Small Bowel, Liver and Multivisceral Transplant

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Policy

Blue Cross and Blue Shield of Kansas City (Blue KC) will provide coverage for Small Bowel/Liver and Multivisceral Transplant when it is determined to be medically necessary because the criteria shown below are met.

When Policy Topic is covered

A small bowel/liver transplant or multivisceral transplant may be considered **medically necessary** for pediatric and adult patients with intestinal failure (characterized by loss of absorption and the inability to maintain protein-energy, fluid, electrolyte, or micronutrient balance) who have been managed with long-term total parenteral nutrition (TPN) and who have developed evidence of impending end-stage liver failure.

A small bowel/liver retransplant or multivisceral retransplant may be considered **medically necessary** after a failed primary small bowel/liver transplant or multivisceral transplant.

When Policy Topic is not covered

A small/bowel/liver transplant or multivisceral transplant is considered **investigational** in all other situations.

Considerations

General

Potential contraindications to solid organ transplant (subject to the judgment of the transplant center):

1. Known current malignancy, including metastatic cancer
2. Recent malignancy with high risk of recurrence
3. History of cancer with a moderate risk of recurrence
4. Systemic disease that could be exacerbated by immunosuppression
5. Untreated systemic infection making immunosuppression unsafe, including chronic infection
6. Other irreversible end-stage disease not attributed to intestinal failure

7. Psychosocial conditions or chemical dependency affecting ability to adhere to therapy

Intestinal failure results from surgical resection, congenital defect, or disease-associated loss of absorption and is characterized by the inability to maintain protein-energy, fluid, electrolyte, or micronutrient balance. Short bowel syndrome is one case of intestinal failure.

Candidates should meet the following criteria:
- Adequate cardiopulmonary status
- Documentation of patient compliance with medical management.

HIV [human immunodeficiency virus]-positive patients who meet the following criteria, as stated in the 2001 guidelines of the American Society of Transplantation, could be considered candidates for small bowel/liver or multivisceral transplantation:
- CD4 count greater than 200 cells per cubic millimeter for greater than 6 months
- HIV-1 RNA undetectable
- On stable anti-retroviral therapy >3 months
- No other complications from AIDS [acquired immune deficiency syndrome] (e.g., opportunistic infection, including aspergillus, tuberculosis, coccidiosis mycosis, resistant fungal infections, Kaposi's sarcoma, or other neoplasm), and meeting all other criteria for transplantation.

Small Bowel/Liver Specific
Evidence of intolerance of total parenteral nutrition (TPN) includes, but is not limited to, multiple and prolonged hospitalizations to treat TPN-related complications, or the development of progressive but reversible liver failure. In the setting of progressive liver failure, small bowel transplant may be considered a technique to avoid end-stage liver failure related to chronic TPN, thus avoiding the necessity of a multivisceral transplant.

Transplant Benefit
Small bowel/liver or multivisceral transplants should be considered for coverage under the transplant benefit.

What is covered under the scope of the human organ transplant (HOT) benefit needs to be considered. Typically, the following are covered under the HOT benefit:

- hospitalization of the recipient for medically recognized transplants from a donor to a transplant recipient;
- prehospital workup and hospitalization of a living donor undergoing a partial hepatectomy should be considered as part of the recipient transplant costs;
- evaluation tests requiring hospitalization to determine the suitability of both potential and actual donors, when such tests cannot be safely and effectively performed on an outpatient basis;
- hospital room, board, and general nursing in semiprivate rooms;

- special care units, such as coronary and intensive care;
- hospital ancillary services;
- physicians' services for surgery, technical assistance, administration of anesthetics, and medical care;
- acquisition, preparation, transportation, and storage of organ;
- diagnostic services;
- drugs that require a prescription by federal law.

Expenses incurred in the evaluation and procurement of organs and tissues are benefits when billed by the hospital. Included in these expenses may be specific charges for participation with registries for organ procurement, operating rooms, supplies, use of hospital equipment, and transportation of the tissue or organ to be evaluated.

