



Medical Coverage Policy

Effective Date12/15/2024

Next Review Date12/15/2025

Coverage Policy Number..... 0288

Intestinal and Multivisceral Transplantation

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INSTRUCTIONS FOR USE

The following Coverage Policy applies to health benefit plans administered by Cigna Companies. Certain Cigna Companies and/or lines of business only provide utilization review services to clients and do not make coverage determinations. References to standard benefit plan language and coverage determinations do not apply to those clients. Coverage Policies are intended to provide guidance in interpreting certain standard benefit plans administered by Cigna Companies. Please note, the terms of a customer’s particular benefit plan document [Group Service Agreement, Evidence of Coverage, Certificate of Coverage, Summary Plan Description (SPD) or similar plan document] may differ significantly from the standard benefit plans upon which these Coverage Policies are based. For example, a customer’s benefit plan document may contain a specific exclusion related to a topic addressed in a Coverage Policy. In the event of a conflict, a customer’s benefit plan document always supersedes the information in the Coverage Policies. In the absence of a controlling federal or state coverage mandate, benefits are ultimately determined by the terms of the applicable benefit plan document. Coverage determinations in each specific instance require consideration of 1) the terms of the applicable benefit plan document in effect on the date of service; 2) any applicable laws/regulations; 3) any relevant collateral source materials including Coverage Policies and; 4) the specific facts of the particular situation. Each coverage request should be reviewed on its own merits. Medical directors are expected to exercise clinical judgment where appropriate and have discretion in making individual coverage determinations. Where coverage for care or services does not depend on specific circumstances, reimbursement will only be provided if a requested service(s) is submitted in accordance with the relevant criteria outlined in the applicable Coverage Policy, including covered diagnosis and/or procedure code(s). Reimbursement is not allowed for services when billed for conditions or diagnoses that are not covered under this Coverage Policy (see “Coding Information” below). When billing, providers must use the most appropriate codes as of the effective date of the submission. Claims submitted for services that are not accompanied by covered code(s) under the applicable Coverage Policy

will be denied as not covered. Coverage Policies relate exclusively to the administration of health benefit plans. Coverage Policies are not recommendations for treatment and should never be used as treatment guidelines. In certain markets, delegated vendor guidelines may be used to support medical necessity and other coverage determinations.

Overview

This Coverage Policy addresses primary and repeat deceased donor intestinal and multivisceral organ transplantation. Contraindications for transplantation are also addressed.

Coverage Policy

Primary and repeat deceased donor intestinal transplantation and primary and repeat deceased donor multivisceral organ transplantation are considered medically necessary in an individual with total irreversible intestinal failure for ANY of the following indications:

- failure, contraindication, or intolerance to parenteral nutrition with ANY of the following:
 - impending or overt liver failure
 - impending loss of central vein access (e.g., thrombosis)
 - recurrent, life-threatening sepsis
 - frequent episodes of dehydration
- high risk of death
- severe short bowel syndrome
- frequent hospitalizations for complications directly related to intestinal failure
- pseudo-obstruction

Deceased donor intestinal or multivisceral transplantation are considered not medically necessary when ANY of the following absolute contraindications to transplantation exist (this list may not be all-inclusive):

- malignancy that is expected to significantly limit future survival
- unsuccessfully treated major or systemic infections
- systemic illness or comorbidities that would be expected to substantially negatively impact the successful completion and/or outcome of transplant surgery
- a pattern of demonstrated patient noncompliance which would place a transplanted organ at serious risk of failure
- human immunodeficiency virus (HIV) disease unless **ALL** of the following are noted:
 - CD4 count greater than 200 cells/mm³
 - HIV-1 ribonucleic acid (RNA) undetectable
 - stable anti-retroviral therapy for more than three months
 - absence of serious complications associated with or secondary to HIV disease (e.g., opportunistic infection, including aspergillus, tuberculosis, coccidioidomycosis; resistant fungal infections; or Kaposi's sarcoma or other neoplasm)

Health Equity Considerations

Health equity is the highest level of health for all people; health inequity is the avoidable difference in health status or distribution of health resources due to the social conditions in which people are born, grow, live, work, and age.

Social determinants of health are the conditions in the environment that affect a wide range of health, functioning, and quality of life outcomes and risks. Examples include safe housing, transportation, and neighborhoods; racism, discrimination and violence; education, job opportunities and income; access to nutritious foods and physical activity opportunities; access to clean air and water; and language and literacy skills.

