



# Transplant Review Guidelines

Solid Organ Transplantation

**Ohio Only**

Effective Date: 01/01/2024

# Contents

Solid Organ Transplantation .....	4
Application .....	4
SARS-CoV-2 Vaccination .....	5
Universal Contraindications .....	6
Kidney including Kidney/Liver, Kidney/Heart, and Kidney/Lung .....	8
General Information .....	8
Indications .....	9
Organ-specific Contraindications .....	10
Considerations for Substance Use Disorder .....	10
Special Considerations .....	10
Liver .....	13
General Information .....	13
Indications .....	14
Organ-specific Contraindications .....	16
Considerations for Substance Use Disorder .....	16
Special Considerations .....	16
Pancreas and Kidney/Pancreas .....	20
General Information .....	20
Indications .....	21
Organ-specific Contraindications .....	21
Consideration for Substance Use Disorder .....	22
Special Considerations .....	22
Intestine including Liver/Intestine and Multivisceral .....	25
General Information .....	25
Indications .....	25
Organ-specific Contraindications .....	26
Considerations for Substance Use Disorder .....	26
Special Considerations .....	27
Heart .....	29
General Information .....	29
Indications .....	29
Organ-specific Contraindications .....	31
Considerations for Substance Use Disorder .....	31
Special Considerations .....	32
Lung .....	35
General Information .....	35
Indications .....	35
Organ-specific Contraindications .....	37
Considerations for Substance Use Disorder .....	38
Special Considerations .....	38
Heart/Lung .....	41

General Information.....	41
Indications .....	41
Organ-specific Indications .....	41
Consideration for Substance Use Disorder .....	41
Special Considerations.....	42
Appendix A.....	43
Appendix B.....	44
Appendix C .....	48
Appendix D .....	50
Appendix E.....	51
Review and approval history.....	52

# Solid Organ Transplantation

## Application

This clinical guideline applies only to the state of Ohio. Any requests for services that are stated as unproven or services for which there is a coverage or quantity limit will be evaluated for medical necessity using [Rule 5160-1-01 - Ohio Administrative Code | Ohio Laws](#).

In accordance with Ohio Administrative Code 5160-2-65 (L), reimbursement for all organ transplant services, except for kidney transplants, is contingent upon review and recommendation by the “Ohio Solid Organ Transplant Consortium” [[The Ohio Solid Organ Transplantation Consortium \(OSOTC\)](#)] based on criteria established by Ohio organ transplant surgeons and authorization from the department. Organ acquisition and transportation costs for heart, heart/lung, liver, pancreas, single/double lung, and liver/small bowel transplant services will be reimbursed at one hundred per cent of billed charges.

Prior authorization activities must be conducted in accordance with the Ohio Department of Medicaid Managed Care Provider Agreements located at: [Managed Care Agreements \(ohio.gov\)](#).

# SARS-CoV-2 Vaccination

Optum supports the recommendations of the American Society of Transplant Surgeons (ASTS), American Society of Transplantation (AST) and The International Society for Heart and Lung Transplantation (ISHLT) concerning vaccination against SARS-CoV-2. Optum encourages solid organ transplant candidates to discuss the following ASTS/AST/ISHLT recommendations of their transplant team:

- Solid organ transplant recipients should be vaccinated against SARS-CoV-2, using locally approved vaccines
- Eligible household and close contacts of solid organ transplant recipients should be vaccinated against SARS-CoV-2
- Whenever possible, vaccination should occur prior to transplantation, ideally with completion of vaccine series a minimum of two weeks prior to transplant.

Optum understands there are many additional issues relevant to the individual member such as local prevalence of SARS-CoV-2 and its variants, personal situations relating to immunosuppression and transplant infections, and the vaccination level in the household. Decisions concerning vaccination should be made by the member in consultation with the member's transplant team.

## Reference

ASTS, AST, ISHLT Joint Statement about COVID-19 Vaccination in Organ Transplant Candidates and Recipients. Nov 29, 2021. [ISHLT-AST-ASTS Joint-Statement COVID19-Vaccination 30-December.pdf](#)

# Universal Contraindications

**NOTE:** The following list contains the standard contraindications for solid organ transplants. These contraindications apply to ALL types of transplants unless otherwise noted. There may be additional contraindications or exceptions that apply to a specific type of transplant. Please refer to the “Contraindications” section in the specific type of transplant for more information.

- Infections
  - Systemic or uncontrolled infection including sepsis
- Significant uncorrectable life-limiting medical conditions
- Severe end stage organ damage that would have an impact on patient survival
- Active untreated or untreatable malignancy
- Irreversible, severe brain damage
- Active substance use disorders
  - While there is no evidence-based, optimal period of sobriety, an attempt at a period of at least 90 days abstinence is expected. This would allow sufficient time to address alcohol dependence issues and may, in some patients, allow sufficient clinical improvement which may, in turn, avert the need for transplantation. See the organ-specific transplant sections below for additional information.
- Inactive alcohol and/or substance abuse (alcohol, crystal meth, heroin, cocaine, methadone, and/or narcotics, etc.) is not a contraindication
- Recreational or medicinal use of marijuana is not a contraindication

## References

- Flannery BA, Volpicelli JR, Pettinati HM. Psychometric properties of the Penn Alcohol Craving Scale. *Alcohol Clin Exp Res*. 1999 Aug;23(8):1289-95. PMID: 10470970.
- Kanaan R. Indications and contraindications to lung transplant: patient selection. *Rev Pneumol Clin*. 2010;67(1):5-14.
- Kasike BL, Cangro CB, Hariharan S, Hricik DE, Kerman RH, Roth D, Rush DN, Vazquez MA and Weir MR. The Evaluation of Renal Transplant Candidates: Clinical Practice Guidelines for The American Society of Transplantation. *Am J Transplant*. 2001; Suppl. 1, Vol. 2: 5–9.
- Lee BP, Vittinghoff E, Hsu C, et al. Predicting Low Risk for Sustained Alcohol Use After Early Liver Transplant for Acute Alcoholic Hepatitis: The Sustained Alcohol Use Post-Liver Transplant Score. *Hepatology*. 2019 Apr;69(4):1477-1487. doi: 10.1002/hep.30478. Epub 2019 Mar 5. PMID: 30561766; PMCID: PMC6453818.
- Lucey MR, Brown KA, et al. Minimal Criteria for Placement of Adults on the Liver Transplant Waiting List. *Transplantation*. 1998;66(7):956-962
- Maddrey WC, Boitnott JK, Bedine MS, et al. Corticosteroid therapy of alcoholic hepatitis. *Gastroenterology*. 1978. 75 (2): 193–9.
- Martin P, DiMartini A, Feng S, Brown Jr R, and Fallon M. Evaluation for liver transplantation in adults: 2013 Practice Guideline by the American Association for the Study of Liver Diseases and the American Society of Transplantation. *Hepatology*. 2014;59(3):1144-1165.
- Mathurin P et al. Early Liver Transplantation for Severe Alcoholic Hepatitis; *N Engl J Med* 2011; 365:1790-1800.

Mehra MR, Canter CE, Hannan MM, et al. The 2016 International Society for Heart Lung Transplantation Listing Criteria for Heart Transplantation: A 10-year update. *J Heart Lung Transplant*. 2016;35(1):1-23.

Nadim MK, Sung RS, et al. Simultaneous liver–kidney transplantation summit: current state and future directions. *Am J Transplant*. 2012; 12:2901-2908.

Orens JB, et al. International guidelines for the selection of lung transplant candidates: 2006 update—a consensus report from the Pulmonary Scientific Council of the International Society for Heart and Lung Transplantation. *J Heart Lung Transplant*. 2006;25(7):745-55.

O'Shea RS, Dasarathy S, McCullough AJ, et al. Alcoholic liver disease. *Hepatology*. 2010; 51:307.

Watt KD, Charlton MR. Metabolic syndrome and liver transplantation: a review and guide to management. *J Hepatol*. 2010; 53:199-206.

# Kidney including Kidney/Liver, Kidney/Heart, and Kidney/Lung

Medical necessity determinations must comply with the definitions and principles established in [Rule 5160-1-01 - Ohio Administrative Code | Ohio Laws](#)

## General Information

- Kidney transplantation is the treatment of choice for suitable patients with end-stage kidney disease
- Preemptive living donor transplantation is encouraged whenever possible
- Candidates should be referred to a transplant center as soon as it appears probable that renal replacement therapy (dialysis) will be needed within the next 6–12 months (Kasiske et al., 2001)
- Due to the very long wait times and the likely increased burden of comorbid conditions, patients over the age of 70 may not be considered for deceased donor transplantation by many kidney transplant programs. In many instances, while a member between 70–75 years of age may not be considered for a deceased donor transplant, a center may be willing to evaluate an older patient for a living donor transplant.
  - The importance of living donation in this situation should be emphasized with the patient
- Wait times in many parts of the country can last for years, particularly for those with blood groups O and B and those who are highly sensitized. Strategies to increase the likelihood of getting an organ include:
  - Patients should be very strongly encouraged to consider living donation and to seek out potential donors. Kidney Paired Donation/Exchange (KPD) is considered medically necessary
  - Double listing in another United Network for Organ Sharing (UNOS) Region with a shorter wait time should be discussed and encouraged if the patient’s living situation will allow the flexibility to do this
  - ABO incompatible transplants are considered medically necessary
  - Desensitization protocols for highly sensitized (high PRA) patients are considered medically necessary
- Candidates should be informed that placement on the cadaveric waiting list does not guarantee transplantation, since changes in their medical status may delay or preclude transplantation. (Kasiske et al., 2001)
  - If a patient will have to be on a waiting list for a long time, the importance of maintaining transplant readiness by strict adherence to all advice from the transplant center, the treating nephrologist and the dialysis center should be emphasized
- Patients with primary oxalosis with ESRD should be considered for combined liver/kidney transplant (Eason et al., 2008; Compagnon et al., 2014)