Administration of products with a specific transplant benefit needs to be defined as to:

- when the benefit begins (at the time of admission for the transplant or once the patient is determined eligible for a transplant, which may include tests or office visits before transplant);
- when the benefit ends (at the time of discharge from the hospital or at the end of required follow-up, including the immunosuppressive drugs administered on an outpatient basis).

Coverage usually is not provided for:

- HOT services for which the cost is covered/funded by governmental, foundational, or charitable grants;
- organs sold rather than donated to the recipient;
- an artificial organ.

Description of Procedure or Service

Populations	Interventions	Comparators	Outcomes
Individuals: • With intestinal failure and evidence of impending end-stage liver failure	Interventions of interest are: • Small bowel and liver transplant alone or multivisceral transplant	Comparators of interest are: • Medical management • Parenteral nutrition	Relevant outcomes include: • Overall survival • Morbid events • Treatment-related mortality • Treatment-related morbidity
Individuals: • With a failed small bowel and liver or multivisceral transplant without contraindications for retransplant	Interventions of interest are: • Small bowel and liver retransplant alone or multivisceral retransplant	Comparators of interest are: • Medical management • Parenteral nutrition	Relevant outcomes include: • Overall survival • Morbid events • Treatment-related mortality • Treatment-related morbidity

This evidence review addresses transplantation and retransplantation of an intestinal allograft in combination with a liver allograft, either alone or in combination with one or more of the following organs: stomach, duodenum, jejunum, ileum, pancreas, or colon.

For individuals who have intestinal failure and evidence of impending end-stage liver failure who receive a small bowel and liver transplant alone or multivisceral transplant, the evidence includes a limited number of case series. Relevant outcomes are overall survival, morbid events, and treatment-related mortality and morbidity. These transplant procedures are infrequently performed and few reported case series exist. However, results from the available case series have revealed fairly high postprocedural survival rates. Given these results and bearing in mind the abysmal survival rates of patients who exhaust all other treatments, transplantation may prove not only to be the last option, but also a beneficial one. To be clear, transplantation is contraindicated for patients in whom the procedure is expected to be futile due to comorbid disease, or in whom posttransplantation care is expected to significantly worsen comorbid conditions. The evidence is sufficient to determine that the technology results in a meaningful improvement in the net health outcome.

For individuals who have a failed small bowel and liver or multivisceral transplant without contraindications for retransplant who receive a small bowel and liver retransplant alone or multivisceral retransplant, the evidence includes case series. Relevant outcomes are overall survival, morbid events, and treatment-related mortality and morbidity. Although limited in quantity, the available post retransplantation data has suggested reasonably high survival rates. Given exceedingly poor survival rates without retransplantation of patients who have exhausted other treatments, evidence of postoperative survival from uncontrolled studies is sufficient to demonstrate that retransplantation provides a survival benefit in appropriately selected patients. Retransplantation is contraindicated for patients in whom the procedure is expected to be futile due to comorbid disease or in whom posttransplantation care is expected to significantly worsen comorbid conditions. The evidence is sufficient to determine that the technology results in a meaningful improvement in the net health outcome.

Background

Small bowel transplants are typically performed in patients with short bowel syndrome, defined as an inadequate absorbing surface of the small intestine due to extensive disease or surgical removal of a large portion of small intestine. In some instances, short bowel syndrome is associated with liver failure, often due to the long-term complications of total parenteral nutrition (TPN).

These patients may be candidates for a small bowel/liver transplant or a multivisceral transplant, which includes the small bowel and liver with one or more of the following organs: stomach, duodenum, jejunum, ileum, pancreas, and/or colon. The type of transplantation depends on the underlying etiology of intestinal failure, quality of native organs, presence or severity of liver disease, and history of prior abdominal surgeries.[1] A multivisceral transplant is indicated when anatomic or other medical problems preclude a small bowel/liver transplant. Complications following small bowel/liver and multivisceral transplants include acute or chronic rejection, donor-specific antibodies, infection, lymphoproliferative disorder, graft-versus-host disease, and renal dysfunction.[2]

Note: Isolated small bowel transplants are considered in a separate policy.