General Background

Intestinal (i.e., small bowel only), liver-intestinal, or multivisceral transplantation are accepted therapeutic options for highly selected adults with irreversible intestinal and/or multivisceral organ failure who have failure, contraindication, or intolerance to total parenteral nutrition (TPN). Irreversible gastrointestinal system failure is defined as the inability to maintain nutrition or adequate fluid and electrolyte balance without special support, when currently available medical and surgical treatments fail to improve intestinal adaptation and gut function. Causes may differ among children and adults (Reyes, 2020; Matarese, 2007). Although TPN is the standard of care for patients with temporary or permanent intestinal failure, it severely affects quality of life and may be associated with a number of highly morbid and sometimes fatal complications (Kesseli and Sudan, 2022; Markman, 2012). Transplantation should be considered once it has been clearly shown that the bowel cannot adapt to allow full enteral autonomy from parenteral nutrition (Braun, 2007). Additional life-threatening indications include impending or overt liver failure, loss or impending loss of central venous access (e.g., thrombosis), recurrent, systemic sepsis, frequent episodes of dehydration, high risk of death, severe short bowel syndrome, frequent hospitalization, or pseudo-obstruction (Reyes, 2020; Avitzur, 2010; American Gastroenterological Association [AGA], 2003, Kaufman, 2001).

Specific indications for intestinal and multivisceral transplantation may include the following (Reyes, 2020; Matsumoto, 2018; Bharadwaj, 2017; Carter, 2007; Lauro, 2007; Matarese, 2007; Sudan, 2007; Reyes, 2006; Dove and Brown, 2004; AGA, 2003; Abu-Elmagd, 2001):

Common Indications for Intestinal and Multivisceral Transplantation

Children	Adults
Aganglionosis (Hirschsprung’s disease)	Autoimmune enteritis
Autoimmune enteropathy	Crohn’s disease
Congenital epithelial mucosal disease (microvillus inclusion disease, tufting enteropathy)	Desmoid tumors
Crohn’s disease	Gardner’s syndrome/familial polyposis
Familial polyposis	Hollow visceral myopathy
Gastroschisis	Inflammatory bowel disease
Inflammatory pseudotumor	Ischemia
Intestinal atresia	Radiation enteritis
Intestinal failure-associated liver disease	Secretory diarrhea
Intestinal pseudo-obstruction	Short gut syndrome
Microvillus inclusion disease	Surgical adhesions
Necrotizing enterocolitis	Trauma
Pseudo-obstruction	Vascular occlusion
Radiation enteritis	Volvulus
Short gut syndrome	
Tufting enteropathy	

Trauma Volvulus	
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Intestinal and multivisceral transplantations are more challenging than other types of solid organ transplantation due to the intestine’s large number of immune competent cells and colonization of the gut with microorganisms. Intestinal allografts may be transplanted alone, as in an isolated intestine graft, or as a composite graft which may include the liver, duodenum, and pancreas. If the recipient operation includes replacement of the entire gastrointestinal graft and liver, it is generally referred to as a multivisceral transplantation (Reyes, 2020). The type and number of transplanted organs is dictated by the extent of the abdominal pathology and the functional status of the organs at the time of transplantation (Matsumoto, 2018; Bharadwaj, 2017; Matarese, 2007; Abu-Elmagd, 2006).

Isolated intestine transplantation may be indicated when there is a permanent need for total parenteral nutrition (TPN) after failure of intestinal adaptation and failed attempts of medical and surgical rehabilitation (Matarese, 2007). Combined liver-intestinal transplantation may be appropriate for individuals with combined intestinal and TPN-associated liver failure, liver failure associated with portal and mesenteric venous thrombosis, intestinal failure due to a hypercoagulable state associated with enzyme deficiencies that can be corrected by a liver graft (e.g., mesenteric vascular thrombosis secondary to protein C or S deficiency), or documented end-stage hepatic disease. In adults, such disease is associated with refractory ascites, spontaneous bacterial peritonitis, refractory variceal bleeding, chronic encephalopathy, hepatorenal syndrome, failure to thrive, or a severe compromise in the quality of life (Abu-Elmagd, 2001). In children, end-stage hepatic disease is suggested by hyperbilirubinemia persisting beyond three to four months of age, combined with features of portal hypertension, such as splenomegaly, thrombocytopenia, or prominent superficial abdominal veins.

