calculator. [ T in Context Link 1 ]

[U] A specialty society guideline recommends that patients with an acute-on-chronic liver failure grade of 3 be considered for liver transplant.(119) A calculator is available at www.aclf.in/?page=doctor_aarc_grade_cal. [ U in Context Link 1 ]

[V] Patients who have organ failure that has stabilized or improved may be better candidates for transplant.(120) [ V in Context Link 1 ]

[W] Grade III encephalopathy is characterized by confusion, incoherent speech, and sleepiness but is arousable to voice. Grade IV is a comatose patient, unresponsive to pain, with decerebrate or decorticate posturing.(110) [ W in Context Link 1 ]

[X] Severe acute respiratory distress syndrome ($PaO_2$ to $FiO_2$ ratio less than 150 mm Hg ($SpO_2$ to $FiO_2$ ratio less than 150)) is predictive of worse post-transplant outcomes and may be considered a barrier to transplant.(120) $SpO_2$ to $FiO_2$ ratios generally correlate well with $PaO_2$ to $FiO_2$ ratios after mathematical correction when $SpO_2$ levels are 97% or less.(121) However, this ratio should be used with caution due to limitations in accuracy of pulse oximetry, especially in patients who are poorly perfused or have acidosis.(121)(122) Pulse oximetry ($SpO_2$) may underestimate arterial saturation ($SaO_2$), especially in people with dark skin pigmentation, thick skin, cold body temperature, or who are wearing colored nail polish.(121) Where appropriate, pulse oximetry should be measured after warming fingers or removing nail polish.(123) [ X in Context Link 1 ]

[Y] Hepatopulmonary syndrome is characterized by hypoxemia due to intrapulmonary vascular dilation in the setting of portal hypertension or cirrhosis.(114)(132)(133) [ Y in Context Link 1, 2, 3 ]

[Z] Portopulmonary hypertension with a mean pulmonary artery pressure of greater than 45 mm Hg following treatment is associated with a high mortality rate post liver transplant and is considered a contraindication to transplant.(119)(134) [ Z in Context Link 1, 2 ]

[AA] A clinical guideline recommends liver transplant as lifesaving therapy for all patients with Wilson disease and acute liver failure.(135) Patients with acute liver failure due to Wilson disease may present with hemolysis, hepatic encephalopathy, and (in contrast to other causes of acute liver failure) relatively small elevations of serum aminotransferases.(135) [ AA in Context Link 1, 2 ]

[BB] Some patients with acute liver injury due to Wilson disease will respond to aggressive medical therapy while others may progress to acute liver failure.(135) A New Wilson Index score of 11 or greater (available at www.pediatriconcall.com/calculators/hepatology/wilsons-disease-scoring-system) is predictive of high mortality without liver transplant; however, it may be less reliable in children than in adults.(135) [ BB in Context Link 1, 2 ]

[CC] Patient may have chronic liver disease due to failure of medical management or due to disease progression in a previously undiagnosed and untreated patient.(135) [ CC in Context Link 1, 2 ]

[DD] Total hepatectomy with a temporary portacaval shunt may be required in severe hepatic trauma or primary liver allograft nonfunction immediately after transplant.(137)(138) [ DD in Context Link 1, 2 ]

[EE] Glycogen storage disease increases the risk for malignant transformation.(139) [ EE in Context Link 1 ]

[FF] Primary nonfunction (PNF) differs from hyperacute rejection in that PNF occurs immediately following transplant and is not antibody-mediated, whereas hyperacute rejection occurs after an initial period of stability (24 to 48 hours) and is due to antibody-mediated rejection with detectable donor-specific antibodies.(142) Donor risk factors for PNF include prolonged organ ischemia, hepatic steatosis, older age, and deceased cardiac donors; recipient risk factors include older age and higher Model for End-Stage Liver Disease scores.(142) [ FF in Context Link 1, 2 ]

[GG] Treated and cured cancers, including any carcinoma in situ, nonmetastatic basal cell and squamous cell carcinoma of the skin, melanoma in situ, prostate cancer with Gleason score 6 or less, small (3 cm or less) renal tumors, superficial bladder cancer, and follicular or papillary thyroid cancer less than 2 cm with low-grade histology, are not contraindications to transplant. Patients with hematologic or solid tumor malignancies in remission and patients with myelodysplasias, chronic leukemia, or low-grade lymphomas may be transplant candidates after evaluation by a transplant hematologist.(143) [ GG in Context Link 1, 2 ]

[HH] The standard medical definition of acute liver failure in children is acute liver disease of less than 8 weeks' duration plus either an INR greater than 2 or an INR greater than 1.5 with any degree of hepatic encephalopathy.(146) However, for purposes of liver transplant, the Organ Procurement and Transplantation Network defines acute liver failure (also known as fulminant liver failure) as the onset of hepatic encephalopathy within 8 weeks of the first signs or symptoms of liver disease.(108) [ HH in Context Link 1 ]

[II] Hepatic encephalopathy is graded by West Haven criteria for patients age 3 years or older or by the Whitington Scale for patients younger than 3 years.(110)(146) A calculator for West Haven criteria is available at www.mdcalc.com/hepatic-encephalopathy-grades-stages. Whitington Scale criteria for early encephalopathy (stage I and II) include inconsolable crying, sleep reversal, and inattention to task; moderate encephalopathy (stage III) is characterized by stupor, combativeness, and somnolence with hyperreflexia; and late encephalopathy (stage IV) is characterized by coma (either arousable to painful stimuli (IVa) or with no response to pain (IVb)) with absent reflexes and decerebrate or decorticate posturing.(146) [ II in Context Link 1 ]

[JJ] The Model for End-Stage Liver Disease score is used for liver allocation for patients 12 years or older; an individual's score can be calculated at the Organ Procurement and Transplantation Network website at http://optn.transplant.hrsa.gov/converge/resources/MeldPeldCalculator.asp?index=98.(108) [ JJ in Context Link 1 ]

[KK] The Pediatric Model for End-Stage Liver Disease score, a model similar to the Model for End-Stage Liver Disease, has been developed for children 11 years of age or younger. An individual's score can be calculated at the Organ Procurement and Transplantation Network website at http://optn.transplant.hrsa.gov/converge/resources/MeldPeldCalculator.asp?index=99.(108) [ KK in Context Link 1 ]

[LL] In cases in which the calculated Model for End-Stage Liver Disease (MELD) or Pediatric Model for End-Stage Liver Disease (PELD) score does not reflect the urgent need for a liver transplant, an appeal may be made to the Regional Review Board for a score exception.(108)(115) Examples of conditions eligible for MELD or PELD score exclusions include hepatopulmonary syndrome, primary hyperoxaluria, metabolic disorders, hepatocellular carcinoma, and cystic fibrosis with $FEV_1$ less than 40% predicted.(108) [ LL in Context Link 1, 2 ]