Rationale

This evidence review was created in December 1995 and has been updated regularly with searches of the MEDLINE database. The most recent literature update was conducted through June 7, 2018.

Evidence reviews assess the clinical evidence to determine whether the use of a technology improves the net health outcome. Broadly defined, health outcomes are length of life, quality of life, and ability to function—including benefits and harms. Every clinical condition has specific outcomes that are important to patients and to managing the course of that condition. Validated outcome measures are necessary to ascertain whether a condition improves or worsens; and whether the magnitude of that change is clinically significant. The net health outcome is a balance of benefits and harms.

To assess whether the evidence is sufficient to draw conclusions about the net health outcome of a technology, 2 domains are examined: the relevance and the quality and credibility. To be relevant, studies must represent one or more intended clinical use of the technology in the intended population and compare an effective and appropriate alternative at a comparable intensity. For some conditions, the alternative will be supportive care or surveillance. The quality and credibility of the evidence depend on study design and conduct, minimizing bias and confounding that can generate incorrect findings. The randomized controlled trial is preferred to assess efficacy; however, in some circumstances, nonrandomized studies may be adequate. Randomized controlled trials are rarely large enough or long enough to capture less common adverse events and long-term effects. Other types of studies can be used for these purposes and to assess generalizability to broader clinical populations and settings of clinical practice.

Transplantation Of Small Bowel and Liver OR Multivisceral Organs

Clinical Context and Test Purpose

The purpose of small bowel and liver transplant alone or multivisceral transplant in patients who have intestinal failure and evidence of impending end-stage liver failure is to provide a treatment option that is an alternative to or an improvement on existing therapies.

The question addressed in this evidence review is: Does small bowel and liver transplant alone or multivisceral transplant improve the net health outcome in individuals with intestinal failure and evidence of impending end-stage liver failure?

The following PICOTS were used to select literature to inform this review.

Patients
The relevant population of interest is individuals with intestinal failure and evidence of impending end-stage liver failure.

Interventions
The therapy being considered is small bowel and liver transplant alone or multivisceral transplant.

Comparators
The following practices are currently being used to make decisions about intestinal failure and evidence of impending end-stage liver failure: medical management and parenteral nutrition.

Outcomes
The general outcomes of interest are overall survival (OS), morbid events, and treatment-related mortality and morbidity.

Timing
Periprocedural complications, short- and long-term graft survival, and 1- and 5-year OS are of interest.

Setting
Transplantation of small bowel, liver, or multivisceral transplantation takes place in a tertiary hospital setting.

Systematic Reviews
A TEC Assessment (1999) focused on multivisceral transplantation and offered the following conclusions:

> "Multivisceral transplantation in patients with small bowel syndrome, liver failure, and/or other gastrointestinal problems such as pancreatic failure, thromboses of the celiac axis and the superior mesenteric artery, or pseudo-obstruction affecting the entire gastrointestinal tract is associated with poor patient and graft survival. Pediatric and adult patients have a similar 2- and 5-year survival of 33% to 50%. However, without this procedure, it is expected that these patients would face 100% mortality."[3]

Case Series
The published literature consists of case series, mainly reported by single centers in the United States and Europe. Tables 1 and 2 summarize the characteristics and results of the case series, respectively. Many case series have included isolated small bowel transplantations.

Reasons for transplantations were mainly short bowel syndrome. Other reasons included congenital enteropathies and motility disorders. Most common outcomes reported were survival rates and weaning off total parenteral nutrition (TPN). Several studies have presented survival rates by type of transplantation, while others have combined all types of transplants when reporting survival rates. When

rates were reported by type of transplant, isolated transplantations had higher survival rates than multivisceral transplants (see Table 2).