A full multivisceral transplantation involves the en bloc transplantation of the stomach, liver, duodenum and pancreas with the intestine. In a modified procedure only one or two organs may be transplanted. It is indicated for patients with irreversible failure of their abdominal visceral organs, including the small bowel. The aims of multivisceral transplantation are to replace as many functional digestive units as possible, restore gastric emptying, ileocecal valve function, rectal continence, and improvement of surgical and oncological margins of resection (Braun, 2007). Conditions include symptomatic extensive thrombosis of the splanchnic vascular system, massive gastrointestinal polyposis or neoplasm, and generalized hollow visceral myopathy or neuropathy (Abu-Elmagd, 2001). Multivisceral transplantation may also be indicated for diffuse gastrointestinal disorders such as dysmotility syndromes, hereditary neoplasms, and extensive vascular thrombosis (Matarese, 2007).

Contraindications to Intestinal and Multivisceral Transplantation

Contraindications for intestinal and multivisceral transplantation are similar to those for other types of solid organ transplantation. Absolute contraindications include severe uncontrolled infection, multiorgan failure, nonresectable or disseminated malignancy, significant cardiopulmonary insufficiency, acquired immunodeficiency syndrome, the existence of life-threatening uncontrollable intra-abdominal or systemic infections, and noncompliance (Braun, 2007; Matarese, 2007; Abu-Elmagd, 2001; Kaufman, 2001). In addition to the absolute contraindications noted, relative contraindications which may also negatively affect survival, may include, but not be limited to (Kaufman, 2007; Abu-Elmagd, 2001):

- current, ongoing substance abuse, including tobacco, alcohol and narcotic/other addictive pain medications
- profound neurologic disabilities

- severe congenital or acquired immunological deficiencies
- multisystem autoimmune diseases
- progressive neuropathy or myopathy that is not amenable to rehabilitation
- any active medical process that is currently not optimally treated and/or stable and that is likely to result in end-organ damage or medical emergency without appropriate management, such as active peptic ulcer disease, diverticular disease, active hepatitis, cholecystitis, pancreatitis, diabetes mellitus, hypertension, autoimmune disease, or cytopenia
- advanced age
- positive crossmatch

Deceased (Cadaver) Donor Intestinal and Multivisceral Transplantation

Intestinal and multivisceral transplantations most frequently involve the use of cadaveric, or deceased, donors. Although randomized clinical trial data are not available, there are several case reports and retrospective studies demonstrating improved outcomes. Demographic characteristics of 187 candidates on the intestine only transplant waiting list on Nov 3, 2024, show that 80% were under 17 years old, 48.7% were female, with a race/ethnicity breakdown of 54.5% white, 13.9% Black, 25.7% Hispanic and 4.3% Asian. The demographic characteristics of intestine transplant recipients in 2024 reported 28.7% are <17 years old, 54.8% are female, with a race/ethnicity breakdown of 64.4% white, 11.0% Black, 21.9% Hispanic and 1.4% Asian (United States Organ Procurement and Transplantation Network and the Scientific Registry of Transplant Recipients [OPTN/SRTR], 2024). According to national data from the OPTN/SRTR, one-, three-, and five-year patient survival outcomes for individuals undergoing initial or primary deceased donor intestinal transplantation from 2008-2015 (as of Nov 3, 2024) are 82.8%, 69.0%, and 59.1%, respectively. Neither graft nor patient survival data are available for multivisceral transplantation from the OPTN.

Literature Review

Abu-Elmagd et al. (2009) reported results of a retrospective review of 453 patients who received 500 visceral transplants at a single transplant facility. Of 453 recipients, 198 (44%) received intestine, 142 (31%) received combined liver-intestine, and 113 (25%) received multivisceral grafts: 84 with liver (full) and 29 without liver (modified). Actuarial patient survival was 85% at 1-year, 61% at 5-years, 42% at 10-years, and 35% at 15-years with respective graft survival of 80%, 50%, 33%, and 29%. With a 10% retransplantation rate, second/third graft survival was 69% at 1-year and 47% at 5-years. Although limited by uncontrolled study design, long-term survival data suggest acceptable overall survival rates for primary and repeat intestinal and multivisceral transplantation.

Retransplantation

The overall effect of intestinal and multivisceral retransplantation in the United States has not been evaluated in a comprehensive manner and there are limited data in the published, peer-reviewed medical literature. Causes of graft loss may include acute cellular rejection, chronic rejection, post-transplant lymphoproliferative disorder, graft dysmotility or dysfunction, severe infection, arterial graft aneurysm, or allograft liver failure (Mazariegos, 2008). Careful patient selection, post-transplant immunosuppression, and patient management are essential for successful long-term outcomes (Mazariegos, 2008). Based on Organ Procurement Transplant Network and the Scientific Registry of Transplant Recipients (OPTN/SRTR) data for repeat intestine transplants performed between 2008-2015 Kaplan-Meier one-, three-, and five-year patient survival rates (as of Nov 3, 2024) were 70.2%, 53.9% and 49.8%, respectively. Individuals undergoing repeat intestinal or multivisceral transplantation should meet all of the eligibility criteria for primary transplantation and should not have absolute contraindications to transplantation.