## Indications

- When to refer (Bunnapradist & Danovitch, 2007)
  - Kidney transplantation should be discussed with all patients with irreversible advanced chronic kidney disease (CKD)
  - Patients with CKD without known contraindications for transplantation should be referred to a transplant program when they approach CKD stage 4 or a glomerular filtration rate (GFR) less than 30 ml/min/1.73 m<sup>2</sup>
  - Early referral will improve the chances of a patient receiving a preemptive transplant, especially those with a potential living donor; referral to a kidney transplant program does not imply immediate transplantation
- End-stage renal disease (ESRD)
  - Chronic renal failure with glomerular filtration rate (GFR) < 20ml/min
  - Chronic renal failure on dialysis
  - Symptomatic uremia
- Anticipated ESRD as defined above within next 12 months (preemptive transplantation).
- Combined kidney/liver transplant *when at least one* the following are present: (OPTN Policy 9.9 Liver-Kidney Allocation; Table 9-17 Medical Eligibility Criteria for Liver-Kidney Allocation). See Appendix A for National Kidney Foundation (NKF) definition of chronic kidney disease (CKD).
  - Candidates with sustained acute kidney injury (AKI)
    - Dialysis at least once every 7 days for the last 6 weeks **AND/OR**
    - eGFR ≤ 25 mL/min at least once every 7 days for the last 6 weeks
  - Candidates with chronic kidney disease (CKD) as defined by the National Kidney Foundation (NKF) **AND** at least one of the following:
    - Regularly administered dialysis as an end-stage renal disease (ESRD) patient in a hospital based, independent non-hospital based, or home setting
    - eGFR ≤ 30 mL/min at time of listing.
  - Candidates diagnosed with at least one of the following:
    - Hyperoxaluria
    - Atypical hemolytic uremic syndrome (aHUS) from mutations in factor H or factor I
    - Familial non-neuropathic systemic amyloidosis
    - Methylmalonic aciduria
- Simultaneous heart/kidney transplant
  - See criteria in the heart transplantation section of this guideline
- Retransplantation. Usually due to primary non-function, rejection, recurrent disease and/or immunosuppression toxicity.

## Organ-specific Contraindications

*Please review the Universal Contraindications found at the beginning of the Guidelines. These apply to all transplants unless otherwise noted below. Additional contraindications and exceptions that are specific to a particular type of transplant are noted below.*

- Reversible renal failure (Bunnapradist & Danovitch, 2007)

## Considerations for Substance Use Disorder

For patients experiencing catastrophic decompensation where a period of abstinence is not realistic the transplant center must have an institutional protocol that requires, at a minimum:

- Appropriate patient and psychosocial support profile. Transplant center must have an institutional protocol to conduct psychosocial evaluation and proactively implement interventions to promote post-transplant success.
  - Presence of close supportive social network
  - Absence of severe coexisting behavioral health disorders that would negatively impact a treatment plan
  - Agreement by patient (with support of his/her social network) to post-transplant rehabilitation and monitoring, and to lifelong abstinence from addictive substances
- Evaluation by addiction specialist indicating high likelihood of success of post-transplant rehabilitation and abstinence
- Approval by a transplant selection committee that includes in addition to the regular members, a psychiatrist and/or an addiction specialist
  - No special consideration for acute decompensation with illicit drug addiction and/or abuse
- Any other substance abuse needs to be addressed
- Inactive alcohol and/or substance abuse (alcohol, crystal meth, heroin, cocaine, methadone, and/or narcotics, etc.) is not a contraindication

## Special Considerations

*Additional consultation and/or evaluation may be indicated in these situations.*

These recommendations are consistent with the 2001 American Society of Transplantation (AST) Clinical Practice Guidelines.(Kasiske et al., 2001).

- Patients with a history of malignancy require an oncology evaluation to determine status of disease. Recommendations for suitability and timing of a solid organ transplant following successful treatment of malignancy may be found in Appendix B. The recommendations are based on Al-Adra et al. (2021).
- Social and psychiatric issues can have significant impact on the outcomes of a transplant. It is expected that a psychosocial evaluation and/or a psychiatry consultation is obtained as part of the standard transplant evaluation. (Crone et al., 2010). The evaluation should address the following:
  - Overall functioning
  - Understanding of underlying illness and need for proposed treatment
  - History of adherence and compliance and barriers to compliance
  - Quality of relationships

- Presence of a supportive caregiver
  - Social history including educational level and employment history
  - Housing and living situation including reliable transportation to attend medical visits
  - Socioeconomic status including sufficient funding to pay for immunosuppressive medications post-transplant
  - Current and past history of alcohol and substance use and abuse
  - Current and past psychiatric history including baseline cognitive status and coping skills
- Patients with human immunodeficiency virus (HIV) infection must be on a highly active antiretroviral therapy (HAART) regimen and there must be documented evidence of sustained viral load suppression
  - BMI  $\geq 35$  kg/m<sup>2</sup>. NOTE: There are few data to suggest which, if any, obese patients should be denied transplantation based on obesity. (Kasiske et al., 2001)
    - Refer to requesting program patient selection criteria
  - Pediatric patients should have a normal history and physical, or if there is any indication of abnormal cardiac function, cardiology evaluation should be obtained
  - Adult patients with known heart disease including, but not limited to, heart failure, cardiomyopathy and coronary artery disease require cardiology consultation and completion of consultant's recommendations, if any
  - Gastrointestinal (GI) clearance may be indicated in patients with a history of complicated or active GI disorders
  - Significant, uncorrectable pulmonary disease. Pulmonary consultation and completion of consultant's recommendations, if any, is required.

## References

- Bunnapradist S, Danovitch G. Evaluation of Adult Kidney Transplant Candidates. *Am J Kidney Dis*. 2007;50(5):890-898.
- Compagnon P, Metzler P, Samuel D, et al. Long-term results of combined liver-kidney transplantation for primary hyperoxaluria type 1: the French experience. *Liver Transpl*. 2014;20(12):1475-1485. doi:10.1002/lt.24009
- Crone CC, Marcangelo MJ, Shuster JL Jr. An approach to the patient with organ failure: transplantation and end-of-life treatment decisions. *Med Clin North Am*. 2010;94(6):1241-xii. doi:10.1016/j.mcna.2010.08.005
- Eason, JD, et al. Proceedings of consensus conference on simultaneous liver/kidney transplantation (SLK). *Am J Transplant*. 2008;8:2243-2251.
- Gill J, Shah T, Hristea I, Chavalitdhamrong D, Anastasi B, Takemoto SK, Bunnapradist S. Outcomes of simultaneous heart-kidney transplant in the US: a retrospective analysis using OPTN/UNOS data. *Am J Transplant*. 2009;9(4):844-52.
- Hong KN, Merlo A, Chauhan D, Davies RR, Iribarne A, Johnson E, Jeevanandam V, and Russo MJ. Evidence support severe renal insufficiency as a relative contraindication to heart transplantation. *J Heart Lung Transplant*. 2016 Jul;35(7):893-900.
- Kasiske BL, Cangro CB, Hariharan S, Hricik DE, Kerman RH, Roth D, Rush DN, Vazquez MA, Weir MR. The Evaluation of Renal Transplant Candidates: Clinical Practice Guidelines for The American Society of Transplantation. *Am J Transplant*. 2001;Suppl. 1,Vol. 2:5-9.
- Martin P, DiMartini A, Feng S, Brown Jr R, Fallon M. Evaluation for liver transplantation in adults: 2013 Practice Guideline by the American Association for the Study of Liver Diseases and the American Society of Transplantation. *Hepatology*. 2014;59(3):1144-1165.

Mehta RL, Kellum JA, Shah SV, et al. Acute Kidney Injury Network: Report of an initiative to improve outcomes in acute kidney injury. *Crit Care*. 2007;11:R31.

National Kidney Foundation. Kidney Disease Outcomes Quality Initiative (NKF KDOQI)<sup>™</sup>. Chronic Kidney Disease: Evaluation, Classification and Stratification. 2002. National Kidney Foundation, Inc.

Organ Procurement and Transplantation Network (OPTN) Policies. Policy 9.9 Liver-Kidney Allocation. Effective date: 8/4/2020.

[https://optn.transplant.hrsa.gov/media/1200/optn\\_policies.pdf#nameddest=Policy\\_09](https://optn.transplant.hrsa.gov/media/1200/optn_policies.pdf#nameddest=Policy_09) Accessed 8/17/2020.

Renal Association. Assessment of the Potential Kidney Transplant Recipient. January 2011. Available at: <https://renal.org/wp-content/uploads/2017/06/assessment-of-the-potential-kidney-transplant-recipient-5th-edition-1.pdf> Accessed 8/17/20

Russo MJ, Rana A, Chen JM, Hong KN, Gelijins A, Moskowitz A, Widman WD, Ratner L, Naka Y, Hardy MA. Pretransplant patient characteristics and survival following combined heart and kidney transplantation. *Arch Surg*. 2009;144(3):241-246.

# Liver

Medical necessity determinations must comply with the definitions and principles established in [Rule 5160-1-01 - Ohio Administrative Code | Ohio Laws](#)

Liver transplantation is considered medical necessary in certain indications. The Ohio Department of Medicaid recognizes the use of InterQual® criteria secondary to the decision of the Ohio Solid Organ Transplant Consortium. For medical necessity clinical coverage criteria, refer to the InterQual® CP Procedures, Transplantation, Liver.