Several investigators have reported higher survival rates in transplants conducted more recently than those conducted earlier.[4-6] Reasons for improved survival rates in more recent years have been attributed to the development of more effective immunosuppressive drugs and the learning curve for the complex procedure.

Authors of these series, as well as related reviews, have observed that while outcomes have improved over time, recurrent and chronic rejection and complications of immunosuppression continue to be obstacles to long-term survival. A separate discussion of complications follows the evidence tables.

Table 1. Summary of Key Case Series Characteristics for Transplantations

Study	Country	N	Median Age (Range), y	Interventions		Follow-Up (Range)
				Treatment	n	
Lacaille et al (2017)[7]	France	110	5.3 (0.4-19)	• Isolated IT • Combined liver IT • Multivisceral graft	45 60 5	Of 55 alive: • 17 at <5 y • 17 at 5-10 y • 21 at ≥10 y
Garcia Aroz et al (2017)[8,a]	U.S.	10	1.5 (0.7-13)	• Isolated IT • Combined liver IT	7 3	6/7 alive at ≥10 y
Dore et al (2016)[9]	U.S.	30	0.2 (0.1-18)	• Isolated IT • Combined liver IT • Multivisceral graft	6 6 18	28 (4-175) mo
Rutter et al (2016)[10]	U.K.	60	1.8 (0-8)	• Isolated IT • Multivisceral graft • Modified multivisceral	16 35 9	21.3 (0-95) mo
Lauro et al (2014)[11]	Italy	46	34 (NR)	• Isolated IT • Combined liver IT • Multivisceral graft	34 6 6	51.3 mo
Varkey et al (2013)[12]	Sweden	20	• Adults: 44 (20-67) • Children: 6 (0.5-13)	• Isolated IT • Combined liver IT • Multivisceral graft	4 1 15	NR
Mangus et al (2013)[4]	U.S.	100	• Adults: 48 (NR to 66) • Children: 1 (0.6 to NR)	• Multivisceral graft • Modified multivisceral	84 16	25 mo

IT: intestinal transplantation; NR: not reported.
[a] Living donors.

Table 2. Summary of Key Case Series Results for Transplantations

Study	Interventions	Survival	Off TPN

	Treatment	n		
Lacaille et al (2017)[7]	• Isolated IT • Combined liver IT • Multivisceral graft	60 45 5	• 59% at 10 y; 54% at 18 y • 48% at 10 y • NR	All treatments combined: • 73% at last follow-up
Garcia Aroz et al (2017)[8,a]	• Isolated IT • Combined liver IT	7 3	All transplantations combined: • 70%	All treatments combined: • 100% at last follow-up
Dore et al (2016)[9]	• Isolated IT • Combined liver IT • Multivisceral graft	6 6 18	• 83% at 9 y • 33% at 10 y • 67% at 2.5 y	All treatments combined: • 71% in 31 d • 62% at last follow-up
Rutter et al (2016)[10]	• Isolated IT • Multivisceral graft • Modified multivisceral	16 35 9	• 92% at 1 y; 37% at 5 y • 71% at 1 y; 33% at 5 y • 85% at 1 y; 65% at 5 y	NR
Lauro et al (2014)[11]	• Isolated IT • Combined liver IT • Multivisceral graft	34 6 6	All transplantations combined: • 77% at 1 y • 58% at 3 y • 53% at 5 y • 37% at 10 y	NR
Varkey et al (2013)[12]	• Isolated IT • Combined liver IT • Multivisceral graft	4 1 15	All transplantations combined: • 78% at 1 y • 50% at 5 y	NR
Mangus et al (2013)[4]	• Multivisceral graft • Modified multivisceral	84 16	All transplantations combined: • 72% at 1 y • 57% at 5 y	NR

IT: intestinal transplantation; NR: not reported; TPN: total parenteral nutrition.
[a] Living donors.