[MM] Pediatric patients who have chronic liver disease and ongoing gastrointestinal bleeding requiring 20 mL/kg or more of red blood cell transfusions within 24 hours or who have a need for mechanical ventilation or continuous renal replacement may be registered as a status 1B for transplant, indicating an urgent need for liver transplant.(108) [ MM in Context Link 1 ]

[NN] See Intensive, Intermediate, and Telemetry Care Guidelines ISC. [ NN in Context Link 1 ]

[OO] See Clinical Indications for Procedure in this guideline. [ OO in Context Link 1 ]

[PP] Effective antiemetic agents include 5-hydroxytryptamine receptor antagonists, dexamethasone, anticholinergic agents, or neurokinin 1 receptor antagonists. Patients at risk for postoperative nausea and vomiting may be given antiemetics preoperatively as prophylaxis.(164) [ PP in Context Link 1 ]

# Definitions

## Abdominal status acceptable

- Abdominal status acceptable, as indicated by **ALL** of the following(1):
  - Bowel sounds present
  - No ileus, signs of obstruction, or peritonitis
  - Abdominal distention absent or manageable at next level of care

### References

1. Martinez JP. Abdominal pain. In: Walls RM, editor. Rosen's Emergency Medicine: Concepts and Clinical Practice. 10th ed. Elsevier; 2023:211-220.e1.

## Activity level acceptable

- Activity level acceptable, as indicated by **1 or more** of the following:
  - Patient ambulatory and can perform ADL as appropriate for age and development
  - Activity at baseline
  - Activity level acceptable for next level of care

## General Discharge Criteria met

- General Discharge Criteria met or Pediatric General Discharge Criteria met (if either is relevant or necessary for patient's condition)

## Hemodynamic stability

- Hemodynamic stability, as indicated by **1 or more** of the following:
  - Hemodynamic abnormalities at baseline or acceptable for next level of care
  - Patient hemodynamically stable, as indicated by **ALL** of the following(1)(2):
    - Tachycardia absent
    - Hypotension absent
    - No evidence of inadequate perfusion (eg, no myocardial ischemia)
    - No other hemodynamic abnormalities (eg, no Orthostatic hypotension)

### References

1. Schriger DL. Approach to the patient with abnormal vital signs. In: Goldman L, Cooney KA, editors. Goldman-Cecil Medicine. 27th ed. Elsevier; 2024:32-35.
2. Ramgopal S, Sepanski RJ, Martin-Gill C. Empirically derived age-based vital signs for children in the out-of-hospital setting. Annals of Emergency Medicine 2023;81(4):402-412. DOI: 10.1016/j.annemergmed.2022.09.019.

## Hepatic and biliary abnormalities absent or acceptable

- Hepatic and biliary abnormalities absent or acceptable, as indicated by **1 or more** of the following(1)(2)(3):
  - No abnormalities present
  - Hepatic and biliary status acceptable for next level of care, as indicated by **ALL** of the following:
    - Liver function tests normal, stable, or improving
    - Ascites absent, diminishing, or stable, with adequate respiratory function for next level of care
    - Renal function acceptable
    - Bilirubin stable or diminishing
    - Encephalopathy absent or controlled adequately for next level of care
    - No biliary obstruction, or current drainage and treatment plan appropriate for next level of care

### References


1. Ghany MG, Hoofnagle JH. Approach to the patient with liver disease. In: Loscalzo J, Fauci A, Kasper D, Hauser S, Longo D, Jameson JL, editors. Harrison's Principles of Internal Medicine. 21st ed. McGraw Hill Education; 2022:2546-2553.
2. Befeler AS, Bacon BR. Cirrhosis and its complications. In: Loscalzo J, Fauci A, Kasper D, Hauser S, Longo D, Jameson JL, editors. Harrison's Principles of Internal Medicine. 21st ed. McGraw Hill Education; 2022:2624-2633.
3. Greenberger NJ, Paumgartner G, Pratt DS. Diseases of the gallbladder and bile ducts. In: Loscalzo J, Fauci A, Kasper D, Hauser S, Longo D, Jameson JL, editors. Harrison's Principles of Internal Medicine. 21st ed. McGraw Hill Education; 2022:2641-2652.


## Hypotension absent

- Hypotension absent,[A] as indicated by **1 or more** of the following:
  - Hypotension absent in adult patient, as indicated by **1 or more** of the following:
    - Systolic blood pressure greater than or equal to 90 mm Hg[A](1)
    - Mean arterial pressure[B] greater than or equal to 70 mm Hg  MAP Calculator[A](1)(2)
    - Blood pressure at patient's baseline (eg, healthy adult with low systolic blood pressure), at intentional therapeutic goal (eg, patient with heart failure), or acceptable for next level of care (eg, blood pressure stable and no significant signs or symptoms due to low blood pressure)
  - Hypotension absent in pediatric patient, as indicated by **1 or more** of the following:
    - Systolic blood pressure greater than or equal to 110 mm Hg in child 13 to 17 years of age[A](3)
    - Systolic blood pressure greater than or equal to 100 mm Hg in child 6 to 12 years of age[A](3)
    - Systolic blood pressure greater than or equal to 95 mm Hg in child 3 to 5 years of age[A](3)
    - Systolic blood pressure greater than or equal to 90 mm Hg in child 1 or 2 years of age[A](3)
    - Systolic blood pressure greater than or equal to 80 mm Hg in infant 6 to 11 months of age[A](3)
    - Systolic blood pressure greater than or equal to 70 mm Hg in infant 3 to 5 months of age[A](3)
    - Systolic blood pressure greater than or equal to 65 mm Hg in infant 1 or 2 months of age[A](3)
    - Blood pressure at patient's baseline (eg, healthy child with low systolic blood pressure), at intentional therapeutic goal, or acceptable for next level of care (eg, blood pressure stable and no significant signs or symptoms due to low blood pressure)

### References


1. Schriger DL. Approach to the patient with abnormal vital signs. In: Goldman L, Cooney KA, editors. Goldman-Cecil Medicine. 27th ed. Elsevier; 2024:32-35.
2. Puskarich MA, Jones AE. Shock. In: Walls RM, editor. Rosen's Emergency Medicine: Concepts and Clinical Practice. 10th ed. Elsevier; 2023:34-41.e1.

3. Anderson CC, Kapoor S, Mark TE. Pediatric parameters and equipment. In: Anderson CC, Kapoor S, Mark TE, editors. The Harriet Lane Handbook: A Manual for Pediatric House Officers. 23rd ed. Elsevier; 2024:i-iii.

### Footnotes

A. Criteria based upon clinician-acquired numeric values (eg, vital signs, oxygen saturation) should be used if they are accurate reflections of the patient's condition. Transitory findings (eg, abnormal only upon initial emergency department intake or only one time out of multiple readings) that rapidly improve with no or minimal treatment usually do not reflect disease severity or risk for deterioration. This does not imply that an initial or one-time reading cannot ever be applicable. The goal is to separate erroneous or incidental findings from those that truly represent the patient's clinical picture.
B. The mean arterial pressure (MAP) takes into account both SBP and DBP readings.