View the InterQual® criteria at: [InterQual® \(cue4.com\)](#)

## General Information

Patients may be placed on the UNOS waiting list for a variety of reasons; hence, the overall clinical status will determine the need for listing. However, priority status is currently defined by the MELD score for adult recipients and the Pediatric End-Stage Liver Disease (PELD) score for pediatric recipients. PELD score is not required for listing but may be used for the purpose of assigning priority for organ allocation. Definitions and calculators for the MELD and PELD scores can be found on the OPTN website at: <https://optn.transplant.hrsa.gov/resources/allocation-calculators/>

- Adults with hepatocellular carcinoma (HCC) who meet Milan criteria (Mazzaferro, 1996) will be awarded MELD exception points. OPTN Dynamic Imaging criteria apply. See “Special Considerations” below.
  - Milan Criteria (Mazzaferro, 1996)
    - Not a candidate for subtotal hepatic resection
    - Tumor is HCC stage II (T2 one nodule 2.0 – 5.0 cm, two or three nodules, all < 3.0 cm).
    - No macrovascular involvement
    - No identifiable extrahepatic spread of tumor to surrounding lymph nodes, lungs, abdominal organs or bone
  - Tumors can be downstaged with hepatic artery chemoembolization (HACE or TACE) with or without radiofrequency ablation (RFA). If successfully downstaged to be within the Milan criteria, MELD exception points are not automatically assigned. All such candidates with HCC, including those with downsized tumors who’s original or presenting tumor was greater than a stage T2, must be referred to the applicable Regional Review Board (RRB) for prospective review in order to receive additional priority.
- Children with the following conditions will be awarded PELD exception points:
  - Hepatoblastoma
  - Urea cycle disorders and organic acidemia
  - Combined liver/intestine transplant
- Living Donor Liver Transplant (LDLT). See “Indications” below.
  - Results from A2ALL (Berg et al., 2011; Olthoff et al., 2015) study demonstrated significant survival advantage associated with receipt of LDLT in comparison to continued waiting for Deceased Donor Liver Transplant (DDLTL) for candidates with low laboratory MELD scores
  - Complications of cirrhosis with low MELD score should be considered for LDLT (Koffron et al., 2008)
- Patients with primary oxalosis with ESRD should be considered for combined liver/kidney transplant. (Eason et al., 2008; Compagnon et al., 2014)

- Alcohol-associated liver disease has emerged as the most common indication for liver transplant leading to a doubling of transplants in the U.S. over the past 15 years. While broader acceptance of waiving mandated periods of sobriety for this subset of patients has contributed to this increase, regional differences may be leading to inequity in transplant access (Lee et al., 2019)
- Some transplant centers may use instruments such as Maddrey's Discriminant Function (Maddrey et al., 1978), the Sustained Alcohol Use Post-LT (SALT) (Lee et al., 2019), or the Penn Alcohol Craving Scale (PACS) (Flannery et al., 1999) to assist in the identification of patients who are at low risk for continued alcohol use and thus are good candidates for liver transplant.
- Transplant in the setting of non-resectable colorectal liver metastases is emerging as a potential treatment option for select patients. Optum will continue to monitor the medical literature for outcomes data and the establishment of standardized patient selection criteria.

## Indications

- Candidate for evaluation consistent with the practice guideline of the American Association for the Study of Liver Disease (AASLD) and the American Society of Transplantation (Martin et al., 2014).
- Liver transplant candidate consistent with Organ Procurement and Transplant Network (OPTN) guidelines
  - Transplantation is indicated for patients with End-Stage Liver Disease (ESLD) with a life expectancy < 12-24 months OR who have developed life-threatening complications OR with severe liver-associated debility frequently associated with sustained portal hypertension
    - Intractable ascites usually requiring frequent paracenteses
    - Recurring variceal bleeding not well controlled with surgical banding and medical therapy
    - Recurring spontaneous bacterial peritonitis (SBP)
    - Intractable hepatic encephalopathy
    - Severe thrombocytopenia with complications
    - Intractable pruritus
    - Muscle wasting due to liver disease with other systemic illnesses excluded
    - Debilitating fatigue due to liver disease with other systemic illnesses excluded
    - Intractable hyponatremia
    - Hepatic chylothorax
- Living donor liver transplant is a valid treatment option for patients with low MELD scores, especially in cases where a deceased donor offer is not likely to occur
- Polycystic liver disease with massive enlargement leading to physical impairment
- Hepatocellular carcinoma within Milan criteria determined by the OPTN Dynamic Imaging criteria and no CONTRAINDICATIONS.
  - Not a candidate for subtotal resection
  - The HCC meets the definition of a Stage T2 lesion(s) that include any of the following:
    - One lesion greater than or equal to 2 cm and less than or equal to 5 cm in size
    - Two or three lesions greater than or equal to 1 cm and less than or equal to 3 cm in size
  - Written documentation has been submitted with the request that the lesion meets the definition of OPTN Class 5B, 5T or a combination of 5A lesions that meets the definition of tumor Stage T2

- No macrovascular involvement
- No identifiable extrahepatic spread of tumor to surrounding lymph nodes, lungs, abdominal organs or bone
- Hepatocellular carcinoma that has been downstaged.
  - Note: Successful downstaging does not result in an automatic award of MELD exception points. The case must be referred to the Regional Review Board with a request for exception points.
  - The inclusion criteria for downstaging should be a single tumor < 8 cm or 2 to 3 tumors, each < 5 cm, with a total tumor diameter < 8 cm and no vascular invasion by imaging criteria
  - The tumor must meet the Milan Criteria after the downstaging procedure
  - Successful downstaging also requires a significant decrease in the AFP level to < 500 ng/ml for those patients with an initial AFP level > 1000 ng/ml.
- Cholangiocarcinoma (Martin et al., 2014).
  - May be approved under certain circumstances under the appropriate protocol at a center with an approved living donor liver transplant program OR a program in a region where the RRB will award MELD exception points to patients who qualify under the requesting program's treatment protocol (Heimbach et al., 2006; Becker et al., 2008; and Gores, 2006)
  - If donor availability (living or deceased) is in doubt due to program qualification (living donor) or RRB policy (deceased donor), the member can be educated about other available in-network programs that can satisfy one or both donor requirements.
- Neuroendocrine tumors (NET). CMS has concluded: "It is unclear which patients could benefit in this rare disease, but some patients do appear to benefit from a transplant. Therefore, coverage of this treatment may be best considered only in carefully selected patients on a case-by-case basis at this time." (Martin et al., 2014)
- Hemangioendothelioma (HAE). CMS and AASLD have concluded that generally patients with HAE have a better prognosis than do patients with HCC and may not have evidence of significant underlying liver disease. Consequently, transplantation is not common, but not necessarily contraindicated. For patients with large tumors liver transplantation should be considered for patients with unresectable HAE. (Martin et al., 2014)
- Hepatoblastoma: Children with hepatoblastoma may be considered for transplantation. The patient will have received multidisciplinary tumor board review and appropriate consideration of chemotherapy. PELD rules are not applied for patient selection.
  - If extrahepatic disease is not resectable or the patient is not a transplant candidate, additional chemotherapy, TACE, or radiation therapy may be indicated
- Nonresectable hilar or perihilar cholangiocarcinoma when all of the following are met (Breuer et al., 2022; Cambridge et al., 2021):
  - Tumor diameter < 3 cm
  - Negative lymph nodes
  - Absence of intra- or extrahepatic metastases
- Retransplantation is usually due to primary non-function, hepatic artery thrombosis, portal vein thrombosis, rejection, chronic cholestasis without chronic rejection and recurrent disease

## Organ-specific Contraindications

*Please review the Universal Contraindications found at the beginning of the Guidelines. These apply to all transplants unless otherwise noted below. Additional contraindications and exceptions that are specific to a particular type of transplant are noted below*

- Active untreated or untreatable non-hepatic malignancy
- Hepatocellular carcinoma that exceeds University of California, San Francisco (UCSF) criteria is a contraindication to transplantation:
  - Single lesion not exceeding 6.5 cm; OR
  - 2-3 lesions, none exceeding 4.5 cm, WITH
  - Total tumor diameter not greater than 8 cm
- Congenital abnormalities that will preclude a liver transplant

## Considerations for Substance Use Disorder

For patients experiencing catastrophic decompensation where a period of abstinence is not realistic the transplant center must have an institutional protocol that requires, at a minimum:

- Appropriate patient and psychosocial support profile. Transplant center must have an institutional protocol to conduct psychosocial evaluation and proactively implement interventions to promote post-transplant success.
  - Presence of close supportive social network
  - Absence of severe coexisting behavioral health disorders that would negatively impact a treatment plan
  - Agreement by patient (with support of his/her social network) to post-transplant rehabilitation and monitoring, and to lifelong abstinence from addictive substances
- Evaluation by addiction specialist indicating high likelihood of success of post-transplant rehabilitation and abstinence
- Approval by a transplant selection committee that includes in addition to the regular members, a psychiatrist and/or an addiction specialist
- No special consideration for acute decompensation with illicit drug addiction and/or abuse
- Any other substance abuse needs to be addressed
- Inactive alcohol and/or substance abuse (alcohol, crystal meth, heroin, cocaine, methadone, and/or narcotics, etc.) is not a contraindication

## Special Considerations

*Additional consultation and/or evaluation may be indicated in these situations.*