Complications

Several case series have focused on complications after small bowel and multivisceral transplantation. For example, Nagai et al (2016) reported on cytomegalovirus (CMV) infection after intestinal or multivisceral transplantation at a single center in the United States.[13] A total of 210 patients had either an intestinal transplant, multivisceral transplant, or modified multivisceral transplant between 2003 and 2014. The median length of follow-up was 2.1 years. Thirty-four (16%) patients developed CMV infection at a median of 347 days after transplantation. Nineteen patients had tissue-invasive CMV disease. CMV infection was significantly associated with rejection (odds ratio, 2.6; $p<0.01$) and adversely affected patient survival (hazard ratio, 2.7; $p<0.001$). In a 2016 report from another U.S. center, Timpone et al (2016) reported that 16 (19%) of 85 patients undergoing intestinal or multivisceral transplantation developed CMV infection a mean of 139 days (range, 14-243 days) postoperatively.[14]

Wu et al (2016) investigated the incidence and risk factors of acute antibody-mediated rejection (ABMR) among patients undergoing intestinal transplantation (N=175).[15] All patients were 25 years of age. Acute ABMR was diagnosed by clinical evidence; histologic evidence of tissue damage; focal or diffuse linear C4d deposition; and circulating anti-human leukocyte antigen antibodies. Of the 175 intestinal transplants, 58% were liver-free grafts, 36% included a liver graft, and 6.3% were retransplantations. Eighteen cases of acute ABMR were identified—14 (14%) among the patients undergoing first liver-free transplantation, 2 (3%) among patients undergoing liver and small bowel transplantations, and 2 (18%) among the patients undergoing retransplantation. Graft failure occurred in 67% of patients with acute ABMR. The presence of a donor-specific antibody and a liver-free graft were associated with the development of acute ABMR.

In a series by Cromvik et al (2016), 5 (19%) of 26 patients were diagnosed with graft-versus-host disease after intestinal or multivisceral transplantation.[16] Risk factors for graft-versus-host disease were: malignancy as a cause of transplantation; neoadjuvant chemotherapy; or brachytherapy before transplantation.

In a retrospective study, Florescu et al (2012) reported on bloodstream infections among 98 children (>18 years) with small bowel and combined organ transplants.[17] Seventy-seven (79%) underwent small bowel transplant in combination with a liver, kidney, or kidney and pancreas, and 21 had an isolated small bowel transplant. After a median follow-up of 52 months, 58 (59%) patients had survived. The 1-year survival rate was similar in patients with combined small bowel transplant (75%) and those with isolated small bowel transplant (81%). In the first year after transplantation, 68 (69.4%) patients experienced at least 1 episode of bloodstream infection. The 1-year survival rate for patients with bloodstream infections was 72% compared with 87% in patients without bloodstream infections (p=0.056 for the difference in survival in patients with and without bloodstream infections).

Wu et al (2011) reported on 241 patients who underwent intestinal transplantation.[18] Of these, 147 (61%) had multivisceral transplants, 65 (27%) had small bowel transplants, and 29 (12%) had small bowel/liver transplants. Recipients included 151 (63%) children and 90 (37%) adults. Twenty-two (9%) patients developed graft-versus-host disease. Children younger than 5 years old were most likely to develop this condition (13.2% [16/121]) than children between 5 and 18 years (6.7% [2/30]) and adults older than 18 years (4.4% [9/90]).

HIV-Positive Transplant Recipients

Solid organ transplant for patients who are HIV-positive was historically controversial, due to the long-term prognosis for HIV positivity and the impact of immunosuppression on HIV disease. No studies reporting on outcomes in HIV-positive patients who received small bowel and liver or multivisceral transplants were identified in literature reviews.

