



CIGNA MEDICAL COVERAGE POLICY

The following Coverage Policy applies to all health benefit plans administered by CIGNA Companies including plans formerly administered by Great-West Healthcare, which is now a part of CIGNA.

Subject Intestinal and Multivisceral Transplantation

Effective Date2/15/2011
Next Review Date.....2/15/2012
Coverage Policy Number0288

Table of Contents

Coverage Policy	1
General Background	2
Coding/Billing Information	5
References	6
Policy History.....	11

Hyperlink to Related Coverage Policies

- Intestinal Rehabilitation Programs
- Liver Transplantation
- Nutritional Support

INSTRUCTIONS FOR USE

Coverage Policies are intended to provide guidance in interpreting certain **standard** CIGNA HealthCare benefit plans. Please note, the terms of a customer's particular benefit plan document [Group Service Agreement (GSA), 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 supercedes** 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. 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. Proprietary information of CIGNA. Copyright ©2011 CIGNA

Coverage Policy

CIGNA covers deceased donor isolated intestinal transplantation for total irreversible intestinal failure as medically necessary when the individual can no longer be safely maintained on total parenteral nutrition (TPN).

CIGNA covers deceased donor combined liver-intestinal transplantation as medically necessary for EITHER of the following indications:

- intestinal failure with end-stage hepatic disease
- intestinal failure from a hypercoagulable state associated with enzyme deficiencies that can be corrected by a liver graft

CIGNA covers deceased donor multivisceral organ transplantation involving the en bloc transplantation of the stomach, liver, duodenum and pancreas as medically necessary when there is irreversible failure of abdominal visceral organs, including the small bowel.

CIGNA does not cover deceased donor intestinal or multivisceral transplantation when ANY of the following absolute contraindications to transplantation exist because it is considered not medically necessary (this list may not be all-inclusive):

- malignancy that is expected to significantly limit future survival
- persistent, recurrent or 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)

CIGNA does not cover living donor isolated intestinal or multivisceral transplantation because it is considered experimental, investigational or unproven.

General Background

Isolated intestinal (i.e., small bowel only), liver-intestinal, or multivisceral transplantation are accepted therapeutic options for highly selected individuals with irreversible intestinal and/or multivisceral organ failure who can no longer be maintained on total parenteral nutrition (TPN). Gastrointestinal system failure is defined as the inability to maintain nutrition or adequate fluid and electrolyte balance without special support, due to impairment of the primary enteric digestive, absorptive, neuroendocrine and/or motor function. It is considered irreversible when currently available medical and surgical treatments fail to enhance the three different phases of intestinal adaptation and gut functions. Causes may differ among children and adults (Matarese, 2006). 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 and has a treatment-related mortality of 7–28% (Markmann, 2007; Abu-Elmagd, 2001).

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. 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 (Abu-Elmagd, 2006; Matarese, 2006). Isolated intestine transplantation may be indicated when there is a permanent need for TPN after failure of intestinal adaptation, and attempts of medical and surgical rehabilitation (Matarese, 2006). 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).

Combined liver-intestinal transplantation is indicated 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 (Hwang, 2002).

Multivisceral transplantation, with or without the liver, is indicated for diffuse gastrointestinal disorders such as dysmotility syndromes, hereditary neoplasms, and extensive vascular thrombosis (Matarese, 2006). 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). A full multivisceral transplantation involves the en bloc transplantation of the stomach, liver, duodenum and pancreas with the intestine. It is indicated for patients with irreversible failure of their abdominal visceral organs, including the small bowel. Conditions that cause this include symptomatic extensive

thrombosis of the splanchnic vascular system, massive gastrointestinal polyposis or neoplasm, and generalized hollow visceral myopathy or neuropathy (Abu-Elmagd, 2001).

Specific indications for intestinal and multivisceral transplantation may include the following (Lauro, 2007; Reye, 2007; Carter, 2006; Matarese, 2006; Dove and Brown, 2004; Abu-Elmagd, 2001):

Indications for Intestinal and/or Multivisceral Transplantation

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

Intestinal and multivisceral transplantations most frequently involve the use of cadaveric, or deceased, donors. Although randomized clinical trials and comparison studies are not available, there are several case reports and retrospective studies demonstrating improved outcomes. According to the 2009 annual report of the Organ Procurement Transplant Network (OPTN)/Scientific Registry of Transplant Recipients (SRTR), one-year patient survival rates with the use of deceased donors are 89% for intestine-only recipients and 72% for liver-intestine recipients, respectively. Ten-year patient survival rates are 46% for intestine-only recipients, and 42% for liver-intestine recipients, respectively.