Unless otherwise cited, these recommendations are consistent with the 2013 American Association for the Study of Liver Disease (AASLD) Clinical Practice Guidelines. (Martin et al., 2014)

- Additional considerations may be present where liver transplantation may be appropriate in other circumstances where quality of life considerations become paramount.
  - Conditions eligible for MELD exception points:

- Cystic fibrosis with signs of reduced pulmonary function with forced expiratory volume at one second (FEV1) that falls below 40 percent
- Portopulmonary hypertension
- Hepatic artery thrombosis within 14 days of transplant
- Hepatoblastoma (pediatric) eligible for PELD exception points
- Urea cycle disorder or organic acidemia (pediatric) eligible for PELD exception points
- Primary oxaluria eligible for MELD exception points
- Hepatopulmonary syndrome eligible for MELD exception points
- Combined liver/intestine or multivisceral transplant
- Familial amyloidosis/familial amyloid polyneuropathy (FAP)
  - Patients may have no measurable abnormality of liver function at the time of the request for authorization
  - Liver transplants generally are done below the age of 30 AND when the patients are clinically well
  - Patients may be living donors for a domino transplant
- All other presentations not eligible for automatic MELD exception points including but not limited to intractable pruritus (itching), recurrent spontaneous bacterial peritonitis, bleeding, ascites, thrombocytopenia, encephalopathy, polycystic liver disease or other quality of life issues not adequately accounted for in the MELD/PELD score may be considered.
- Social and psychiatric issues can have significant impact on the outcomes of a transplant. It is expected that a psychosocial evaluation and/or a psychiatry consultation is obtained as part of the standard transplant evaluation. (Crone et al., 2020). The evaluation should address the following:
  - Overall functioning
  - Understanding of underlying illness and need for proposed treatment
  - History of adherence and compliance and barriers to compliance
  - Quality of relationships
  - Presence of a supportive caregiver
  - Social history including educational level and employment history
  - Housing and living situation including reliable transportation to attend medical visits
  - Socioeconomic status including sufficient funding to pay for immunosuppressive medications post-transplant
  - Current and past history of alcohol and substance use and abuse
  - Current and past psychiatric history including baseline cognitive status and coping skills
- Patients with a history of malignancy require an oncology evaluation to determine status of disease. Recommendations for suitability and timing of a solid organ transplant following successful treatment of malignancy may be found in Appendix B. The recommendations are based on Al-Adra et al. (2021)
- Patients with human immunodeficiency virus (HIV) infection must be on a highly active antiretroviral therapy (HAART) regimen and there must be documented evidence of sustained viral load suppression
- BMI  $\geq$  35 kg/m<sup>2</sup>
  - Refer to requesting program patient selection criteria
- Pediatric patients should have a normal history and physical, or if there is any indication of abnormal cardiac function, cardiology evaluation should be obtained

- Adult patients with known heart disease including but not limited to heart failure, cardiomyopathy and coronary artery disease require cardiology consultation and completion of consultant's recommendations if any
- Significant, uncorrectable pulmonary disease. Pulmonary consultation and completion of consultant's recommendations if any is required.
- Gastrointestinal clearance may be indicated in patients with a history of complicated or active GI disorders

## References

Ahmed A, Keefe B. Current Indications and Contraindications for Liver Transplantation. *Clin Liver Dis*. 2007;11:227-247.

Becker NS et al. Outcomes analysis for 280 patients with cholangiocarcinoma treated with liver transplantation over an 18-year period. *J Gastrointest Surg*. 2008;12:117.

Berg CL et al. Liver transplant recipient survival benefit with living donation in the MELD allocation era 1, 2, 3. A2All study. *Hepatology*. 2011;54(4):1313-1321. doi:10.1002/hep.24494.

Breuer E, Mueller M, Doyle MB, et al. Liver Transplantation as a New Standard of Care in Patients With Perihilar Cholangiocarcinoma: Results From an International Benchmark Study. *Ann Surg*. 2022 Nov 1;276(5):846-853. doi: 10.1097/SLA.0000000000005641. Epub 2022 Jul 27. PMID: 35894433.

Cambridge WA, Fairfield C, Powell JJ, et al. Meta-analysis and Meta-regression of Survival After Liver Transplantation for Unresectable Perihilar Cholangiocarcinoma. *Ann Surg*. 2021 Feb 1;273(2):240-250. doi: 10.1097/SLA.0000000000003801. PMID: 32097164.

Carbone M, Neuberger J. Liver transplantation in PBC and PSC: indications and disease recurrence. *Clin Res Hepatol Gastroenterol*. 2011;35(6-7):446-54. doi: 10.1016/j.clinre.2011.02.007.

Centers for Medicare and Medicaid. Coverage bulletin CAG-00091R. CMS.gov. <http://www.cms.gov/medicare-coverage-database/details/nca-decision-memo.aspx?NCAId=259>. Published June 21, 2012. Accessed June 10, 2021.

Crone CC, Marcangelo MJ, Shuster JL Jr. An approach to the patient with organ failure: transplantation and end-of-life treatment decisions. *Med Clin North Am*. 2010;94(6):1241-xii. doi:10.1016/j.mcna.2010.08.005

Eason JD et al. Proceedings of consensus conference on simultaneous liver/kidney transplantation (SLK). *Am J Transplant*. 2008;8:2243-2251.

Gores GJ et al. Model for End-Stage Liver Disease (MELD) exception for cholangiocarcinoma or biliary dysplasia. *Liver Transpl*. 2006;12:S95.

Heimbach JK et al. Predictors of disease recurrence following neoadjuvant chemoradiotherapy and liver transplantation for unresectable perihilar cholangiocarcinoma. *Transplantation*. 2006;82: 1703.

Kim WR et al. Hyponatremia and Mortality among Patients on the Liver-Transplant Waiting List. *N Engl J Med*. 2008;359:1018-26.

Koffron A et al. Liver Transplantation: Indications, Pretransplant Evaluation, Surgery, and Posttransplant Complications. *Med Clin N Am*. 2008;92:861–888

Kulik LM, Fisher RA, Rodrigo DR, Brown RS Jr, Freise CE, Shaked A, Everhart JE, Everson GT, Hong JC, Hayashi PH, Berg CL, Lok AS; A2ALL Study Group. Outcomes of living and deceased donor liver transplant recipients with hepatocellular carcinoma: results of the A2ALL cohort. *Am J Transplant*. 2012;12(11):2997-3007.

Martin P et al. Evaluation for liver transplantation in adults: 2013 Practice Guideline by the American Association for the Study of Liver Disease and the the American Society of Transplantation. *Hepatology*. 2014;59(3):1144-1166.

Mazzaferro V et al. Liver transplantation for the treatment of small hepatocellular carcinomas in patients with cirrhosis. *N Engl J Med*. 1996;334:693-699.

Merion RM, Schaubel DE, Dykstra DM, Freeman RB, Port FK, Wolfe RA. The survival benefit of liver transplantation. *Am J Transplant*. 2005;5(2):307-13.

Merion RM, Wolfe RA, Dykstra DM, Leichtman AB, Gillespie B, Held PJ. Longitudinal assessment of mortality risk among candidates for liver transplantation. *Liver Transpl*. 2003 Jan;9(1):12–18

National Cancer Institute. Childhood Liver Cancer Treatment-for health professionals (PDQ®), Hepatoblastoma. <http://www.cancer.gov/types/liver/hp/child-liver-treatment-pdq>. Updated August 4, 2021. Accessed September 9, 2021.

Newsome PN et al. Guidelines for liver transplantation for patients with non-alcoholic steatohepatitis. *Gut*. 2012;61(4):484-500. doi: 10.1136/gutjnl-2011-300886.

Ohio Administrative Code (OAC) 5160-1-01. Medicaid medical necessity: definitions and principles. Available at: [Rule 5160-1-01 - Ohio Administrative Code | Ohio Laws](#). Accessed March 28, 2023.

Ohio Administrative Code (AOC) 5160-2-65 (L). Available at: [Rule 5160-2-65 - Ohio Administrative Code | Ohio Laws](#). Accessed March 28, 2023.

Olthoff KM, Smith AR, Abecassis M, Baker T, Emond JC, Berg CL, Beil CA, Burton Jr JR, Fisher RA, Freise CE, Gillespie BW, Grant DR, Humar A, Kam I, Merion RM, Pomfret EZ, Samstein B, Shaked A. Defining long-term outcomes with living donor liver transplantation in North America. *Ann Surg*. 2015 Sep;262(3):465-75.

Organ Procurement and Transplantation Network (OPTN) and Scientific Registry of Transplant Recipients (SRTR). OPTN / SRTR 2010 Annual Data Report. Rockville, MD: Department of Health and Human Services, Health Resources and Services Administration, Healthcare Systems Bureau, Division of Transplantation; 2011.

Organ Procurement and Transplantation Network (OPTN). Policies. [https://optn.transplant.hrsa.gov/media/1200/optn\\_policies.pdf](https://optn.transplant.hrsa.gov/media/1200/optn_policies.pdf)

Pomfret EA, Washburn K, Wald C, Nalesnik MA, Douglas D, Russo M, Roberts J, Reich DJ, Schwartz ME, Mieles L, Lee FT, Florman S, Yao F, Harper A, Edwards E, Freeman R, Lake J. Report of a national conference on liver allocation in patients with hepatocellular carcinoma in the United States. *Liver Transpl*. 2010 Mar;16(3):262-78.

Poon KS, Chen TH, Jeng LB, Yang HR, Li PC, Lee CC, Yeh CC, Lai HC, Su WP, Peng CY, Chen YF, Ho YJ, Tsai PP. A high model for end-stage liver disease score should not be considered a contraindication to living donor liver transplantation. *Transplant Proc*. 2012 Mar;44(2):316-9.