Current OPTN policy permits HIV-positive transplant candidates.[19]

The British HIV Association and the British Transplantation Society (2017) updated their guidelines on kidney transplantation in patients with HIV disease.[20] These criteria may be extrapolated to other organs:

- Adherent with treatment, particularly antiretroviral therapy
- CD4 count greater than 100 cells/mL (ideally >200 cells/mL) for at least 3 months
- Undetectable HIV viremia (<50 HIV-1 RNA copies/mL) for at least 6 months
- No opportunistic infections for at least 6 months
- No history of progressive multifocal leukoencephalopathy, chronic intestinal cryptosporidiosis, or lymphoma.

Section Summary: Transplantation of Small Bowel/Liver or Multivisceral Organs
Intestinal transplantation procedures are infrequently performed and only relatively small case series, generally, single-center, are available. For patients experiencing significant complications from TPN, which can lead to liver failure and repeated infections, these case series have shown reasonably high posttransplant survival rates in patients who have a high probability of death without treatment. Guidelines and U.S. federal policy no longer view HIV infection as an absolute contraindication for solid organ transplantation.

Retransplantation OF SMALL BOWEL and LIVER OR MULTIVISCERAL ORGANS

Clinical Context and Test Purpose
The purpose of small bowel and liver retransplant alone or multivisceral retransplant in patients who have a failed small bowel and liver or multivisceral transplant without contraindications for retransplant is to provide a treatment option that is an alternative to or an improvement on existing therapies.

The question addressed in this evidence review is: Does small bowel and liver retransplant alone or multivisceral retransplant improve the net health outcome in individuals with a failed small bowel and liver or multivisceral transplant and no contraindications to retransplant?

The following PICOTS were used to select literature to inform this review.

Patients
The relevant population of interest is individuals with a failed small bowel and liver or multivisceral transplant without contraindications for retransplant.

Interventions
The therapy being considered is small bowel and liver retransplant alone or multivisceral retransplant.

Comparators
The following practices are currently being used to make decisions about failed small bowel and liver or multivisceral transplant when there are no contraindications for retransplant: medical management and parenteral nutrition.

Outcomes
The general outcomes of interest are OS, morbid events, treatment-related mortality, and treatment-related morbidity.

Timing
Periprocedural complications, short- and long-term graft survival, and 1- and 5-year OS are of interest.

Setting
Retransplantation of small bowel, liver, or multivisceral transplantation takes place in a tertiary hospital setting.

Case Series
Evidence for the use of retransplantation to treat individuals who have failed intestinal transplantations includes several case series, mostly from single institutions. The case series by Desai et al (2012) analyzed records from the United Network for Organ Sharing database.[6] Among the case series described in Table 3, reasons for retransplantations included: acute rejection, chronic rejection, CMV, liver failure, lymphoproliferative disorder, and graft dysfunction. Survival rates for retransplantations are listed in Table 4.

Table 3. Summary of Key Case Series Characteristics for Retransplantations

Study	Country	N	Median Age (Range), y	Interventions		Follow-Up, (Range), mo
				Treatment	n	
Ekser et al (2018)[21]	U.S.	18[b]	27.0 (17.4)[a] (0.9 to 57)	• Isolated IT • Modified MVT • Multivisceral graft	1 1 16	NR
Lacaille et al (2017)[7]	France	10	13 (5-16)	• Isolated IT • Combined liver IT	3 7	4
Desai et al (2012)[6]	U.S.	• 72 (adults) • 77 (children)	NR	Adults: • Isolated IT • Combined liver IT Children: • Isolated IT • Combined liver IT	 41 31 28 49	NR
Abu-Elmagd et al (2009)[5]	U.S.	47	NR	• Isolated IT • Combined liver IT	31 7 9	NR

				• Multivisceral graft		
Mazariegos et al (2008)[22]	U.S.	14	9.4 (3.2-22.7)	• Isolated IT • Combined liver IT • Multivisceral graft	1 3 10	55.9

IT: intestinal transplantation; MVT: multivisceral transplantation; NR: not reported.
[a] Mean (standard deviation).
[b] Of a cohort of 218 transplant or retransplant procedures.