## Immunosuppressed

- Immunosuppressed refers to a degree of immunocompromise that is clinically significant (eg, affects choice of antimicrobial agent due to possibility of atypical organism, necessitates additional isolation, or leads to clinically relevant increase in likelihood of severe infection)[A]; examples include(1)(2)(3)(4):
  - Neutropenia (absolute neutrophil count less than 500/$mm^3$ (0.5 x$10^9$/L), or expected to decrease to this level within the next 48 hours)
  - Drug-induced immunosuppression (ie, current usage); examples include:
    - Systemic corticosteroids[B](6)(7)(8)(9)
    - Immunosuppressive agent (eg, tacrolimus, azathioprine, methotrexate, cyclosporin)
    - Immunomodulatory therapy (eg, tumor necrosis factor inhibitor, interleukin inhibitor, monoclonal antibodies)
  - Poorly controlled diabetes mellitus (eg, HbA1c of 8.5% (69 mmol/mol) or higher)[C][D](10)(11)(12)(13)
  - Chronic kidney disease (ie, estimated GFR less than 60 mL/min/1.73$m^2$ (1.0 mL/sec/1.73$m^2$)) or end-stage renal disease (hemodialysis or peritoneal dialysis)[E](15)(16)(17)(18)(19)(20)
  - Cirrhosis[F](21)(22)(23)(24)(25)
  - Bone marrow suppression or dysfunction (eg, chemotherapy, radiation therapy, bone marrow fibrosis or infiltration with malignant cells)
  - Humoral (antibody, B-lymphocyte) immune dysfunction or deficiency (eg, common variable immune deficiency, specific antibody deficiency, chronic lymphocytic leukemia)(26)(27)
  - Cell-mediated (eg, T-lymphocyte, natural killer cell) immune dysfunction or deficiency (eg, severe combined immune deficiency, DiGeorge syndrome, Wiskott-Aldrich syndrome)
  - Phagocytic cell (neutrophil, macrophage) dysfunction (eg, chronic granulomatous disease, leukocyte adhesion deficiency)
  - Acquired immunodeficiencies (eg, HIV/AIDS, hematopoietic and lymphoid malignancies)
  - History of solid organ or hematopoietic stem cell transplant[G]
  - Asplenia (surgical or congenital) or functional hyposplenia (eg, sickle cell disease)[H](28)
  - Complement deficiency (eg, hereditary, due to protein loss (nephrotic syndrome))

### References

1. Holland SM, Gallin JI. Evaluation of the patient with suspected immunodeficiency. In: Bennett JE, Dolin R, Blaser MJ, editors. Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases. 9th ed. Philadelphia, PA: Elsevier; 2020:142-153.e2.
2. Perkins J, Waasdorp CP. The immunocompromised patient. In: Walls RM, editor. Rosen's Emergency Medicine: Concepts and Clinical Practice. 10th ed. Elsevier; 2023:2348-2360.e2.
3. Sifri CD. Approach to fever and suspected infection in the immunocompromised host. In: Goldman L, Cooney KA, editors. Goldman-Cecil Medicine. 27th ed. Elsevier; 2024:1851-1862.

4. Michaels MG, Chong HJ, Green M. Infections in immunocompromised persons. In: Kliegman RM, et al., editors. Nelson Textbook of Pediatrics. 22nd ed. Elsevier; 2025:1659-1666.
5. Infections of the Immunocompromised Host. In: McKean SC, Ross JJ, Dressler DD, Scheurer DB, editors. Principles and Practice of Hospital Medicine. 2nd ed. New York, NY: McGraw-Hill Education; 2017:1646-1652.
6. Youssef J, Novosad SA, Winthrop KL. Infection risk and safety of corticosteroid use. Rheumatic Diseases Clinics of North America 2016;42(1):157-176, ix-x. DOI: 10.1016/j.rdc.2015.08.004.
7. George MD, et al. Risk for serious infection with low-dose glucocorticoids in patients with rheumatoid arthritis : a cohort study. Annals of Internal Medicine 2020;173(11):870-878. DOI: 10.7326/M20-1594.
8. Wu J, Keeley A, Mallen C, Morgan AW, Pujades-Rodriguez M. Incidence of infections associated with oral glucocorticoid dose in people diagnosed with polymyalgia rheumatica or giant cell arteritis: a cohort study in England. Canadian Medical Association Journal 2019;191(25):E680-E688. DOI: 10.1503/cmaj.190178.
9. Ramirez JA, et al. Treatment of community-acquired pneumonia in immunocompromised adults: a consensus statement regarding initial strategies. Chest 2020;158(5):1896-1911. DOI: 10.1016/j.chest.2020.05.598.
10. Hine JL, et al. Association between glycaemic control and common infections in people with Type 2 diabetes: a cohort study. Diabetic Medicine 2017;34(4):551-557. DOI: 10.1111/dme.13205.
11. Critchley JA, Carey IM, Harris T, DeWilde S, Hosking FJ, Cook DG. Glycemic control and risk of infections among people with type 1 or type 2 diabetes in a large primary care cohort study. Diabetes Care 2018;41(10):2127-2135. DOI: 10.2337/dc18-0287.
12. Mor A, Dekkers OM, Nielsen JS, Beck-Nielsen H, Sorensen HT, Thomsen RW. Impact of glycemic control on risk of infections in patients with type 2 diabetes: a population-based cohort study. American Journal of Epidemiology 2017;186(2):227-236. DOI: 10.1093/aje/kwx049.
13. Luk AOY, et al. Glycaemia control and the risk of hospitalisation for infection in patients with type 2 diabetes: Hong Kong Diabetes Registry. Diabetes/Metabolism Research and Reviews 2017;33(8):Online. DOI: 10.1002/dmrr.2923.
14. American Diabetes Association. Standards of care in diabetes - 2025. Diabetes Care 2025;48(S1):S1-S352. (Reaffirmed 2025 Mar)
15. Ishigami J, Matsushita K. Clinical epidemiology of infectious disease among patients with chronic kidney disease. Clinical and Experimental Nephrology 2019;23(4):437-447. DOI: 10.1007/s10157-018-1641-8.
16. Ishigami J, Grams ME, Chang AR, Carrero JJ, Coresh J, Matsushita K. CKD and risk for hospitalization with infection: the atherosclerosis risk in communities (ARIC) study. American Journal of Kidney Diseases 2017;69(6):752-761. DOI: 10.1053/j.ajkd.2016.09.018.
17. Narayanan M. The many faces of infection in CKD: evolving paradigms, insights, and novel therapies. Advances in Chronic Kidney Disease 2019;26(1):5-7. DOI: 10.1053/j.ackd.2018.10.001.
18. Crepin T, et al. Uraemia-induced immune senescence and clinical outcomes in chronic kidney disease patients. Nephrology, Dialysis, Transplantation 2020;35(4):624-632. DOI: 10.1093/ndt/gfy276.
19. Yeun JY, Young B, Depner TA, Chin AA. Hemodialysis. In: Yu AS, Chertow GM, Luyckx VA, Marsden PA, Skorecki K, Taal MW, editors. Brenner and Rector's The Kidney. 11th ed. Philadelphia, PA: Elsevier; 2020:2038-2093 e21.
20. Betjes MG. Immune cell dysfunction and inflammation in end-stage renal disease. Nature Reviews. Nephrology 2013;9(5):255-65. DOI: 10.1038/nrneph.2013.44.
21. Kamath PS, Shah VH. Overview of cirrhosis. In: Feldman M, Friedman LS, Brandt LJ, editors. Sleisenger & Fordtran's Gastrointestinal and Liver Disease. 11th ed. Philadelphia, PA: Elsevier; 2021:1164-1171.e1.
22. Zangeneh TT, El Ramahi R, Klotz SA. Bacterial and miscellaneous infections of the liver. In: Sanyal AJ, Boyer TD, Lindor KD, Terrault NA, editors. Zakim and Boyer's Hepatology. 7th ed. Philadelphia, PA 19103-2899: Elsevier; 2018:579-592.e4.
23. Piano S, Angeli P. Bacterial infections in cirrhosis as a cause or consequence of decompensation? Clinics in Liver Disease 2021;25(2):357-372. DOI: 10.1016/j.cld.2021.01.006.
24. Albillos A, Martin-Mateos R, Van der Merwe S, Wiest R, Jalan R, Alvarez-Mon M. Cirrhosis-associated immune dysfunction. Nature Reviews. Gastroenterology & Hepatology 2022;19(2):112-134. DOI: 10.1038/s41575-021-00520-7.