Ravaioli M, Grazi GL, Piscaglia F, Trevisani F, Cescon M, Ercolani G, Vivarelli M, Golfieri R, D'Errico Grigioni A, Panzini I, Morelli C, Bernardi M, Bolondi L, Pinna AD. Liver transplantation for hepatocellular carcinoma: results of down-staging in patients initially outside the Milan selection criteria. *Am J Transplant*. 2008 Dec;8(12):2547-57.

Schaubel DE, Sima CS, Goodrich NP, Feng S, Merion RM. The survival benefit of deceased donor liver transplantation as a function of candidate disease severity and donor quality. *Am J Transplant*. 2008;8:419-425.

Scientific Registry of Transplant Recipients. <https://www.srtr.org/>

Squires RH, Ng V, Romero R, et al. Evaluation of the pediatric patient for liver transplantation: 2014 Practice Guideline by The American Association for the Study of Liver Diseases, American Society of Transplantation and The North American Society for Pediatric Gastroenterology, Hepatology and Nutrition. *Hepatology*. 2014 Jul; 60(1):362-98. doi: 10.1002/hep.27191

Wiesner R, Edwards E, Freeman R, Harper A, Kim R, Kamath P, et al. Model for end-stage liver disease (MELD) and allocation of donor livers. *Gastroenterology*. 2003;124:91-96.

Yao FY, Kerlan RK, Hirose R, Davern TJ, Bass NM, Feng S, Peters M, Terrault N, Freise CE, Ascher NL, Roberts JP. Excellent outcome following down-staging of hepatocellular carcinoma prior to liver transplantation: an intention-to-treat analysis. *Hepatology*. 2008;48:819-827.

# Pancreas and Kidney/Pancreas

Medical necessity determinations must comply with the definitions and principles established in [Rule 5160-1-01 - Ohio Administrative Code | Ohio Laws](#)

## General Information

- There are three variations of pancreas and kidney/pancreas transplants.
  - Both organs can be implanted during one procedure. This is referred to as simultaneous pancreas kidney transplantation (SPK).
  - The pancreas can be transplanted after a kidney transplant. This is referred to as pancreas after kidney transplantation (PAK).
  - The pancreas can be transplanted alone. This is called pancreas transplant alone (PTA)
- SPK, PAK or PTA may be indicated in patients with either Type 1 or Type 2 diabetes. Pancreas transplantation can provide excellent outcomes for patients with labile diabetes (Gruessner, 2011). The outcomes of combined kidney pancreas transplants in Type 2. diabetics are comparable to the outcomes in Type 1 diabetics. (Light et al.,2006; Nath et al., 2005)
- SPK transplant is the definitive treatment of Type 1 diabetes combined with end-stage renal disease. Long-term graft function can lead to improvement in diabetes-related complications and, in patients younger than 50 years, can lead to improved overall survival. PAK transplant and PA transplant do not result in similar improvements in patient survival, but with appropriate patient selection, they can improve quality of life by rendering the patient insulin-free. (Dhanireddy, 2012)
- A pancreas transplant may be justified on the basis that patients replace daily injections of insulin with an improved quality of life but at the expense of a major surgical procedure and lifelong immunosuppression. (White, 2009)
- The rate of patient survival is approximately 97% at 1 year and 92% at 3 years after SPK transplantation. Similar patient survival rates are reported for PAK and PTA recipients. Graft survival is variable, depending on the type of pancreas transplant performed. The mortality among diabetics is greatly reduced by SPK transplantation compared with the waiting list; however, it is less so for solitary pancreas transplants. (Redfield et al., 2016)
- Complications include graft thrombosis, bleeding, abdominal abscess, pancreatic leak, urinary tract infection, and early rejection. (Ablorsu, 2008) Pancreas transplant is associated with more surgical complications and higher perioperative morbidity and mortality than kidney transplant alone. (Dhanireddy, 2012) There is a high incidence of kidney graft failure in SPK recipients, following a pancreas graft loss. About 50% of the kidney graft failure occurred within three months after the loss of the pancreas graft. (Hill, 2008)
- Allogeneic Islet Cell transplantation is not medically necessary except:
  - When performed under a clinical trial **AND**
  - A clinical trial benefit exists **AND**
  - The trial conforms to the provisions of that benefit.

Autologous islet cell transplantation following total pancreatectomy for non-malignant conditions is an accepted treatment to prevent the immediate onset of insulin dependent diabetes mellitus. (Bramis, 2012)

## Indications

- SPK and PAK:
  - Qualifies for kidney transplant (see kidney criteria) **AND** the member is diabetic. The outcomes of combined kidney pancreas transplants in Type 2 diabetics are comparable to the outcomes in Type 1 diabetics. (Light & Barhyte, 2006)
  - The criteria for covering a pancreas transplant alone are not applicable when a kidney is also being transplanted
- PTA:
  - Type 1 diabetes mellitus with one or both of the following:
    - Labile diabetes mellitus with documented life-threatening hypoglycemic unawareness and/or frequent hypoglycemic episodes despite optimal medical management, Clark Hypoglycemic Score  $\geq 4$  (see Appendix C)
    - Physical or psychological inability to safely administer exogenous insulin
  - Type 2 diabetes mellitus with one of the following:
    - Labile diabetes mellitus with documented life-threatening hypoglycemic unawareness despite optimal medical management, Clark Hypoglycemic Score  $\geq 4$  (see Appendix C)
    - Physical or psychological inability to safely administer exogenous insulin
  - Appropriate candidates will have all of the following characteristics: (Stratta, 2009)
    - Insulin requiring diabetes for  $> 5$  years receiving  $\leq 1$  unit/kg/day
    - BMI  $< 30$
    - Age  $< 60$
    - No history of major vascular events such as bilateral limb amputations and disabling CVA
    - Not actively smoking
    - Left ventricular ejection fraction  $\geq 40\%$  with no left ventricular hypertrophy
- Retransplantation is usually due to non-function of the grafted organ(s), chronic rejection and chronic allograft pancreatitis

## Organ-specific Contraindications

*Please review the Universal Contraindications found at the beginning of the Guidelines. These apply to all transplants unless otherwise noted below. Additional contraindications and exceptions that are specific to a particular type of transplant are noted below.*

- Significant cardiac disease: (Stratta, 2009)
  - Non-correctable coronary artery disease
  - Ejection fraction (LVEF, EF)  $< 40\%$

## Consideration for Substance Use Disorder

For patients experiencing catastrophic decompensation where a period of abstinence is not realistic the transplant center must have an institutional protocol that requires, at a minimum:

- Appropriate patient and psychosocial support profile. Transplant center must have an institutional protocol to conduct psychosocial evaluation and proactively implement interventions to promote post-transplant success.
  - Presence of close supportive social network
  - Absence of severe coexisting behavioral health disorders that would negatively impact a treatment plan
  - Agreement by patient (with support of his/her social network) to post-transplant rehabilitation and monitoring, and to lifelong abstinence from addictive substances
- Evaluation by addiction specialist indicating high likelihood of success of post-transplant rehabilitation and abstinence
- Approval by a transplant selection committee that includes in addition to the regular members, a psychiatrist and/or an addiction specialist
- No special consideration for acute decompensation with illicit drug addiction and/or abuse
- Any other substance abuse needs to be addressed
- Inactive alcohol and/or substance abuse (alcohol, crystal meth, heroin, cocaine, methadone, and/or narcotics, etc.) is not a contraindication

## Special Considerations

*Additional consultation and/or evaluation may be indicated in these situations.*

- Serum C-peptide
  - Serum C-peptide measurements are not required. Transplant candidacy is based on other considerations noted elsewhere in this document. (Stratta, 2009)
- Autologous Islet Cell transplantation. (Bramis, 2012)
  - May be indicated following total pancreatectomy for non-malignant conditions
  - Check benefits to determine if it is covered under a particular plan
- Social and psychiatric issues can have significant impact on the outcomes of a transplant. It is expected that a psychosocial evaluation and/or a psychiatry consultation is obtained as part of the standard transplant evaluation. (Crone et al., 2020). The evaluation should address the following:
  - Overall functioning
  - Understanding of underlying illness and need for proposed treatment
  - History of adherence and compliance and barriers to compliance
  - Quality of relationships
  - Presence of a supportive caregiver
  - Social history including educational level and employment history
  - Housing and living situation including reliable transportation to attend medical visits
  - Socioeconomic status including sufficient funding to pay for immunosuppressive medications post-transplant
  - Current and past history of alcohol and substance use and abuse
  - Current and past psychiatric history including baseline cognitive status and coping skills

- Patients with a history of malignancy require an oncology evaluation to determine status of disease. Recommendations for suitability and timing of a solid organ transplant following successful treatment of malignancy may be found in Appendix B. The recommendations are based on Al-Adra et al. (2021)
- Patients with human immunodeficiency virus (HIV) infection must be on a highly active antiretroviral therapy (HAART) regimen and there must be documented evidence of sustained viral load suppression.
- BMI  $\geq$  35 kg/m<sup>2</sup>
  - Refer to requesting program patient selection criteria
- Pediatric patients should have a normal history and physical, or if there is any indication of abnormal cardiac function, cardiology evaluation should be obtained
- Adult patients with known heart disease including but not limited to heart failure, cardiomyopathy and coronary artery disease require cardiology consultation and completion of consultant's recommendations, if any.
- Gastrointestinal clearance may be indicated in patients with a history of complicated or active GI disorders.
- Patients over the age of 60
  - Refer to requesting program patient selection criteria
- Significant, uncorrectable pulmonary disease. Pulmonary consultation and completion of consultant's recommendations if any is required.