Table 4. Summary of Key Case Series Results for Retransplantations

Study	Interventions		Survival	Off TPN
	Treatment	**n**		
Ekser et al (2018)[21]	• Isolated IT • Modified MVT • Multivisceral graft	1 1 16	Graft survival: • 71% at 1 y; 56% at 3 y; 44% at 5 y Patient survival: 71% at 1 y; 47% at 3 y; 37% at 5 y	NR
Lacaille et al (2017)[7]	• Isolated IT • Combined liver IT	3 7	All transplantations combined: • 30% at last follow-up	NR
Desai et al (2012)[6]	Adults: • Isolated IT • Combined liver IT Children: • Isolated IT • Combined liver IT	 41 31 28 49	Adults: • 80% at 1 y; 47% at 3 y; 29% at 5 y • 63% at 1 y; 56% at 3 y; 47% at 5 y Children: • 81% at 1 y; 74% at 3 y; 57% at 5 y • 42% at 1 y; 42% at 3 y; 42% at 5 y	NR
Abu-Elmagd et al (2009)[5]	• Isolated IT • Combined liver IT • Multivisceral graft	31 7 9	All transplantations combined: • 69% at 1 y • 47% at 5 y	NR
Mazariegos et al (2008)[22]	• Isolated IT • Combined liver IT • Multivisceral graft	1 3 10	All transplantations combined: • 71% at last follow-up	100%

IT: intestinal transplantation; MVT: multivisceral transplant; NR: not reported; TPN: total parenteral nutrition.

Section Summary: Retransplantation of Small Bowel and Liver or Multivisceral Organs

Evidence for retransplantations derives mostly from single-center case series, though 1 series used records from the United Network for Organ Sharing database. Although limited in quantity, the available follow-up data after retransplantation have suggested reasonably high survival rates after small bowel and liver transplants and multivisceral retransplantation in patients who continue to meet criteria for transplantation.

Summary of Evidence

For individuals who have intestinal failure and evidence of impending end-stage liver failure who receive a small bowel and liver transplant alone or multivisceral transplant, the evidence includes a limited number of case series. Relevant outcomes are overall survival, morbid events, and treatment-related mortality and morbidity. These transplant procedures are infrequently performed and few reported case series exist. However, results from the available case series have revealed fairly high postprocedural survival rates. Given these results and the exceedingly poor survival rates of patients who exhaust all other treatments, transplantation may prove not only to be the last option, but also a beneficial one. Transplantation is contraindicated for patients in whom the procedure is expected to be futile due to comorbid disease, or in whom posttransplantation care is expected to significantly worsen comorbid conditions. The evidence is sufficient to determine that the technology results in a meaningful improvement in the net health outcome.

For individuals who have a failed small bowel and liver or multivisceral transplant without contraindications for retransplant who receive a small bowel and liver retransplant alone or multivisceral retransplant, the evidence includes case series. Relevant outcomes are overall survival, morbid events, and treatment-related mortality and morbidity. Although limited in quantity, the available post retransplantation data have suggested reasonably high survival rates. Given exceedingly poor survival rates without retransplantation of patients who have exhausted other treatments, evidence of postoperative survival from uncontrolled studies is sufficient to demonstrate that retransplantation provides a survival benefit in appropriately selected patients. Retransplantation is contraindicated for patients in whom the procedure is expected to be futile due to comorbid disease or in whom posttransplantation care is expected to significantly worsen comorbid conditions. The evidence is sufficient to determine that the technology results in a meaningful improvement in the net health outcome.