Literature Review

Desai et al. (2012) performed an analysis of United Network of Organ Sharing (UNOS) registry data relative to outcomes for intestine retransplantation performed in children and adults from 1987-2009. Of 1822 isolated intestine transplants (ITx) in 1664 patients during the study period, 149 patients (adults, n=72; children, n=77) received repeat transplantation. Nine of these were third transplants, all in children. Of 41 adult isolated ITx, patient survival was 80.1%, 47.4%, and 28.5% at 1, 3, and 5 years, respectively, which is lower than outcomes seen with primary isolated ITx (p=0.005). For combined liver/ITx retransplantation in adults (L-ITx, n=31), patient survival at one-, three-, and five-years was 63.1%, 56.1%, and 46.8%, respectively, compared with primary L-ITx retransplantation (p=0.07). Isolated ITx retransplantation in children (n=28) resulted in patient survival of 80.7%, 74%, and 57.5% at one-, three-, and five-years, respectively. One-, three-, and five-year patient survival in children receiving L-ITx was 42%, 42%, and 42%, respectively. Although data suggests lower survival rates for retransplantation compared to primary transplantation, outcomes are acceptable in this population of individuals for which alternative treatment options are limited.

Professional Societies/Organizations

American Society of Transplantation (AST): On behalf of the AST, Kaufman (2001) published guidelines regarding the indications for pediatric intestinal transplantation. These include progressive parenteral nutrition-associated liver disease, recurring sepsis, impending loss of central venous access, extreme short-bowel syndrome, and congenital intractable epithelial (mucosal) disorders. The Society notes that intestinal transplantation is a lifesaving therapy for the child with intestinal failure. Transplantation should be considered when intestinal failure has been, or will probably become, refractory to conventional management, the mainstay of which remains parenteral nutrition therapy.

American Gastroenterological Association (AGA): The AGA's medical position statement: Short Bowel Syndrome and Intestinal Transplantation (2003) notes the following indications for intestinal transplantation:

- impending or overt liver failure
- thrombosis of major central venous channels
- frequent central line-related sepsis
- frequent severe dehydration

Medicare Coverage Determinations

	Contractor	Determination Name/Number	Revision Effective Date
NCD	National	Intestinal and Multi-Visceral Transplantation (260.5)	6/26/2006
LCD		No Local Determination found	

Note: Please review the current Medicare Policy for the most up-to-date information. (NCD = National Coverage Determination; LCD = Local Coverage Determination)

Coding Information

Notes:

1. This list of codes may not be all-inclusive since the American Medical Association (AMA) and Centers for Medicare & Medicaid Services (CMS) code updates may occur more frequently than policy updates.
2. Deleted codes and codes which are not effective at the time the service is rendered may not be eligible for reimbursement.

Considered Medically Necessary when used to report primary and repeat deceased donor intestinal transplantation and primary and repeat deceased donor multivisceral organ transplantation:

CPT®* Codes	Description
44132	Donor enterectomy (including cold preservation), open; from cadaver donor
44135	Intestinal allotransplantation; from cadaver donor
44137	Removal of transplanted intestinal allograft, complete
44140	Colectomy, partial; with anastomosis
44715	Backbench standard preparation of cadaver or living donor intestine allograft prior to transplantation, including mobilization and fashioning of the superior mesenteric artery and vein
44720	Backbench reconstruction of cadaver or living donor intestine allograft prior to transplantation; venous anastomosis, each
44721	Backbench reconstruction of cadaver or living donor intestine allograft prior to transplantation; arterial anastomosis, each
47133	Donor hepatectomy (including cold preservation), from cadaver donor
47135	Liver allotransplantation; orthotopic, partial or whole, from cadaver or living donor, any age
47143	Backbench standard preparation of cadaver donor whole liver graft prior to allotransplantation, including cholecystectomy, if necessary, and dissection and removal of surrounding soft tissues to prepare the vena cava, portal vein, hepatic artery, and common bile duct for implantation; without trisegment or lobe split
47144	Backbench standard preparation of cadaver donor whole liver graft prior to allotransplantation, including cholecystectomy, if necessary, and dissection and removal of surrounding soft tissues to prepare the vena cava, portal vein, hepatic artery, and common bile duct for implantation; with trisegment split of whole liver graft into 2 partial liver grafts (i.e., left lateral segment (segments II and III) and right trisegment (segments I and IV through VIII))
47145	Backbench standard preparation of cadaver donor whole liver graft prior to allotransplantation, including cholecystectomy, if necessary, and dissection and removal of surrounding soft tissues to prepare the vena cava, portal vein, hepatic artery, and common bile duct for implantation; with lobe split of whole liver graft into 2 partial liver grafts (i.e., left lobe (segments II, III, and IV) and right lobe (segments I, V through VIII))
47146	Backbench reconstruction of cadaver or living donor liver graft prior to allotransplantation; venous anastomosis, each
47147	Backbench reconstruction of cadaver or living donor liver graft prior to allotransplantation; arterial anastomosis, each
47399 [†]	Unlisted procedure, liver
48550	Donor pancreatectomy (including cold preservation), with or without duodenal segment for transplantation
48551	Backbench standard preparation of cadaver donor pancreas allograft prior to transplantation, including dissection of allograft from surrounding soft tissues, splenectomy, duodenotomy, ligation of bile duct, ligation of mesenteric vessels, and Y-graft arterial anastomoses from iliac artery to superior mesenteric artery and to splenic artery
48552	Backbench reconstruction of cadaver donor pancreas allograft prior to transplantation, venous anastomosis, each
48554	Transplantation of pancreatic allograft

CPT®* Codes	Description
48556	Removal of transplanted pancreatic allograft

†Note: Considered Medically Necessary when used to represent liver allotransplantation; heterotopic, partial or whole, from cadaver donor, any age.

HCPCS Codes	Description
S2053	Transplantation of small intestine and liver allografts
S2054	Transplantation of multivisceral organs
S2055	Harvesting of donor multivisceral organs, with preparation and maintenance of allografts; from cadaver donor
S2152	Solid organ(s), complete or segmental, single organ or combination of organs; deceased or living donor(s), procurement, transplantation, and related complications; including: drugs; supplies; hospitalization with outpatient follow-up; medical/surgical, diagnostic, emergency, and rehabilitative services, and the number of days of pre-and post-transplant care in the global definition

***Current Procedural Terminology (CPT®) ©2023 American Medical Association: Chicago, IL.**

References

1. Abu-Elmagd KM. Intestinal transplantation for short bowel syndrome and gastrointestinal failure: current consensus, rewarding outcomes, and practical guidelines. *Gastroenterology*. 2006 Feb;130(2 Suppl 1):S132-7.
2. Abu-Elmagd KM, Costa G, Bond GJ, Soltys K, Sindhi R, Wu T, et al. Five hundred intestinal and multivisceral transplantations at a single center: major advances with new challenges. *Ann Surg*. 2009 Oct;250(4):567-81.
3. Abu-Elmagd K, Reyes J, Fung JJ. Clinical intestinal transplantation: recent advances and future consideration. In: Norman DJ, Turka LA, editors. *Primer on transplantation*. 2nd ed. Mt. Laurel, NJ: American Society of Transplantation; 2001. p. 610-25.
4. American Gastroenterological Association. American Gastroenterological Association medical position statement: short bowel syndrome and intestinal transplantation. *Gastroenterology*. 2003 Apr;124(4):1105-10.
5. Avitur Y, Grant D. Intestine transplantation in children: Update 2010. *Pediatr Clin North Am*. 2010 Apr;57(2):415-31.
6. Bharadwaj S, Tandon P, Gohel TD, Brown J, Steiger E, Kirby DF, et al. Current status of intestinal and multivisceral transplantation. *Gastroenterol Rep (Oxf)*. 2017 Jan 26. pii: gow045.
7. Braun F, Broering D, Faendrich F. Small intestine transplantation today. *Langenbecks Arch Surg*. 2007 May;392(3):227-38. Epub 2007 Jan 25.