The use of living intestine donors remains controversial (Benedetti, 2006). Potential advantages to the use of living donors may be the application of desensitization protocols to improve outcomes, reduced waiting times, better human leukocyte antigen matching, and the setting of an elective procedure. Major limitations of this technique include risks to the donor and the potential inferior physiologic performance of the segmental graft compared to a full postmortal graft (Braun, 2007). Questions remain regarding donor risks, including long-term complications of bowel resection and potential impairment of intestinal absorption. Other issues include optimum drainage system, choice of segment of the intestine for transplantation and timing and closure of the ostomy (Ontario Medical Advisory Secretariat, 2003).

Gangemi et al. (2009) retrospectively reported the results of 10 children who received a total of 13 living donor intestinal transplantation (DLITx, n=8) or combined living donor intestinal and liver transplantation (CLDLITx, n=5). One- and three-year patient and graft survival rates for DLITx were 60% and 50%, respectively. For recipients of CLDLITx, one- and two-year patient survival were 100%, liver graft survival was 100%, and bowel graft survival was 80%.

Data are limited in the published peer-reviewed scientific literature regarding living donor intestinal or multivisceral transplantation. Published results of case reports and retrospective reviews are limited by small participant numbers, study methods, and a lack of long-term donor and recipient outcomes. Longer follow-up is needed to better assess the safety and effectiveness of this procedure. Although results appear promising, the role of living donor intestinal or multivisceral transplantation has not been established.

Retransplantation

The overall effect of intestinal or multivisceral retransplantation in the United States has not been evaluated in a comprehensive manner and there are scarce 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). Based on Organ Procurement Transplant Network (OPTN) patient survival data for repeat intestinal transplants performed between 1997 and 2004, one-, three-, and five-year Kaplan-Meier survival rates were 64.1%, 39.8%, and 47.7%, respectively. Careful patient selection, post transplant immunosuppression, and patient management are essential for successful long-term outcomes (Mazariegos, 2008). Individuals undergoing repeat intestinal transplantation should meet all of the eligibility criteria for primary transplantation and should not have absolute contraindications to transplantation.

Contraindications

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, nonsectable or disseminated malignancy, significant cardiopulmonary insufficiency, acquired immunodeficiency syndrome, the existence of life-threatening uncontrollable intra-abdominal or systemic infections, and noncompliance (Abu-Elmagd, 2001; Kaufman, 2001; Matarese, 2006; Braun, 2007). In addition to the absolute contraindications noted, relative contraindications which may also negatively affect survival, may include, but not be limited to (Abu-Elmagd, 2001; Kaufman, 2007):

- 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 cross-match

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

Summary

The published, peer-reviewed scientific literature supports deceased donor intestinal and multivisceral transplantation as an accepted treatment option for highly selected individuals with irreversible intestinal and/or multivisceral organ failure, and for those who can no longer be maintained on total parenteral nutrition (TPN). The role of living donors for intestinal or multivisceral transplantation has not been established.

Coding/Billing Information

Note: This list of codes may not be all-inclusive.

Covered when medically necessary:

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
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 [†]	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
47136 [†]	Liver allotransplantation; heterotopic, 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 two 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 two partial liver grafts (i.e., left lobe (segments II, III, and IV) and right lobe (segments I, V-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
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

HCPCS	Description
-------	-------------

Codes	
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

†Note: Experimental, investigational, unproven and not covered when used to report living donor isolated intestinal or multivisceral transplantation.

ICD-9-CM Diagnosis Codes	Description
211.3	Benign neoplasm of other parts of digestive system; colon
289.81	Primary hypercoagulable state
555.0	Regional enteritis; Small intestine
555.1	Regional enteritis; Large intestine
557.0	Acute vascular insufficiency of intestine
557.1	Chronic vascular insufficiency of intestine
558.1	Gastroenteritis and colitis due to radiation
560.2	Volvulus
560.81	Intestinal or peritoneal adhesions with obstruction (postoperative) (postinfection)
564.1	Irritable bowel syndrome
572.8	Other sequelae of chronic liver disease
751.1	Atresia and stenosis of small intestine
751.3	Hirschsprung's disease and other congenital functional disorders of colon
751.5	Other anomalies of intestine
756.73	Gastroschisis
777.50-777.53	Necrotizing enterocolitis in newborn

Experimental/Investigational/Unproven/Not Covered:

CPT* Codes	Description
44133	Donor enterectomy (including cold preservation), open; partial, from living donor
44136	Intestinal allotransplantation; from living donor

ICD-9-CM Diagnosis Codes	Description
V59.8 [†]	Donor of other specified organ or tissue

†Note: Experimental, investigational, unproven and not covered when used to report living donor isolated intestinal or multivisceral transplantation.