Supplemental Information

Practice Guidelines and Position Statements

American Gastroenterological Association

The American Gastroenterological Association (2003) published a position statement on short bowel syndrome and intestinal transplantation.[23] The statement noted that only patients with life-threatening complications due to intestinal failure or long-term total parenteral nutrition have undergone intestinal transplantation. The statement recommended the following Medicare-approved indications, pending availability of additional data:

- Impending liver failure
- Thrombosis of major central venous channels
- Frequent central line associated sepsis
- Frequent severe dehydration.

American Society of Transplantation

The American Society of Transplantation (2001) issued a position paper on indications for pediatric intestinal transplantation.[24] The Society listed the following disorders in children as being potentially treatable by intestinal transplantation: short bowel syndrome, defective intestinal motility, and impaired enterocyte absorptive capacity. Contraindications for intestinal transplant to treat pediatric patients with intestinal failure are similar to those of other solid organ transplants: profound neurologic disabilities, life-threatening comorbidities, severe immunologic deficiencies, nonresectable malignancies, autoimmune diseases, and insufficient vascular patency.

U.S. Preventive Services Task Force Recommendations

Not applicable.

Medicare National Coverage

Medicare covers intestinal transplantation for the purposes of restoring intestinal function in patients with irreversible intestinal failure only when performed for patients who have failed total parenteral nutrition and only when performed in centers that meet approved criteria.[25] The criteria for approval of centers are based on a "volume of 10 intestinal transplants per year with a 1-year actuarial survival rate of 65 percent."

Ongoing and Unpublished Clinical Trials

A search of ClinicalTrials.gov in June 2018 did not identify any ongoing or unpublished trials that would likely influence this review.

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Billing Coding/Physician Documentation Information

44120 Enterectomy, resection of small intestine; single resection and anastomosis

44121 Enterectomy, resection of small intestine; each additional resection and anastomosis (List separately in addition to code for primary procedure)

44132 Donor enterectomy (including cold preservation), open; from cadaver

donor

44133 Donor enterectomy (including cold preservation), open; partial, from living donor

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

44799 Unlisted procedure, intestine

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 (code deleted 1/1/2016)

47140 Donor hepatectomy (including cold preservation), from living donor; left lateral segment only (segments II and III)

47141 Donor hepatectomy (including cold preservation), from living donor; total left lobectomy (segments II, III and IV)

47142 Donor hepatectomy (including cold preservation), from living donor; total right lobectomy (segments V, VI, VII and VIII)

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 (ie, 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 (ie, left lobe (segments II, III, and IV) and right lobe (segments I and 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

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

ICD-10 Codes

K72.00-K72.01 Acute and subacute hepatic failure code range

K72.10-K72.11 Chronic hepatic failure code range

K91.2 Postsurgical malabsorption, not elsewhere classified (includes short bowel syndrome)

Additional Policy Key Words

N/A

Policy Implementation/Update Information

11/1/01 New policy. Added to the surgery section.
11/1/02 No policy statement changes. Added to the transplant section.
11/1/03 No policy statement changes. Added new HCPCPS codes.
11/1/04 Policy statement revised to include HIV+ status as investigational.
11/1/05 Policy statement revised to remove HIV+ status as investigational.
4/1/06 No policy statement changes. Added general criteria to the considerations section.
11/1/06 No policy statement changes.
11/1/07 No policy statement changes.
11/1/08 No policy statement changes.
11/1/09 No policy statement changes.
11/1/10 No policy statement changes.
11/1/11 Policy statement revised to list absolute contraindications as not medically necessary.
11/1/12 Contraindications combined (absolute and relative) and moved to Considerations section. Wording of contraindications changed to be consistent with other solid organ transplant policies.
11/1/13 Statement added that small bowel/liver transplant or multivisceral retransplant may be considered medically necessary after a failed primary small bowel/liver transplant or multivisceral transplant.
11/1/14 Statement revised that procedure is investigational in all other situations. (previously considered not medically necessary.
11/1/15 No policy statement changes.
11/1/16 No policy statement changes.
11/1/17 No policy statement changes.
11/1/18 No policy statement changes.