8. Buchman A. Short bowel syndrome. In: Feldman M, Friedman LS, Brandt LJ, editors. *Sleisenger & Fordtran's Gastrointestinal and Liver Disease*, 10th ed. Philadelphia, PA: Saunders; 2016.
9. Carter BA, Karpen SJ. Intestinal failure-associated liver disease: management and treatment strategies past, present, and future. *Semin Liver Dis*. 2007 Aug;27(3):251-8.
10. Castillo RO, Zarge R, Cox K, Strichartz D, Berquist W, Bonham CA, et al. Pediatric intestinal transplantation at Packard Children's Hospital/Stanford University Medical Center: report of a four-year experience. *Transplant Proc*. 2006 Jul-Aug;38(6):1716-7.
11. Centers for Medicare and Medicaid Services (CMS). Local Coverage Determinations (LCDs) alphabetical index. Accessed Nov 4, 2024. Available at URL address: <https://www.cms.gov/medicare-coverage-database/search.aspx>
12. Centers for Medicare and Medicaid Services (CMS). National Coverage Determinations (NCDs) alphabetical index. Accessed Nov 4, 2024. Available at URL address: <https://www.cms.gov/medicare-coverage-database/search.aspx>
13. Chatzipetrou MA, Tzakus AG, Pinna AD, Kato T, Misiakos EP, Tsaroucha AK, et al. Intestinal transplantation for the treatment of desmoid tumors associated with familial adenomatous polyposis. *Surgery*. 2001 Mar;129(3):277-81.
14. Desai CS, Grussner AC, Khan KM, Fishbein TM, Jie T, Rodriguez Rilo HL, Grussner RW. Isolated intestinal transplants vs liver-intestinal transplants in adult patients in the United States: 22 yr of OPTN data. *Clin Transplant*. 2012 Jul-Aug;26(4):622-8.
15. Desai CS, Khan KM, Grussner AC, Fishbein TM, Grussner RW. Intestinal retransplantation: analysis of Organ Procurement and Transplantation database. *Transplantation*. 2012 Jan 15;93(1):120-5.
16. Di Benedetto F, De Ruvo N, Berretta M, Masetti M, Montalti R, Di Sandro S, et al. Hepatocellular carcinoma in HIV patients treated by liver transplantation. *Eur J Surg Oncol*. 2007 Jun 22; [Epub ahead of print]
17. Dove L, Brown R. The emerging role of gastrointestinal organ transplantation. *Clinics in Family Practice*. 2004 Sep;6(3):775-91.
18. Fishbein TM. Intestinal transplantation. *N Engl J Med*. 2009 Sep 3;361(10):998-1008.
19. Fryer JP. *Curr Opin Organ Transplant*. The current status of intestinal transplantation. 2008 Jun;13(3):266-72.
20. Grant D, Abu-Elmagd K, Reyes J, Tzakis A, Lagnas A, Fishbein T, et al. 2003 report of the intestine transplant registry: a new era has dawned. *Ann Surg*. 2005 Apr;241(4):607-13.
21. Hauser GJ, Kaufman SS, Matsumoto CS, Fishbein TM. Pediatric intestinal and multivisceral transplantation: a new challenge for the pediatric intensivist. *Intensive Care Med*. 2008 Sep;34(9):1570-9.
22. Health Resources and Services Administration, HHS. Organ procurement and transplantation network. Final rule. *Fed Regist*. 2007 Mar 9;72(46):10616-9.