25. Campbell KA, Trivedi HD, Chopra S. Infections in cirrhosis: a guide for the clinician. American Journal of Medicine 2021;134(6):727-734. DOI: 10.1016/j.amjmed.2021.01.015.
26. Ameratunga R, Allan C, Woon ST. Defining common variable immunodeficiency disorders in 2020. Immunology and Allergy Clinics of North America 2020;40(3):403-420. DOI: 10.1016/j.iac.2020.03.001.
27. Perez EE, Ballow M. Diagnosis and management of specific antibody deficiency. Immunology and Allergy Clinics of North America 2020;40(3):499-510. DOI: 10.1016/j.iac.2020.03.005.
28. Squire JD, Sher M. Asplenia and hyposplenism: an underrecognized immune deficiency. Immunology and Allergy Clinics of North America 2020;40(3):471-483. DOI: 10.1016/j.iac.2020.03.006.

## Footnotes

A. Examples are given for some of the mechanisms of immunocompromise; however, the list is not all-encompassing. The intent is to illustrate the degree of immunocompromise that may be clinically significant. The presence of a listed potentially immunocompromising factor does not always indicate clinically significant immunosuppression. For example, some findings, such as neutropenia, are usually indicative of significant immunocompromise, whereas others (eg, presence of diabetes, renal failure, or asplenia) may not necessarily indicate clinically important immunocompromise. The judgment as to the presence of clinically significant immunocompromise in a particular patient is also influenced by several variables, such as the nature of the suspected infection and the specific details of the patient's presentation, condition, and comorbidities. Patients may have more than one potential source of immunocompromise, increasing the likelihood of significant dysfunction (eg, poorly controlled diabetes and chronic kidney disease).

B. The minimum dose of systemic corticosteroid use associated with an increased risk of serious infection is not defined, but there is increasing risk with higher doses and longer duration of treatment.(5) Observational studies of patients with rheumatologic disease indicated, after statistical adjustment, that infection risk was increased with prolonged use of as little as 5 mg of prednisone-equivalent per day dosing, and also found that higher doses and longer duration increased risk.(6)(7)(8) An evidence-based specialty society guideline defines clinically important immunocompromise in adult pneumonia patients as those patients with an impaired immune response who are judged to be at elevated risk of infection by atypical or opportunistic organisms, so that there is a need to alter empirical antimicrobial therapy.(9) This same guideline states that corticosteroid use would lead to such an immune system impairment at doses of 20 mg of prednisone-equivalent per day or more for 14 days or more, or a course of treatment with a cumulative dose of 600 mg or more of prednisone-equivalent.(9)

C. It is generally agreed that the presence of diabetes is associated with an increased risk of infection, including infection leading to hospitalization.(2)(10)(11)(12)(13) At least some of this risk is attributed to the deleterious effects of diabetes on the immune system.(2)(10)(11)(12)(13) It has been found that the impact of diabetes can be higher in certain types of infections (eg, higher impact in cellulitis, osteomyelitis) and with a longer total duration of the diagnosis.(10)(11)(13)

D. There is no universally agreed upon HbA1c level that indicates "poor control." It has been found that the higher the HbA1c, the larger the impact on the immune system.(10)(11)(12)(13) Goal HbA1c can vary to some degree depending on the patient. Otherwise healthy adults and adolescents may have a target HbA1c of less than 7% (53 mmol/mol), whereas those who have complex comorbidities, impairment in cognition or activities of daily living, or a history of severe hypoglycemia may have a target of less than 8% (64 mmol/mol).(14) However, these targets are put forth with reduction of microvascular and macrovascular effects of diabetes in mind, not immune system effects.(14) In this way, there is no simple cutoff between adequate and poor control. Cohort studies, after statistical adjustment, have found that HbA1c levels above 8.0% to 8.5% (64 to 69 mmol/mol) are independently associated with hospitalization due to infection.(10)(11)(12)(13)

E. Patients with chronic kidney disease or end-stage renal disease have impaired immune system function, measured, for example, by higher rates of infection requiring hospitalization.(15)(16)(17) The degree of renal impairment correlates with the severity of immunocompromise.(15)(16)(17) The degree of proteinuria (eg, urine albumin to creatinine ratio) is also independently correlated with the severity of immune system dysfunction. These 2 factors are additive, in that patients with both reduced GFR and significant proteinuria are the most severely affected.(15)(16)(17) Patients with end-stage renal disease, in general, have more profound immune system dysfunction, with inadequate dialysis even more detrimental.(18)(19)(20)

F. Patients with cirrhosis of the liver are functionally immunocompromised due to a variety of mechanisms. This immunocompromise correlates with the severity of the cirrhosis and is called cirrhosis-associated immune dysfunction (CAID). Immune dysfunction is also worsened during periods of acute exacerbation of

chronic liver disease.(21)(22)(23)(24)(25) CAID is particularly associated with bacterial infections, affecting both the frequency and severity of infection.(23)(24)(25)

G. Susceptibility to infection varies with the immunosuppressive agents used.(4)

H. Patients with asplenia or hyposplenia are at higher risk of infection with encapsulated organisms, such as *Streptococcus pneumoniae*, meningococcal infection, encapsulated strains of *Haemophilus influenzae*, and certain tick-borne diseases.(2)(28)

## Intake acceptable

- Intake acceptable, as indicated by **1 or more** of the following(1):
  - Oral hydration, medications, and diet
  - Enteral hydration, medications, and diet
  - Administration routes performable at next level of care

### References

1. Hoffer LJ, Bistrian BR, Driscoll DF. Enteral and parenteral nutrition. In: Loscalzo J, Fauci A, Kasper D, Hauser S, Longo D, Jameson JL, editors. Harrison's Principles of Internal Medicine. 21st ed. McGraw Hill Education; 2022:2539-2546.