***Current Procedural Terminology (CPT®) © 2010 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 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.
3. American Gastroenterological Association. American Gastroenterological Association medical position statement: short bowel syndrome and intestinal transplantation. *Gastroenterology*. 2003 Apr;124(4):1105-10.
4. Benedetti E, Holterman M, Asolati M, Di Domenico S, Oberholtzer J, Sankary H, et al. Living related segmental bowel transplantation: from experimental to standardized procedure. *Ann Surg*. 2006 Nov;244(5):694-9.
5. Buchman A. Short bowel syndrome. In: Feldman M, Friedman LS, Brandt LJ, editors. *Sleisenger & Fordtran's Gastrointestinal and Liver Disease*, 9th ed. Philadelphia, PA: Saunders; 2010.
6. Braun F, Broering D, Faendrich F. Small intestine transplantation today. *Langenbecks Arch Surg*. 2007 May;392(3):227-38. Epub 2007 Jan 25.
7. Foxx-Orenstein, A. Ileus and pseudo-obstruction. In: Feldman M, Friedman LS, Brandt LJ, editors. *Sleisenger & Fordtran's Gastrointestinal Liver Disease*, 9th ed. Philadelphia, PA: Saunders; 2010.
8. 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.
9. 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.
10. Centers for Medicare & Medicaid Services. NCD for intestinal and multi-visceral transplantation. Updated 2006 May 11. Accessed Dec 14, 2010. Available at URL address: http://www.cms.hhs.gov/mcd/viewncd.asp?ncd_id=260.5&ncd_version=2&basket=ncd%3A260%2E5%3A2%3AIntestinal+and+Multi%2DVisceral+Transplantation
11. 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.
12. 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]
13. Dove L, Brown R. The emerging role of gastrointestinal organ transplantation. *Clinics in Family Practice*. 2004 Sep;6(3):775-91.
14. ECRI Institute. Hotline Response [database online]. Plymouth Meeting (PA): ECRI Institute; 2009 Jan 12. Intestine and Intestine-Liver Transplantation. 2009 Jan 12. Available at URL address: <http://www.ecri.org>.
15. ECRI Institute. Hotline Response [database online]. Plymouth Meeting (PA): ECRI Institute; 2008 Oct 21. Intestine and Intestine-Liver Transplantation. 2009 Jan 12. Available at URL address: <http://www.ecri.org>

16. ECRI Institute. Intestine and Intestine-Liver Transplantation: Update. Plymouth meeting (PA): ECRI Institute Health Technology Assessment Information Service; 2000 Apr. 37 p. (Evidence Report; no. 32). Available at URL address: <http://www.ecri.org>.
17. Fishbein TM. Intestinal transplantation. *N Engl J Med*. 2009 Sep 3;361(10):998-1008.
18. Fyer JP. *Curr Opin Organ Transplant*. The current status of intestinal transplantation. 2008 Jun;13(3):266-72.
19. Gangemi A, Benedetti E. Living donor small bowel transplantation: literature review 2003-2006. *Pediatr Transplant*. 2006 Dec;10(8):875-8.
20. Gangemi A, Tzvetanov IG, Beatty E, Oberholzer J, Testa G, Sankary HN, et al. Lessons learned I pediatric small bowel and liver transplantation from living-related donors. *Transplantation*. 2009 Apr 15;87(7):1027-30.
21. 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.
22. 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.
23. Health Resources and Services Administration, HHS. Organ procurement and transplantation network. Final rule. *Fed Regist*. 2007 Mar 9;72(46):10616-9.
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. 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.
29. 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.
30. 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
31. 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.
32. 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-yr clinical experience. *Clin Transplant*. 2007(b) Mar-Apr;21(2):177-85.