23. Horslen SP, Smith JM, Ahn Y, Skeans MA, Cafarella M, Noreen SM, Snyder JJ, Israni AK. OPTN/SRTR 2019 Annual Data Report: Intestine. *Am J Transplant*. 2021 Feb;21 Suppl 2:316-355. doi: 10.1111/ajt.16498. PMID: 33595193.
24. Ishii T, Wada K, Nishi T, Sato S, Amae S, Yoshida M, et al. Two Cases of Living-Related Intestinal Transplantation. *Transplant Proc*. 2006 Jul-Aug;38(6): 1687-8.
25. Jeejeebhoy KN. Treatment of intestinal failure: transplantation or home parenteral nutrition? *Gastroenterology*. 2008 Jul;135(1):303-5. Epub 2008 Jun 17.
26. Kato T, Tzakis AG, Selvaggi G, Gaynor JJ, David AI, Busotti A, et al. Intestinal and multivisceral transplantation in children. *Ann Surg*. 2006 Jun;243(6):756-64; discussion 764-6.
27. Kaufman SS, Atkinson JB, Bianchi A, Goulet OJ, Grant D, Langnas AN, et al. Indications for pediatric intestinal transplantation: a position paper of the American Society of Transplantation. *Pediatr Transplant*. 2001;5:80-7.
28. Kesseli SJ and Sudan DL. Small Bowel Transplantation. In: Townsend CM, Beauchamp RD, Evers BM, Mattox KL. ed. *Sabiston Textbook of Surgery*, 21st ed. St. Louis, MO: Elsevier; 2022, Chapter 28, 644-654.
29. Khan FA, Selvaggi G. Overview of intestinal and multivisceral transplantation. In: *Up-To-Date*, Brown RS, ed. Jul 3, 2024. UpToDate, Waltham, MA. Accessed Nov 4, 2024.
30. Lacaille F, Vass N, Sauvat F, Canioni D, Colomb V, Talbotec C, et al. Long-term outcome, growth and digestive function in children 2 to 18 years after intestinal transplantation. *Gut*. 2008 Apr;57(4):455-61.
31. Lao OB, Healy PJ, Perkins JD, Horslen S, Reyes JD, Goldi AB. Outcomes in children after intestinal transplant. *Pediatrics*. 2010 Mar;125(3):e550-8. Epub 2010 Feb 8.
32. Lauro A, Dazzi A, Ercolani G, Cescon M, D'Errico A, Di Simone M, et al. Results of intestinal and multivisceral transplantation in adult patients: Italian experience. *Transplant Proc*. 2006 Jul-Aug;38(6):1696-8
33. Lauro A, Zanfi C, Ercolani G, Dazzi A, Golfieri L, Amaduzzi A, et al. Italian experience in adult clinical intestinal and multivisceral transplantation: 6 years later. *Transplant Proc*. 2007(a) Jul-Aug;39(6):1987-91.
34. Lauro A, Zanfi C, Ercolani G, Dazzi A, Golfieri L, Amaduzzi A, et al. Twenty-five consecutive isolated intestinal transplants in adult patients: a five-year clinical experience. *Clin Transplant*. 2007(b) Mar-Apr;21(2):177-85.
35. Lopushinsky SR, Fowler RA, Kulkarni GS, Fecteau AH, Grant DR, Wales PW. The optimal timing of intestinal transplantation for children with intestinal failure: a Markov analysis. *Ann Surg*. 2007 Dec;246(6):1092-9.
36. Markman AE, Sudan DL. Small bowel transplantation. In: Townsend CM, Beauchamp RD, Evers BM, Mattox KL. ed. *Sabiston textbook of surgery: the biological basis of surgical practice*. 19th ed. Philadelphia, PA: Saunders;2012

37. Matarese LE, Costa G, Bond G, Stamos J, Koritsky D, O'Keefe SJ, Abu-Elmagd K. Therapeutic efficacy of intestinal and multivisceral transplantation: survival and nutrition outcome. *Nutr Clin Pract*. 2007 Oct;22(5):474-81. doi: 10.1177/0115426507022005474. PMID: 17906271.
38. Matsumoto CS, Subramanian S, Fishbein TM. Adult Intestinal Transplantation. *Gastroenterol Clin North Am*. 2018 June; 47(2): 341–354. doi:10.1016/j.gtc.2018.01.011.
39. Mazariegos GV, Soltys K, Bond G, Girnita A, Machaidze Z, Jaffe R, et al. Pediatric intestinal retransplantation: techniques, management, and outcomes. *Transplantation*. 2008 Dec 27;86(12):1777-82.
40. Mittal NK, Tzakis AG, Kato T, Thompson JF. Current status of small bowel transplantation in children: update 2003. *Pediatr Clin North Am*. 2003;50:1419-33.
41. Nathan JD, Rudolph JA, Kocoshis SA, Alonso MH, Ryckman FC, Tiao GM. Isolated liver and multivisceral transplantation for total parenteral nutrition-related end-stage liver disease. *J Pediatr Surg*. 2007 Jan; 42(1):143-7.
42. Nightingale J, Woodward JM on behalf of the Small Bowel and Nutrition Committee of the British Society of Gastroenterology. Guidelines for management of patients with a short bowel. *Gut*. 2006 Aug; 55 Suppl 4:iv1-12.
43. Nucci A, Cartland Burns R, Armah T, Lowery K, Yaworski JA, Strohm M, et al. Interdisciplinary management of pediatric intestinal failure: A 10-year review of rehabilitation and transplantation. *J Gastrointest Surg*. 2008 Mar;12(3):429-35. Epub 2007 Dec 18.
44. O'Keefe SJ. Candidacy for intestinal transplantation. *Am J Gastroenterol*. 2006 Jul;101(7):1644-6.
45. Olausson M, Friman S, Herlenius G, Cahlin C, Nilsson O, Jansson S, et al. Orthotopic liver or multivisceral transplantation as treatment of metastatic neuroendocrine tumors. *Liver Transpl*. 2007 Mar;13(3):327-33.
46. Pironi L, Joly F, Forbes A, Colomb V, Lyszkowska M, Baxter J, et al. Long-term follow-up of patients on home parenteral nutrition in Europe: implications for intestinal transplantation. *Gut*. 2011 Jan;60(1):17-25.
47. Pironi L, Forbes A, Joly F, Colomb V, Lyszkowska M, Vam Gossum A, et al. Survival of patients identified as candidates for intestinal transplantation: a 3-year prospective follow-up. *Gastroenterology*. 2008 Jul;138(1):61-71. Epub 2008 Mar 26.
48. Quintini C, Di Benedetto F, Diago T, Lauro A, Cautero N, De Ruvo N, et al. Intestinal autotransplantation for adenocarcinoma of pancreas involving the mesenteric root: our experience and literature review. *Pancreas*. 2007 Mar;34(2):266-8.
49. Revillon Y, Chardot C. Indications and strategies for intestinal transplantation. *J Pediatr Surg*. 2011 Feb;46(2):280-3.
50. Reyes JD. Intestinal transplantation. *Semin Pediatr Surg*. 2006 Aug;15:288-34.