## References

- Ablorsu E, Ghazanfar A, Mehra S, et al. Outcome of pancreas transplantation in recipients older than 50 years: a single-centre experience. *Transplantation*. 2008 Dec 15;86(11):1511-4. doi: 10.1097/TP.0b013e3181891cd6. PMID: 19077882.
- Bramis K. Systematic review of total pancreatectomy and islet autotransplantation for chronic pancreatitis. *Br J Surg*. 2012 Jun;99(6):761-6.
- Clarke WL, Cox DJ, Gonder-Frederick LA, Julian D, Schlundt D, Polonsky W. Reduced awareness of hypoglycemia in adults with IDDM, a prospective study of hypoglycemic frequency and associated symptoms. *Diabetes Care*. 1995;17:517-522.
- Crone CC, Marcangelo MJ, Shuster JL Jr. An approach to the patient with organ failure: transplantation and end-of-life treatment decisions. *Med Clin North Am*. 2010;94(6):1241-xii. Doi:10.1016/j.mcna.2010.08.005
- Dhanireddy KK. Pancreas Transplantation. *Gastroenterol Clin North Am*. 2012 Mar;41(1):32-42.
- Dean PG, Kudva YC, Larson TS, Kremers WK, Stegall MD. Posttransplant diabetes mellitus after pancreas transplantation. *Am J Transplant*. 2008;8:175-182.
- Gruessner AC. 2011 update on pancreas transplantation: comprehensive trend analysis of 25,000 cases followed up over the course of twenty-four years at the International Pancreas Transplant Registry (IPTR). *Rev Diabet Stud*. 2011 Apr; 8(1):6-16.
- Hill M. What happens to the kidney in an SPK transplant when the pancreas fails due to a technical complication? *Clin Transplant*. 2008 Nov;22(4):456-61.
- Light JA, Barhyte DY. Simultaneous pancreas-kidney transplants in Type I and Type II diabetic patients with end-stage renal disease: similar 10-year outcomes. *Transplant Proc*. 2006; 37:1283-1284.
- Nath DS, Gruessner AC, Kandaswamy R, Gruessner RW, Sutherland DER, Humar A. Outcomes of pancreas transplants for patients with type 2 diabetes mellitus. *Clin Transplant*. 2005;19:792-797.

Ohio Administrative Code (OAC) 5160-1-01. Medicaid medical necessity: definitions and principles. Available at: [Rule 5160-1-01 - Ohio Administrative Code | Ohio Laws](#). Accessed March 28, 2023.

Ohio Administrative Code (AOC) 5160-2-65 (L). Available at: [Rule 5160-2-65 - Ohio Administrative Code | Ohio Laws](#). Accessed March 28, 2023.

Redfield RR, Rickels MR, Naji A, et al. Pancreas Transplantation in the Modern Era. *Gastroenterol Clin North Am*. 2016 Mar;45(1):145-66. doi: 10.1016/j.gtc.2015.10.008. Epub 2016 Jan 13. PMID: 26895686.

Singh RP, Rogers J, Farney AC, Hartmann EL, Reeves-Daniel A, Doares W, Ashcraft E, Adams PL, Stratta RJ. Do pretransplant c-peptide levels influence outcomes in simultaneous kidney-pancreas transplantation? *Transplant Proc*. 2008;40:510-512.

Sampaio MS, Pavani NR, Kuo H-T, Poommipanit N, Cho YW, Shah T, Bunnapradist S. Obesity was associated with inferior outcomes in simultaneous pancreas kidney transplant. *Transplantation*. 2010;89:1117-1125.

Stratta RJ. Selection of appropriate candidates and outcomes of pancreas transplantation for c-peptide positive diabetics. *American Transplant Congress*. June 2, 2009.

White SA. Pancreas transplantation. *Lancet*. 2009 May;373(9677):1808-17.

# Intestine including Liver/Intestine and Multivisceral

Medical necessity determinations must comply with the definitions and principles established in [Rule 5160-1-01 - Ohio Administrative Code | Ohio Laws](#)

## General Information

- Patients with intestinal failure syndromes should be managed in centers with robust intestinal failure/rehabilitation programs to take advantage of all opportunities to regain adequate function and to avoid total parenteral nutrition (TPN) with its complications and intestinal transplant. (Beathe et al., 2008; Torres et al., 2007) If no evaluation for intestinal rehabilitation has been performed, the member may be redirected to a program that has the capacity to perform these important evaluation and management services.
- Adaptation following disease or injury that leads to intestinal failure can occur over many months up to a year or more. The ability of the remaining gut to adapt to be able to support the patient with enteral nutrition alone is determined by a number of factors including the length of the remaining intestine, the segments remaining, the presence of an ileocecal valve, the presence or absence of the colon and general motility patterns. A number of medical and surgical interventions are possible to help many of these patients avoid transplant. (Centers for Medicare and Medicaid; Fryer, 2007)
- Timelier referral of intestinal failure patients who have not yet developed end-stage liver disease may allow for an intestine only transplant (IOT), which is associated with better outcomes. (Chungfat et al., 2007)
- The short-term survival of pediatric intestine recipients has significantly improved in the last decade and reached 90% at the end of the first year after transplant in high-volume intestinal transplant centers. (Avitzur & Grant, 2010)

## Indications

- Intestine
  - Patients with irreversible intestinal failure with associated life-threatening complications (Fishbein, 2009)
  - Patients with secretory diarrhea of childhood may have high mortality/morbidity due to their underlying disease and therefore can be considered for intestine transplant evaluation in the absence of life-threatening complications. (Ruemmele et al., 2004)
  - Dependent on TPN with cholestatic liver disease as defined by elevated direct bilirubin. If cholestasis is advanced, or cirrhosis is present, a combined liver/intestine transplant may be considered (Colomb et al., 2007).
  - Isolated intestinal transplants are performed in the presence of cholestasis only when the liver disease is felt to be reversible
  - Inability to maintain fluid and electrolyte balance
  - Recurrent sepsis as a result of either line sepsis or intestinal stasis
  - Dependent on TPN with loss of or impending loss of (using last major vessel) vascular access
  - Non-reconstructible gastrointestinal (GI) tract
- Liver/small bowel/pancreas with or without addition of stomach or colon
  - Liver/intestine

- One of the above AND
- Biopsy proven fibrotic changes within the liver indicating that the TPN associated liver dysfunction is irreversible OR
- Clinical assessment of significant portal hypertension (such as hypersplenism) where biopsy may not be available or warranted or considered safe to perform
- Multivisceral
  - All the above under Intestine AND
  - Technical considerations that make the anastomoses of one or more of the separate organs problematic when compared to an en bloc dissection and transplantation that requires fewer vascular and intestinal anastomoses OR
  - Desmoid tumors OR
  - Severe gastric or antroduodenal motility disorder (pseudo-obstruction). (Cruz et al., 2010) OR
  - Patients listed for multivisceral transplantation without TPN dependency require special case review. (Kaufman et al., 2001)
- Retransplantation
  - May occur when there is a failed prior intestinal transplantation, including non-function of the grafted organ, acute rejection requiring enterectomy, or chronic rejection

## Organ-specific Contraindications

*Please review the Universal Contraindications found at the beginning of the Guidelines. These apply to all transplants unless otherwise noted below. Additional contraindications and exceptions that are specific to a particular type of transplant are noted below.*

- There are no organ-specific contraindications

## Considerations for Substance Use Disorder

For patients experiencing catastrophic decompensation where a period of abstinence is not realistic the transplant center must have an institutional protocol that requires, at a minimum:

- Appropriate patient and psychosocial support profile. Transplant center must have an institutional protocol to conduct psychosocial evaluation and proactively implement interventions to promote post-transplant success.
  - Presence of close supportive social network
  - Absence of severe coexisting behavioral health disorders that would negatively impact a treatment plan
  - Agreement by patient (with support of his/her social network) to post-transplant rehabilitation and monitoring, and to lifelong abstinence from addictive substances
- Evaluation by addiction specialist indicating high likelihood of success of post-transplant rehabilitation and abstinence
- Approval by a transplant selection committee that includes in addition to the regular members, a psychiatrist and/or an addiction specialist
- No special consideration for acute decompensation with illicit drug addiction and/or abuse
- Any other substance abuse needs to be addressed

- Inactive alcohol and/or substance abuse (alcohol, crystal meth, heroin, cocaine, methadone, and/or narcotics, etc.) is not a contraindication

## Special Considerations

*Additional consultation and/or evaluation may be indicated in these situations.*

- Social and psychiatric issues can have significant impact on the outcomes of a transplant. It is expected that a psychosocial evaluation and/or a psychiatry consultation is obtained as part of the standard transplant evaluation. (Crone et al., 2020). The evaluation should address the following:
  - Overall functioning
  - Understanding of underlying illness and need for proposed treatment
  - History of adherence and compliance and barriers to compliance
  - Quality of relationships
  - Presence of a supportive caregiver
  - Social history including educational level and employment history
  - Housing and living situation including reliable transportation to attend medical visits
  - Socioeconomic status including sufficient funding to pay for immunosuppressive medications post-transplant
  - Current and past history of alcohol and substance use and abuse
  - Current and past psychiatric history including baseline cognitive status and coping skills.
- Patients with a history of malignancy require an oncology evaluation to determine status of disease. Recommendations for suitability and timing of a solid organ transplant following successful treatment of malignancy may be found in Appendix B. The recommendations are based on Al-Adra et al. (2021)
- Patients with human immunodeficiency virus (HIV) infection must be on a highly active antiretroviral therapy (HAART) regimen and there must be documented evidence of sustained viral load suppression.
- BMI  $\geq 35$  kg/m<sup>2</sup>
  - Refer to requesting program patient selection criteria
- Pediatric patients should have a normal history and physical, or if there is any indication of abnormal cardiac function, cardiology evaluation should be obtained.
- Adult patients with known heart disease including but not limited to heart failure, cardiomyopathy and coronary artery disease require cardiology consultation and completion of consultant's recommendations, if any.
- Gastrointestinal clearance may be indicated in patients with a history of complicated or active GI disorders.
- Patients over the age of 60
  - Refer to requesting program patient selection criteria.
- Significant, uncorrectable pulmonary disease. Pulmonary consultation and completion of consultant's recommendations if any is required.
- Subsequent recovery of hyperbilirubinemia with nutritional and medical management may allow for "delisting" or consideration of isolated intestine transplant if the liver has improved despite initial biopsy findings.