33. 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.
34. Markmann JF, Yeh H, Naji A, Olthoff KM, Shaked A, Barker CF. Transplantation of abdominal organs. In: Townsend CM, Beauchamp RD, Evers BM, Mattox KL. Editors. *Sabiston textbook of surgery: the biological basis of surgical practice.* 18th ed. Philadelphia, PA: Saunders;2007
35. Matarese LE, Costa G, Bond G, Stamos J, Koritsky D, O'Keefe SJ, et al. Therapeutic efficacy of intestinal and multivisceral transplantation: survival and nutrition outcome. *Nutr Clin Pract.* 2007 Oct;22(5):474-81.
36. 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.
37. 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.
38. 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.
39. 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.
40. O'Keefe SJ. Candidacy for intestinal transplantation. *Am J Gastroenterol.* 2006 Jul;101(7):1644-6.
41. 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.
42. Ontario Medical Advisory Secretariat. Ministry of Health and Long-Term Care. Small bowel transplant: an evidence-based analysis. 2003. Accessed January 2011. Available at URL address: http://www.health.gov.on.ca/english/providers/program/mas/tech/reviews/pdf/rev_sbtrans_020103.pdf
43. 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.
44. Pomfret EA, Fryer JP, Sima CS, Lake JR, Merion, RM. Liver and intestine transplantation in the United States, 1996-2005. *Am J Transplant.* 2007;7(5 Pt 2):1376-89.
45. 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.
46. Reye JD. Intestinal transplantation. *Semin Pediatr Surg.* 2006 Aug;15:288-34.
47. Reye JD. Intestinal transplantation in children. In: Behrman RE, Kliegman RM, Jenson HB, editors. *Nelson textbook of pediatrics.* 18th ed. Philadelphia, PA: Saunders; 2007.
48. 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.
49. 2009 Annual Report of the U.S. Organ Procurement and Transplantation Network and the Scientific Registry of Transplant Recipients: Transplant Data 1998-2007. Health Resources and Services

Administration, Healthcare Systems Bureau, Division of Transplantation, Rockville, MD. Accessed Jan 5, 2010. Available at URL address: http://www.ustransplant.org/annual_reports/current/1013_in.htm

50. Selvaggi G, Tzakis A. Pediatric intestinal transplantation: literature review 2006-2007. *Pediatr Transplant*. 2008 Dec;12(8):827-34. Epub 2008 Jul 30.
51. 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.
52. 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.
53. Sudan DL. Treatment of intestinal failure: intestinal transplantation. *Nat Clin Pract Gastroenterol Hepatol*. 2007 Sep;4(9):503-10.
54. Troppmann C, Gruessner RWG. Intestinal transplantation. In: Holzheimer RG, Mannick JA, editors. *Surgical treatment: evidence-based and problem oriented*. Munich, Germany: W. Zuckschwerdt Verlag; 2001. Accessed Dec 14, 2010. Available at URL address: <http://www.ncbi.nlm.nih.gov/books/bv.fcgi?rid=surg>
55. 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.
56. Tzvetanov I, Oberholzer J, Benedetti E. Current status of living donor small bowel transplantation. *Curr Opin Organ Transplant*. 2010 Jun;15(3):346-8.
57. 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.
58. United States Organ Procurement and Transplantation Network and the Scientific Registry of Transplant Recipients. 2009 OPTN/SRTR annual report: liver and intestine transplantation in the United States, 1998-2008. Chapter IV. Accessed Dec 14, 2010. Available at URL address: http://optn.transplant.hrsa.gov/ar2009/Chapter_V_AR_CD.htm?cp=6
59. United States Organ Procurement and Transplantation Network and the Scientific Registry of Transplant Recipients. OPTN/SRTR national data: intestine transplantation. Updated 2010 Dec 10. Accessed Dec 14, 2010. Available at URL address: <http://optn.transplant.hrsa.gov/latestData/rptStrat.asp>
60. 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

Policy History

Pre-Merger Organizations	Last Review Date	Policy Number	Title
CIGNA HealthCare	2/15/2008	0288	Multivisceral and Intestinal Transplant: Adult and Pediatric

“CIGNA”, “CIGNA HealthCare” and the “Tree of Life” logo are registered service marks of CIGNA Intellectual Property, Inc., licensed for use by CIGNA Corporation and its operating subsidiaries. All products and services are provided by such operating subsidiaries and not by CIGNA Corporation. Such operating subsidiaries include Connecticut General Life Insurance Company, CIGNA Health and Life Insurance Company, CIGNA Behavioral Health, Inc., CIGNA Health Management, Inc., and HMO or service company subsidiaries of CIGNA Health Corporation and CIGNA Dental Health, Inc. In Arizona, HMO plans are offered by CIGNA HealthCare of Arizona, Inc. In California, HMO plans are offered by CIGNA HealthCare of California, Inc. In Connecticut, HMO plans are offered by CIGNA HealthCare of Connecticut, Inc. In North Carolina, HMO plans are offered by CIGNA HealthCare of North Carolina, Inc. In Virginia, HMO plans are offered by CIGNA HealthCare Mid-Atlantic, Inc. All other medical plans in these states are insured or administered by Connecticut General Life Insurance Company or CIGNA Health and Life Insurance Company.