## Multimodal analgesia

- Multimodal analgesia involves the utilization of 2 or more analgesic agents with different mechanisms of action in order to provide additive or synergistic pain control, while minimizing side effects and reliance on opioids.(1)(2)(3)

### References

1. D'Souza RS, Johnson RL. Regional and multimodal treatments of perioperative pain. In: Benzon H, editor. Practical Management of Pain. 6th ed. Philadelphia, PA 19103-2899: Elsevier; 2023:355-373.e8.
2. George S, Johns M. Review of nonopioid multimodal analgesia for surgical and trauma patients. American Journal of Health-System Pharmacy 2020;77(24):2052-2063. DOI: 10.1093/ajhp/zxaa301.
3. Finnerup NB. Nonnarcotic methods of pain management. New England Journal of Medicine 2019;380(25):2440-2448. DOI: 10.1056/NEJMra1807061.

## No blood loss, or problem resolved

- No blood loss, or problem resolved, as indicated by **1 or more** of the following(1)(2)(3)(4):
  - No blood loss problem
  - Repeat evaluation shows blood loss resolved sufficiently (eg, hemoglobin at acceptable level and stable)

### References

1. Gaddy JD, Dupre AA. Disorders of hemostasis. In: Walls RM, editor. Rosen's Emergency Medicine: Concepts and Clinical Practice. 10th ed. Elsevier; 2023:1486-1499.e2.
2. Dyke C, et al. Universal definition of perioperative bleeding in adult cardiac surgery. Journal of Thoracic and Cardiovascular Surgery 2014;147(5):1458-1463.e1. DOI: 10.1016/j.jtcvs.2013.10.070.
3. Bartoszko J, et al. Comparison of two major perioperative bleeding scores for cardiac surgery trials: universal definition of perioperative bleeding in cardiac surgery and European coronary artery bypass grafting bleeding severity grade. Anesthesiology 2018;129(6):1092-1100. DOI: 10.1097/ALN.0000000000002179.

4. Levy JH, et al. Consensus statement: hemostasis trial outcomes in cardiac surgery and mechanical support. Annals of Thoracic Surgery 2022;113(3):1026-1035. DOI: 10.1016/j.athoracsur.2021.09.080.

## No contraindications to liver transplant present

- No contraindications to liver transplant present, as indicated by **ALL** of the following(1)(2)(3)(4)(5)(6)(7)(8):
  - No sustained increases of intracranial pressure greater than 50 mm Hg
  - Cerebral perfusion pressure not less than 40 mm Hg for more than 2 hours
  - No irreversible brain damage
  - No advanced HIV disease[A](6)
  - No uncontrolled systemic infection (eg, cholangitis, bacterial peritonitis)
  - No active alcohol or illicit substance use[B]
  - No advanced cardiac or pulmonary disease (eg, untreated coronary artery stenosis of 70% or greater, severe valvular disease, severe chronic lung disease) if considered only for liver transplant
  - No severe portopulmonary hypertension (mean pulmonary artery pressure of greater than 45 mm Hg) following pulmonary vasodilator or vasomodulator treatment(8)(14)
  - No unaddressed barriers to ability to comply with immunosuppression protocol and follow-up requirements (eg, adequate social support)
  - No history of persistent nonadherence
  - No anatomic abnormalities precluding liver transplant
  - No active extrahepatic malignancy[C](8)
  - No hemangiosarcoma
  - No Niemann-Pick disease type C

### References

1. Carrion AF, Martin P. Liver transplantation. In: Feldman M, Friedman LS, Brandt LJ, editors. Sleisenger & Fordtran's Gastrointestinal and Liver Disease. 11th ed. Philadelphia, PA: Elsevier; 2021:1533-1550.e4.
2. Pediatric MELD/PELD Exception Review. Guidance to Liver Transplant Programs and the National Liver Review Board [Internet] Organ Procurement and Transplantation Network and U.S. Department of Health & Human Services. 2023 Jul Accessed at: https://optn.transplant.hrsa.gov/. [accessed 2025 Sep 16]
3. Karp SJ, Alexopoulos S. Liver transplantation. In: Townsend CM, Beauchamp RD, Evers BM, Mattox KL, editors. Sabiston Textbook of Surgery. 21st ed. Elsevier; 2022:614-626.
4. Reyes JD, Hsu EK. Liver transplantation. In: Kliegman RM, et al., editors. Nelson Textbook of Pediatrics. 22nd ed. Elsevier; 2025:2507-2508.
5. Fontana RJ. Liver failure and transplantation. In: Goldman L, Cooney KA, editors. Goldman-Cecil Medicine. 27th ed. Elsevier; 2024:1043-1049.
6. Martin P, DiMartini A, Feng S, Brown R, Fallon M. Evaluation for liver transplantation in adults: 2013 practice guideline by the American Association for the Study of Liver Diseases and the American Society of Transplantation. Hepatology 2014;59(3):1144-1165. (Reaffirmed 2025 Jun)
7. Squires RH, et al. Evaluation of the pediatric patient for liver transplantation: 2014 practice guideline by the American Association for the Study of Liver Diseases, American Society of Transplantation and the North American Society for Pediatric Gastroenterology, Hepatology and Nutrition. Hepatology 2014;60(1):362-398. DOI: 10.1002/hep.27191. (Reaffirmed 2025 Jun)
8. European Association for the Study of the Liver. EASL Clinical Practice Guidelines on liver transplantation. Journal of Hepatology 2024;81(6):1040-1086. DOI: 10.1016/j.jhep.2024.07.032. (Reaffirmed 2025 Jun)
9. Rady ED, Anouti A, Thimphitthaya C, Cotter TG. Liver transplantation in alcohol-associated liver disease. Clinics in Liver Disease 2025;29(2):165-184. DOI: 10.1016/j.cld.2024.12.001.
10. Haugen CE, Cameron AM. Early liver transplantation in acute alcoholic hepatitis. Seminars in Liver Disease 2020;40(1):29-33. DOI: 10.1055/s-0039-3399560.

11. Goel A, Daugherty T. Selection criteria for liver transplantation for acute alcohol-associated hepatitis. Clinics in Liver Disease 2021;25(3):635-644. DOI: 10.1016/j.cld.2021.03.007.
12. Singal AK, Mathurin P. Diagnosis and treatment of alcohol-associated liver disease: a review. Journal of the American Medical Association 2021;326(2):165-176. DOI: 10.1001/jama.2021.7683.
13. Crabb DW, Im GY, Szabo G, Mellinger JL, Lucey MR. Diagnosis and treatment of alcohol-associated liver diseases: 2019 practice guidance from the American Association for the study of liver diseases. Hepatology 2020;71(1):306-333. DOI: 10.1002/hep.30866. (Reaffirmed 2025 Jun)
14. DuBrock HM. Portopulmonary hypertension: management and liver transplantation evaluation. Chest 2023;164(1):206-214. DOI: 10.1016/j.chest.2023.01.009.