## References

- Avitzur Y, Grant D. Intestine transplantation in children: update 2010. *Pediatr Clin North Am*. 2010;57(2):415-31.
- Avitzur Y, Wang JY, Silva NT, et al. The impact if intestinal rehabilitation program and its innovative therapies on the outcome of intestine transplant candidates. *J Pediatr Gastroenterol Nutr*. 2015 Jul; 61(1):18-23.
- Beath S, Pironi L, Gabe S, et al. Collaborative strategies to reduce mortality and morbidity in patients with chronic intestinal failure including those who are referred for small bowel transplantation. *Transplantation*. 2008 May 27; 85(10):1378-84
- Burghardt KM, Wales PW, 28eSilva NT et al. Pediatric intestinal transplant listing criteria- a call for a change in the new era of intestinal failure outcomes. *Am J Transplant*. 2015;15(6):1674-81.
- Centers for Medicare and Medicaid. National Coverage Determination (NCD) for Intestinal and Multi-Visceral Transplantation (260.5). Available at <https://www.cms.gov/medicare-coverage-database/view/ncd.aspx?ncdid=280>. Accessed July 18, 2021.
- Chungfat N, Dixler I, Cohran V, et al. Impact of parenteral nutrition-associated liver disease on intestinal transplant waitlist dynamics. *J Am Coll Surg*. 2007;205(6):755-61.
- Colomb V, Dabbas-Tyan M, Taupin P, et al. Long-term outcome of children receiving home parenteral nutrition: a 20-year single-center experience in 302 patients. *J Pediatr Gastroenterol Nutr*. 2007 Mar;44(3):347-53.
- Crone CC, Marcangelo MJ, Shuster JL Jr. An approach to the patient with organ failure: transplantation and end-of-life treatment decisions. *Med Clin North Am*. 2010;94(6):1241-xii. Doi:10.1016/j.mcna.2010.08.005
- Cruz RJ, Costa G, Bond G, et al. Modified “liver-sparing” multivisceral transplant with preserved native spleen, pancreas and duodenum: technique and long-term outcome. *J Gastrointest Surg*. 2010;14(11):1709-21.
- Fishbein TM. Intestinal transplantation. *N Engl J Med*. 2009;361(10):998-1008.
- Fryer JP. Intestinal transplantation: current status. *Gastroenterol Clin N Am* 2007; 36(1): 145–159.
- Grant D, Abu-Elmagd K, Mazariegos G, et al. Intestinal transplant registry report: global activity and trends. *Am J Transplant*. 2015;15(1):210-9.
- Kaufman SS, Atkinson JB, Bianchi A, et al. Indications for pediatric intestinal transplantation: A position paper of the American Society of Transplantation. *Pediatr Transplant*. 2001;5:80-87.
- Ohio Administrative Code (OAC) 5160-1-01. Medicaid medical necessity: definitions and principles. Available at: [Rule 5160-1-01 - Ohio Administrative Code | Ohio Laws](#). Accessed March 28, 2023.
- Ohio Administrative Code (AOC) 5160-2-65 (L). Available at: [Rule 5160-2-65 - Ohio Administrative Code | Ohio Laws](#). Accessed March 28, 2023.
- Ruemmele et al. New Perspectives for Children with Microvillous Inclusion Disease: Early Small Bowel Transplantation. *Transplantation*. 2004;77:1024-1028.
- Stanger JD, Oliveira C, Blackmore C, et al. The impact of multi-disciplinary intestinal rehabilitation programs on the outcome of pediatric patients with intestinal failure: a systematic review and meta-analysis. *J Pediatr Surg*. 2013;48(5):983-92.
- Torres C, Sudan D, Vanderhoof J, et al. Role of an intestinal rehabilitation program in the treatment of advanced intestinal failure. *J Pediatr Gastroenterol Nutr*. 2007 Aug;45(2):204-212.

# Heart

Medical necessity determinations must comply with the definitions and principles established in [Rule 5160-1-01 - Ohio Administrative Code | Ohio Laws](#)

## General Information

- Cardiac transplantation is an option for patients with end-stage heart disease. In 2019, new listings continued to increase, with 4086 new candidates. Also in 2019, 3597 heart transplants were performed, an increase of 157 (4.6%) from 2018; 509 transplants occurred in children and 3088 in adults. Cardiomyopathy is the most common diagnosis among candidates, comprising 59.7% in 2019. The proportion of candidates with ventricular assist devices (VADs) at listing increased from 32.6% in 2018 to 37.1% in 2019. At year-end 2019, 253 candidates were listed for heart-kidney transplant, a substantial increase since 2009. The number of heart-lung candidates remained stable over this same period, with 74 candidates waiting in 2019. From 2017 to 2019, the number of patients removed from the transplant list increased, but fewer were removed due to improvement or being too ill for transplant. Compared with 2017, fewer patients died on the waiting list in 2019. At the end of 2019, 4 patients (0.1%) were listed as status 1, and 48 (1.4%) were status 2. Fewer patients were listed in the highest-urgency categories under the new allocation system implemented in 2018, with 50.5% listed as status 4. (Colvin et al., 2021).
- Combined heart-liver transplants (CHLT) have steadily increased from a total of 18 in 2016 to 79 in 2022 with United Network for Organ Sharing (UNOS) regions 5, 7 and 9 each performing more than 10 over the same time period (OPTN, March 23, 2023). Congenital heart disease with subsequent irreversible liver dysfunction due to congestive hepatopathy has become the most common indication for CHLT (Tracy et al., 2023). In a comprehensive analysis of UNOS data on 1,084 adults who underwent heart transplant (HT) from 2009 through March 2020 [817 CHD heart-only, 74 CHD CHLT, 179 non-CHD heart-only, and 14 heart-liver-kidney], Cotter et al. (2021) found the number of CHLTs for CHD increased from a prior rate of 4/year to 21/year in 2019, representing a > 5-fold increase compared to a doubling of the CHD HT-only and non-CHD HLT groups. The analysis also noted a trend to reduced mortality in the CHD CHLT recipients associated with higher-volume centers that average one CHD CHLT annually. Additionally, in a separate retrospective analysis of the UNOS database for heart transplantation from 1987 to 2015 and stratified into patients undergoing CHLT (n = 192), heart-kidney transplantation (n=1,174), and heart-only transplantation (n=61,471), Chou et al. (2019) documented an immunoprotective effect of the simultaneously transplanted liver or kidney that is transferred to the cardiac allograft in the case of HLT and HKT.
- SynCardia 50cc and 70cc Total Artificial Heart
  - A total artificial heart (TAH) that can maintain the life of a patient with biventricular heart failure when there is imminent risk of death with no other appropriate medical or surgical options, when the patient is waiting for a donor heart or is being evaluated for transplant, is not a candidate for LVAD or BiVAD, and there is adequate space in the chest area for the device.
  - Please refer to the Optum Mechanical Circulatory Support Devices Guideline available internally in Knowledge Library.

## Indications

Medical necessity determinations must comply with the definitions and principles established in [Rule 5160-1-01 - Ohio Administrative Code | Ohio Laws](#).

Cardiac transplantation is considered medically necessary in certain indications. The Ohio Department of Medicaid recognizes the use of InterQual® criteria secondary to the decision of the Ohio Solid Organ Transplantation Consortium. For medical necessity clinical coverage criteria, refer to the InterQual® CP: Procedures, Transplantation, Cardiac.