51. Reyes JD, Dick AAAS. Nelson textbook of pediatrics. 21st ed. Philadelphia, PA: Elsevier; 2020. Chapter 365, Intestinal transplantation in children with intestinal failure, p. 2009-2012.e1
52. Sauvat F, Dupic L, Caldari D, Lesage F, Cezard JP, Lacaille F, et al. Factors influencing outcome after intestinal transplantation in children. *Transplant Proc.* 2006 Jul-Aug;38(6):1689-91.
53. Selvaggi G, Tzakis A. Pediatric intestinal transplantation: literature review 2006-2007. *Pediatr Transplant.* 2008 Dec;12(8):827-34.Epub 2008 Jul 30.
54. Smith JM, Skeans SA, Horslen SP, Edwards EB, Harper AM, Snyder JJ, et al. OPTN/SRTR 2012 Annual Data Report: Intestine. *Am J Transplant.* 2014 Jan;14 Suppl 1:97-111
55. Staun M, Hebuterne X, Shaffer J, Haderslev KV, Bozzetti F, Pertkiewicz M, et al. Management of intestinal failure in Europe. A questionnaire based study on the incidence and management. *Dyn Med.* 2007 Jul 4;6:7.
56. Steinman TI, Becker BN, Frost AE, Olthof KM, Smart FW, Suki WN, et al.; Clinical Practice Committee, American Society of Transplantation. Guidelines for the referral and management of patients eligible for solid organ transplantation. *Transplantation.* 2001 May 15;71(9):1189-204.
57. Sudan DL. Long-term outcomes and quality of life after intestine transplantation. *Curr Opin Organ Transplant.* 2010;15(3):357-60.
58. Sudan DL. Treatment of intestinal failure: intestinal transplantation. *Nat Clin Pract Gastroenterol Hepatol.* 2007 Sep;4(9):503-10.
59. Tzakis AG, Kato T, Levi DM, Defaria W, Selvaggi G, Weppler D, et al. 100 multivisceral transplants at a single center. *Ann Surg.* 2005 Oct;242(4):480-90; discussion 491-3.
60. Tzvetanov I, Oberholzer J, Benedetti E. Current status of living donor small bowel transplantation. *Curr Opin Organ Transplant.* 2010 Jun;15(3):346-8.
61. Uchida Y, Kasahara M, Egawa H, Takada Y, Ogawa K, Ogura Y, et al. Long-term outcome of adult-to-adult living donor liver transplantation for post-Kasai biliary atresia. *Am J Transplant.* 2006 Oct;6(10):2443-8. Epub 2006 Aug 1.
62. United States Organ Procurement and Transplantation Network and the Scientific Registry of Transplant Recipients. OPTN/SRTR national data: intestine transplantation. 2008-2015. Updated as of Nov 3, 2024. Accessed Nov 4, 2024. Available at URL address: <https://optn.transplant.hrsa.gov/data/view-data-reports/national-data/>
63. United States Organ Procurement and Transplantation Network: policies. 10/31/2024. Accessed Nov 4, 2024. Available at URL address: <https://optn.transplant.hrsa.gov/governance/policies/>
64. Wada M, Kato T, Hayashi Y, Selvaggi G, Mittal M, Thompson J, et al. Intestinal transplantation for short bowel syndrome secondary to gastroschisis. *J Pediatr Surg.* 2006 Nov;41(11):1841-5

Revision Details

Type of Revision	Summary of Changes	Date
Annual review	<ul style="list-style-type: none">No policy statement changes	12/15/2024
Annual review	<ul style="list-style-type: none">No policy statement changes	12/15/2023

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