### Footnotes

A. HIV-positive liver transplant candidates should have CD4 counts greater than 100/$mm^3$ (0.1 x$10^9$/L) and plasma HIV RNA levels that are expected to be undetectable at the time of liver transplant.(6)
B. The duration of the period of sobriety required prior to liver transplant is controversial with no universally accepted time period. An arbitrarily picked duration of 6 months is the most commonly employed duration.(9) Because studies have shown that mortality is high in patients with severe alcoholic hepatitis who do not undergo transplant, and that patients undergoing earlier liver transplant for severe alcoholic hepatitis have similar survival and alcohol relapse rates as those who have completed a 6-month waiting period, shorter durations of abstinence may be appropriate.(9)(10)(11)(12) Specialty society guidelines recommend against basing the liver transplant candidacy on a fixed abstinence interval.(8)(13) Use of controlled substances as directed by a clinician (eg, medical marijuana, prescription opiates) should not be labeled as a substance use disorder.
C. Liver transplant candidates with a history of extrahepatic malignancy should have received definitive treatment with an adequate tumor-free survival period. The determination of what constitutes an adequate tumor-free survival period varies depending on the type of malignancy and efficacy of the treatment received.(6)(8)

## No infection, or status acceptable

- No infection, or status acceptable, as indicated by **1 or more** of the following(1)(2)(3)(4)(5):
  - No infection present
  - Infection status acceptable for next level of care, as indicated by **ALL** of the following(6):
    - WBC count normal, stable, or declining with treatment
    - Adequate treatment performable at next level of care
    - Organism and sensitivities identified, or adequate clinical response to empiric therapy
    - Repeat cultures negative or not needed

### References

1. Hooper DC, Shenoy ES, Elshaboury RH. Treatment and prophylaxis of bacterial infections. In: Loscalzo J, Fauci A, Kasper D, Hauser S, Longo D, Jameson JL, editors. Harrison's Principles of Internal Medicine. 21st ed. McGraw Hill Education; 2022:1148-1163.
2. Blum FC, Biros MH. Fever in the adult patient. In: Walls RM, editor. Rosen's Emergency Medicine: Concepts and Clinical Practice. 10th ed. Elsevier; 2023:90-95.e1.
3. Mick NW. Pediatric fever. In: Walls RM, editor. Rosen's Emergency Medicine: Concepts and Clinical Practice. 10th ed. Elsevier; 2023:2067-2077.e2.
4. Melia MT. Approach to fever or suspected infection in the normal host. In: Goldman L, Cooney KA, editors. Goldman-Cecil Medicine. 27th ed. Elsevier; 2024:1845-1851.
5. Sifri CD. Approach to fever and suspected infection in the immunocompromised host. In: Goldman L, Cooney KA, editors. Goldman-Cecil Medicine. 27th ed. Elsevier; 2024:1851-1862.

6. Singh M, Fernandez-Frackelton M. Bacteria. In: Walls RM, editor. Rosen's Emergency Medicine: Concepts and Clinical Practice. 10th ed. Elsevier; 2023:1586-1609.e3.

## No inpatient interventions needed

- No inpatient interventions needed; examples include:
  - Wound care needed not feasible at next level of care
  - Gastrointestinal decompression, such as nasogastric or other tube suction, with continuing ileus or other acute intra-abdominal process
  - Drain care: drains in place, with high-volume output requiring continuing observation and care that cannot be managed at next level of care
  - Repeat urgent or emergent surgery for bleeding, obstruction, abscess, leak, fistula, or other lesions
  - Urgent CT scan, ultrasound, angiogram, or endoscopic procedure to evaluate acute abdominal process

## No transplant done, or status acceptable

- No transplant done, or status acceptable, as indicated by **1 or more** of the following(1)(2)(3)(4)(5)(6)(7)(8)(9)(10)(11):
  - No transplant
  - Status acceptable, as indicated by **ALL** of the following:
    - Infection and rejection absent or under appropriate treatment
    - Immunosuppression regimen appropriate for next level of care
    - Infection prophylaxis regimen established
    - No graft vs host disease evident

### References

1. Loren AW, et al. Hematopoietic Cell Transplantation. NCCN Clinical Practice Guidelines in Oncology [Internet] National Comprehensive Cancer Network (NCCN). v. 2.2025; 2025 Jun 03 Accessed at: https://www.nccn.org/. [accessed 2025 Jun 05]
2. Lehrnbecher T, et al. Guideline for the management of fever and neutropenia in pediatric patients with cancer and hematopoietic cell transplantation recipients: 2023 update. Journal of Clinical Oncology 2023;41(9):1774-1785. DOI: 10.1200/JCO.22.02224.
3. Phelan RA, Margolis D. Graft-versus-host disease, rejection, and venoocclusive disease. In: Kliegman RM, et al., editors. Nelson Textbook of Pediatrics. 22nd ed. Elsevier; 2025:1357-1360.
4. Cooper JE, Stites E, Davis S, Wiseman AC. Prophylaxis and treatment of kidney transplant rejection. In: Johnson RJ, Floege J, Tonelli M, editors. Comprehensive Clinical Nephrology. 7th ed. Elsevier; 2024:1202-1212.e2.
5. Fontana RJ. Liver failure and transplantation. In: Goldman L, Cooney KA, editors. Goldman-Cecil Medicine. 27th ed. Elsevier; 2024:1043-1049.
6. Hooper DK, Varnell CD. Renal transplantation. In: Kliegman RM, et al., editors. Nelson Textbook of Pediatrics. 22nd ed. Elsevier; 2025:3253-3259.
7. Koval CE, Phelan MP. The solid organ transplant patient. In: Walls RM, editor. Rosen's Emergency Medicine: Concepts and Clinical Practice. 10th ed. Elsevier; 2023:2361-2371.e3.
8. Reyes JD, Hsu EK. Liver transplantation. In: Kliegman RM, et al., editors. Nelson Textbook of Pediatrics. 22nd ed. Elsevier; 2025:2507-2508.
9. Shudo Y, Hiesinger W, Woo YJ. Heart Transplantation. In: Sellke FW, del Nido PJ, Swanson SJ, editors. Sabiston and Spencer Surgery of the Chest. 10th ed. Philadelphia, PA 19103-2899: Elsevier; 2024:1946-1970.
10. Smith AB, Clark B, Racine C, Jensen M. Perioperative care of patients undergoing kidney transplantation. In: Knechtle SJ, Marson LP, editors. Kidney Transplantation: Principles and Practice. 9th ed. Elsevier; 2026:201-214.
11. Starling RC. Cardiac transplantation. In: Libby P, Bonow RO, Mann DL, Tomaselli GF, Bhatt DL, Solomon SD, editors. Braunwald's Heart Disease: A Textbook of Cardiovascular Medicine. 12th ed. Elsevier; 2022:1132-1143.

## Operative site and other wounds acceptable

- Operative site and other wounds acceptable, as indicated by **1 or more** of the following(1):
  - Wounds absent
  - Wound site clean and intact, with minimal to no drainage and without signs of infection
  - Current wound care performable at next level of care

### References

1. Yepuri N, Pruekprasert N, Cooney RN. Surgical complications. In: Townsend CM, Beauchamp RD, Evers BM, Mattox KL, editors. Sabiston Textbook of Surgery. 21st ed. Elsevier; 2022:238-283.

## Orthostatic hypotension

- Orthostatic hypotension,[A][B] as indicated by **1 or more** of the following(1)(2)(3):
  - Fall in SBP of 20 mm Hg or more 1 to 3 minutes after patient sits or stands from recumbent position
  - Fall in DBP of 10 mm Hg or more 1 to 3 minutes after patient sits or stands from recumbent position

### References

1. Shibao C, Lipsitz LA, Biaggioni I, American Society of Hypertension Writing Group. Evaluation and treatment of orthostatic hypotension. Journal of the American Society of Hypertension 2013 Jul-Aug;7(4):317-324. DOI: 10.1016/j.jash.2013.04.006.
2. Dalal AS, Van Hare GF. Syncope. In: Kliegman RM, et al., editors. Nelson Textbook of Pediatrics. 22nd ed. Elsevier; 2025:592-599.
3. Fang JC, O'Gara PT. History and physical examination: an evidence-based approach. In: Libby P, Bonow RO, Mann DL, Tomaselli GF, Bhatt DL, Solomon SD, editors. Braunwald's Heart Disease: A Textbook of Cardiovascular Medicine. 12th ed. Elsevier; 2022:123-140.

### Footnotes

A. Concomitant measurements of the heart rate are important to measure to help diagnose subtypes of orthostatic hypotension (eg, the lack of a compensatory increase in heart rate is typical of autonomic failure and an exaggerated tachycardia may be reflective of volume depletion). However, the heart rate is not a component of the definition of orthostatic hypotension, which relies upon blood pressure alone.(1)(2)(3)

B. Criteria based upon clinician acquired numeric values (eg, vital signs, oxygen saturation) should be used if they are accurate reflections of the patient's condition. Transitory findings (eg, abnormal only upon initial emergency department intake or only one time out of multiple readings) that rapidly improve with no or minimal treatment usually do not reflect disease severity or risk for deterioration. This does not imply that an initial or one-time reading cannot ever be applicable. The goal is to separate erroneous or incidental findings from those that truly represent the patient's clinical picture.

## Pain and nausea absent or adequately managed

- Pain and nausea absent or adequately managed, as indicated by **1 or more** of the following(1)(2)(3)(4)(5):
  - No pain or nausea
  - Minimal discomfort on oral medications
  - Pain and nausea managed on regimen performable at next level of care

### References


1. Swarm RA, et al. Adult Cancer Pain. NCCN Clinical Practice Guidelines in Oncology [Internet] National Comprehensive Cancer Network (NCCN). v. 2.2025; 2025 May 21 Accessed at: https://www.nccn.org/. [accessed 2025 Jun 04]
2. Cohen SP. Pain. In: Goldman L, Cooney KA, editors. Goldman-Cecil Medicine. 27th ed. Elsevier; 2024:133-141.e1.
3. Peterson SJB, Weisman SJ. Pediatric pain management. In: Kliegman RM, et al., editors. Nelson Textbook of Pediatrics. 22nd ed. Elsevier; 2025:677-700.
4. Berger MJ, et al. Antiemesis. NCCN Clinical Practice Guidelines in Oncology [Internet] National Comprehensive Cancer Network (NCCN). v. 2.2025; 2025 May 12 Accessed at: https://www.nccn.org/. [accessed 2025 May 19]
5. Fourth consensus guidelines for the management of postoperative nausea and vomiting: erratum. Anesthesia and Analgesia 2020;131(5):e241. DOI: 10.1213/ANE.0000000000005245.


## Peritoneal signs

- Peritoneal signs, as indicated by **1 or more** of the following(1)(2):
  - Rebound tenderness
  - Rigid abdomen
  - Involuntary guarding

### References


1. Bush LM, Levison ME. Peritonitis and intraperitoneal abscesses. In: Bennett JE, Dolin R, Blaser MJ, editors. Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases. 9th ed. Philadelphia, PA: Elsevier; 2020:1009-1036.e5.
2. Landmann A, Bonds M, Postier R. Acute abdomen. In: Townsend CM, Beauchamp RD, Evers BM, Mattox KL, editors. Sabiston Textbook of Surgery. 21st ed. Elsevier; 2022:1134-1149.


## Renal function acceptable

- Renal function acceptable, as indicated by **1 or more** of the following(1)(2)(3):
  - Renal function normal (GFR of 90 mL/min/1.73m$^2$ (1.50 mL/sec/1.73m$^2$) or more) eGFR - Adult Calculator eGFR - Pediatric Calculator
  - Renal function that is **ALL** of the following:
    - Impaired (estimated GFR less than 90 mL/min/1.73m$^2$ (1.50 mL/sec/1.73m$^2$)) but stable or improving eGFR - Adult Calculator eGFR - Pediatric Calculator
    - Appropriate for management at next level of care
  - Renal function at baseline and appropriate for management at next level of care
  - Dialysis needed and performable at next level of care

### References


1. Kliegman RM, et al. Renal failure. In: Kliegman RM, et al., editors. Nelson Textbook of Pediatrics. 22nd ed. Elsevier; 2025:3242-3253.
2. Agarwal A, Barasch J. Acute kidney injury. In: Goldman L, Cooney KA, editors. Goldman-Cecil Medicine. 27th ed. Elsevier; 2024:770-775.e1.
3. Cohen D, Valeri AM. Treatment of irreversible renal failure. In: Goldman L, Cooney KA, editors. Goldman-Cecil Medicine. 27th ed. Elsevier; 2024:840-848.

# Social Determinants of Health Assessment

- Risk of poor health outcomes may be increased by the presence of **1 or more** of the following social determinants of health(1)(2)(3):
  - Housing insecurity, as indicated by **1 or more** of the following:
    - Individual or caregiver's current living situation is **1 or more** of the following(4):
      - Does not have own housing (eg, staying in a hotel, shelter, or with others)
      - Has own housing (eg, house, apartment), but at risk of losing it in the future (ie, behind on rent or mortgage)
      - Has own housing (eg, house, apartment), but has lived in 3 or more places in past year
    - Current housing has **1 or more** of the following:
      - Electrical appliances (eg, stove, refrigerator) not working or unavailable
      - Insufficient heating or cooling
      - Insufficient ventilation
      - Lead paint or pipes
      - Mold
      - Pests (eg, bugs) or rodents
      - Smoke detectors not working or unavailable
  - Food insecurity, as indicated by **1 or more** of the following(5):
    - In the past year, individual or caregiver ran out of food and did not have money to buy more food.
    - In the past year, individual or caregiver worried that they would run out of food before they received money to buy more food.
  - Insufficient transportation, as indicated by **1 or more** of the following(6):
    - In the past year, individual or caregiver missed medical appointments or could not get medications due to lack of transportation.
    - In the past year, individual or caregiver missed nonmedical activities, work, or could not get things needed for daily living due to lack of transportation.
  - Insufficient utilities, as indicated by **1 or more** of the following(7):
    - Utilities (eg, electricity, water, gas, or oil) are currently shut off or unavailable.
    - In the past year, electric, water, gas, or oil company threatened to shut off services.
  - Personal safety risk, as indicated by **2 or more** of the following(5):
    - Individual is sometimes or frequently physically hurt by another person (including family member).
    - Individual is sometimes or frequently insulted or talked down to by another person (including family member).
    - Individual is sometimes or frequently threatened with physical harm by another person (including family member).
    - Individual is sometimes or frequently screamed or cursed at by another person (including family member).
  - Insufficient dependent care, as indicated by **1 or more** of the following:
    - In the past year, individual or caregiver was unable to work due to lack of dependent care.
    - In the past year, individual or caregiver was unable to work more (additional) hours due to lack of dependent care.
    - In the past year, individual or caregiver missed medical appointments or could not get medications due to lack of dependent care.
    - In the past year, individual or caregiver missed nonmedical activities (eg, school, church, social activity) due to lack of dependent care.
  - Depression risk, as indicated by **ALL** of the following(8):
    - In the past 2 weeks, individual had little interest or pleasure in normal activities on at least several days.
    - In the past 2 weeks, individual felt down, depressed, or hopeless on at least several days.

## References

1. Scanlon A, Reinisch C. Social determinants of health. In: Harding MM, Kwong J, Hagler D, Reinisch C, editors. Lewis's Medical-Surgical Nursing: Assessment and Management of Clinical Problems. 12th ed. St. Louis, MO: Mosby; 2023:18-20.

2. Billioux A, Verlander K, Anthony S, Alley D. Standardized Screening for Health-Related Social Needs in Clinical Settings: the Accountable Health Communities Screening Tool. [Internet] National Academy of Sciences. 2017 May Accessed at: https://nam.edu/. [accessed 2025 Sep 12]
3. Addressing social determinants of health. In: Perez R, editor. CMSA's Integrated Case Management. 2nd ed. Springer Publishing Company LLC; 2023:62-75.
4. Sandel M, et al. Unstable housing and caregiver and child health in renter families. Pediatrics 2018;14(2):e20172199. DOI: 10.1542/peds.2017-2199.
5. Children's HealthWatch Survey. Screening Instrument [Internet] Children's HealthWatch. 2024 Feb 13 Accessed at: https://childrenshealthwatch.org/. [accessed 2025 Mar 31]
6. PRAPARE®: Protocol for Responding to and Assessing Patient Assets, Risks, and Experiences Screening Tool. 2.0 [Internet] Association of Asian Pacific Community Health Organizations (AAPCHO) and National Association of Community Health Centers (NACHC). 2025 Accessed at: https://prapare.org/the-prapare-screening-tool/. [accessed 2025 Sep 08]
7. Cook JT, et al. A brief indicator of household energy security: associations with food security, child health, and child development in US infants and toddlers. Pediatrics 2008;122(4):e867-75. DOI: 10.1542/peds.2008-0286.
8. Kroenke K, Spitzer RL, Williams JB. The Patient Health Questionnaire-2: validity of a two-item depression screener. Medical Care 2003;41(11):1284-92. DOI: 10.1097/01.MLR.0000093487.78664.3C.

## Tachycardia absent

- Tachycardia[A][B] absent, as indicated by **1 or more** of the following:
  - Heart rate less than or equal to 100 beats per minute in adult[A][B](1)
  - Heart rate less than or equal to 85 beats per minute in child 13 to 17 years of age[A][B](2)
  - Heart rate less than or equal to 95 beats per minute in child 6 to 12 years of age[A][B](2)
  - Heart rate less than or equal to 110 beats per minute in child 1 to 5 years of age[A][B](2)
  - Heart rate less than or equal to 120 beats per minute in infant 3 to 11 months of age[A][B](2)
  - Heart rate less than or equal to 150 beats per minute in infant 1 or 2 months of age[A][B](2)

### References

1. Schriger DL. Approach to the patient with abnormal vital signs. In: Goldman L, Cooney KA, editors. Goldman-Cecil Medicine. 27th ed. Elsevier; 2024:32-35.
2. Anderson CC, Kapoor S, Mark TE. Pediatric parameters and equipment. In: Anderson CC, Kapoor S, Mark TE, editors. The Harriet Lane Handbook: A Manual for Pediatric House Officers. 23rd ed. Elsevier; 2024:i-iii.

### Footnotes

A. Criteria based upon clinician acquired numeric values (eg, vital signs, oxygen saturation) should be used if they are accurate reflections of the patient's condition. Transitory findings (eg, abnormal only upon initial emergency department intake or only one time out of multiple readings) that rapidly improve with no or minimal treatment usually do not reflect disease severity or risk for deterioration. This does not imply that an initial or one-time reading cannot ever be applicable. The goal is to separate erroneous or incidental findings from those that truly represent the patient's clinical picture.

B. Interpretation of heart rate requires clinical judgment and consideration of several patient-specific factors, such as the patient's baseline heart rate, medications, and clinical impact. For example, an elderly patient on a beta-blocker medication with a baseline resting heart rate of 60 beats per minute may be clinically tachycardic at a heart rate of 94 beats per minute. Likewise, a patient who is upset, in pain, or nervous in the emergency department with a heart rate of 106 beats per minute may meet the technical definition of tachycardia, but this tachycardia (absent associated findings such as chest pain or hypotension) may not be clinically important. The numeric values included in this definition are provided to allow for consistency in terms of a technical definition of the term tachycardia. Whether a heart rate above or below the technical threshold is clinically meaningful is a matter of persistence, context, and clinical judgment.

## Temperature status acceptable

- Temperature status acceptable, as indicated by **1 or more** of the following(1)(2)(3):
  - Temperature less than 100.5 degrees F (38.1 degrees C) (oral) and greater than 96.8 degrees F (36 degrees C) (rectal)
  - Temperature as expected for disease process and appropriate for management at next level of care

### References

1. Nield LS, Kamat D. Fever. In: Kliegman RM, et al., editors. Nelson Textbook of Pediatrics. 22nd ed. Elsevier; 2025:1640-1642.
2. Melia MT. Approach to fever or suspected infection in the normal host. In: Goldman L, Cooney KA, editors. Goldman-Cecil Medicine. 27th ed. Elsevier; 2024:1845-1851.
3. Sifri CD. Approach to fever and suspected infection in the immunocompromised host. In: Goldman L, Cooney KA, editors. Goldman-Cecil Medicine. 27th ed. Elsevier; 2024:1851-1862.

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