View the InterQual® criteria at: [InterQual® \(cue4.com\)](https://www.cue4.com)

- Patients being considered for heart transplant may have documented one or more of the following:
  - Likelihood of death from heart disease within 12 — 24 months without transplant
  - Refractory heart failure requiring continuous inotropic support (Mehra et al., 2016)
  - New York Heart Association Class III or IV or American Heart Association Stage D. See Appendix D for description of heart failure categories.
  - Valvular heart disease with left ventricular dysfunction (not correctable with valve replacement or repair) (Rosa et al., 2015)
  - Recurrent life-threatening arrhythmias not otherwise correctable despite maximal antiarrhythmic and all appropriate conventional medical and surgical modalities (including implantable devices and multiple firings from an ICD for documented VT and VF). (Acker & Jessup, 2011)
  - Intractable angina with coronary artery disease despite maximal medical therapy that is not amenable to revascularization (Yamani & Taylor, 2010)
  - Primary cardiac tumors confined to the myocardium, with a low likelihood of metastasis at time of transplantation (Yamani & Taylor, 2010)
  - Severe hypertrophic or restrictive cardiomyopathy, with NYHA Class IV symptoms (Yamani & Taylor, 2010). See Appendix D for description of heart failure categories.
  - Congenital Heart Disease (CHD) that is not amenable to surgical therapy or that has failed previous surgical correction (Patel, 2009)
- Cardiac amyloidosis, light chain (AL) or transthyretin (ATTR) type
  - If evidence of extracardiac amyloidosis is present on biopsy, it must be deemed not likely to affect post-transplantation recovery. (American College of Cardiology [ACC], 2023; Barrett et al., 2020)
- Simultaneous heart kidney transplant:
  - Heart transplant candidates with an established GFR < 30ml/min/1.73 m<sup>2</sup> or who are on dialysis may be considered for simultaneous heart kidney transplant (Kobashigawa et al., 2020)
  - If there is evidence of CKD and/or AKI not reversible despite optimizing cardiac function, the patient would be considered to have established kidney disease and may be a candidate for simultaneous heart kidney transplant (Kobashigawa et al., 2020)
  - Candidates for simultaneous heart kidney transplantation must undergo evaluation by both organ transplantation teams (Johnson & Nadim, 2021)
- Combined heart liver transplantation for the following indications (Alexopoulos et al., 2022; Zhao et al., 2019):
  - Primary heart disease with secondary cardiac cirrhosis caused by chronic hepatic venous outflow obstruction including:
    - Patients with CHD that required Fontan procedure who ultimately experienced progressive hepatic fibrosis.
  - Hereditary transthyretin (ATTR) amyloidosis leading to cardiomyopathy.
  - Patients with primary indication for liver transplant with concurrent heart disease such as:
    - Arrhythmogenic right ventricular cardiomyopathy
    - Hypertrophic cardiomyopathy

- Dilated nonischemic and ischemic cardiomyopathy
- Congenital constrictive cardiomyopathy
- Radiation-induced cardiomyopathy
- Sarcoidosis
- Retransplantation due to primary graft failure, rejection refractory to immunosuppressive therapy and graft coronary artery disease with severe ischemia of the heart graft. Retransplantation appears most appropriate for those patients more than 6 months following original heart transplantation, who have severe cardiac allograft vasculopathy and associated left ventricular dysfunction, or allograft dysfunction and progressive symptoms of heart failure in the absence of acute rejection. (Mehra et al., 2016)

## Organ-specific Contraindications

*Please review the Universal Contraindications found at the beginning of the Guidelines. These apply to all transplants unless otherwise noted below. Additional contraindications and exceptions specific to a particular type of transplant are noted below.*

Unless otherwise cited, these recommendations are consistent with the 2016 International Society for Heart Lung Transplantation (ISHLT) Listing Criteria for Heart Transplantation: A 10-year update. (Mehra et al., 2016)

- Significant peripheral vascular disease not correctable with surgery.
- Significant uncorrectable life-limiting medical conditions such as severe end stage organ damage including severe diabetes mellitus with end organ damage, irreversible severe pulmonary disease, with FEV<sub>1</sub> < 1 L or FVC < 50%, irreversible severe hepatic disease, irreversible severe renal disease etc. (Acker & Jessup, 2011).
- Active systemic and/or uncontrolled infection associated with left ventricular assist device.
- Ongoing tobacco use. It is reasonable to consider active tobacco smoking as a relative contraindication for transplantation. Active tobacco smoking during the previous six months is a risk factor for poor outcomes after transplantation (Mehra et al., 2006; upheld by Mehra et al., 2016).

## Considerations for Substance Use Disorder

For patients experiencing catastrophic decompensation where a period of abstinence is not realistic the transplant center must have an institutional protocol that requires, at a minimum:

- Appropriate patient and psychosocial support profile. Transplant center must have an institutional protocol to conduct psychosocial evaluation and proactively implement interventions to promote post-transplant success.
  - Presence of close supportive social network
  - Absence of severe coexisting behavioral health disorders that would negatively impact a treatment plan
  - Agreement by patient (with support of his/her social network) to post-transplant rehabilitation and monitoring, and to lifelong abstinence from addictive substances
- Evaluation by addiction specialist indicating high likelihood of success of post-transplant rehabilitation and abstinence
- Approval by a transplant selection committee that includes in addition to the regular members, a psychiatrist and/or an addiction specialist

- No special consideration for acute decompensation with illicit drug addiction and/or abuse
- Any other substance abuse needs to be addressed
- Inactive alcohol and/or substance abuse (alcohol, crystal meth, heroin, cocaine, methadone, and/or narcotics, etc.) is not a contraindication

## Special Considerations

*Additional consultation and/or evaluation may be indicated in these situations.*

Unless otherwise cited, these recommendations are consistent with the 2016 International Society for Heart Lung Transplantation (ISHLT) Listing Criteria for Heart Transplantation: A 10-year update. (Mehra et al., 2016)

- Severe irreversible pulmonary hypertension:
  - Pulmonary artery systemic pressure > 60 mm Hg, mean transpulmonary gradient > 15 mm Hg, and/or pulmonary vascular resistance (PVR) > 5 Wood units on maximal vasodilator therapy. (Alba, 2010). However, the patient may qualify for combined heart/lung transplantation.
  - Elevated PVR defined as a PVR > 5 Woods units, a PVR index > 6, or a transpulmonary pressure gradient 16 to 20mmHg, should be considered as relative contraindications to isolated cardiac transplantation if these parameters can't be met with optimal meds and short-term mechanical support. (Optum Thoracic Solid Organ and VAD Expert Panel, 2021)
  - The current recommended practice is to perform right heart catheterization, treat with vasodilator, intraaortic balloon pump (IABP) and/or mechanical circulatory support device and follow with serial right heart catheterization. If the PA pressure and PVR do not respond to these interventions after 3 to 6 months, it is reasonable to conclude that pulmonary artery hypertension is irreversible. (Mehra et al., 2016)
  - Refer to transplant center patient selection criteria
- Diabetes with end-organ damage other than nonproliferative retinopathy or poor glycemic control (HgbA<sub>1c</sub> > 7.5 or 55 mmol/mol) despite optimal effort is a relative contraindication for transplant.
- Significant chronic pulmonary disease defined as FVC < 50%, non-reversible FEV1 < 50% and DLCO (corrected) < 40% for adults and <50% in children requires pulmonary clearance.
- Patients with a history of malignancy require an oncology evaluation to determine status of disease. Recommendations for suitability and timing of a solid organ transplant following successful treatment of malignancy may be found in Appendix B. The recommendations are based on Al-Adra et al. (2021)
- Social and psychiatric issues can have significant impact on the outcomes of a transplant. It is expected that a psychosocial evaluation and/or a psychiatry consultation is obtained as part of the standard transplant evaluation. (Crone et al., 2020). The evaluation should address the following:
  - Overall functioning
  - Understanding of underlying illness and need for proposed treatment
  - History of adherence and compliance and barriers to compliance
  - Quality of relationships
  - Presence of a supportive caregiver
  - Social history including educational level and employment history
  - Housing and living situation including reliable transportation to attend medical visits
  - Socioeconomic status including sufficient funding to pay for immunosuppressive medications post-transplant
  - Current and past history of alcohol and substance use and abuse
  - Current and past psychiatric history including baseline cognitive status and coping skills

- BMI > 35 kg/m<sup>2</sup>.
  - Refer to transplant center patient selection criteria.
- Patients over the age of 70.
  - Refer to transplant center patient selection criteria.
- Patients with human immunodeficiency virus (HIV) infection must be on a highly active antiretroviral therapy (HAART) regimen and there must be documented evidence of sustained viral load suppression.
- Gastrointestinal (GI) clearance may be indicated in patients with a history of complicated or active GI disorders.
- Clinically severe symptomatic cerebrovascular disease, including a prior cerebrovascular event, may be a relative contraindication (Mehra et al 2016).
- Acute pulmonary embolism may be a relative contraindication (Mancini & Lietz, 2010; Alraies et al., 2014).

## References

Acker MA, Jessup M. Surgical management of heart failure. In: Bonow RO, Mann DL, Zipes DP, Libby P, Braunwald E, editors. *Braunwald's Heart Disease: A Textbook of Cardiovascular Medicine*. 9<sup>th</sup> ed. Philadelphia, PA: Elsevier Saunders; 2011:601-16.

Alba AC. Impact of fixed pulmonary hypertension on post-heart transplant outcomes in bridge-to-transplant patients. *J Heart Lung Transplant*. 2010 Nov;29(11):1253-8.

Alexopoulos SP, Wu WK, Ziogas IA, et al. Adult Combined Heart-Liver Transplantation: The United States Experience. *Transpl Int*. 2022 Jan 4;35:10036. Doi: 10.3389/ti.2021.10036. PMID: 35185360; PMCID: PMC8842230.

Alraies MC, Eckman P. Adult heart transplant: indications and outcomes. *J Thorac Dis*. 2014 Aug;6(8):1120-8. Doi: 10.3978/j.issn.2072-1439.2014.06.44. PMID: 25132979; PMCID: PMC4133547.

Barrett CD, Alexander KM, Zhao H, et al. Outcomes in Patients With Cardiac Amyloidosis Undergoing Heart Transplantation. *JACC Heart Fail*. 2020 Jun;8(6):461-468. Doi: 10.1016/j.jchf.2019.12.013. Epub 2020 May 6. PMID: 32387068.

Canter CE. Indications for heart transplantation in pediatric heart disease: a scientific statement from the American Heart Association Council on Cardiovascular Disease in the Young; the Councils on Clinical Cardiology, Cardiovascular Nursing, and Cardiovascular Surgery and Anesthesia; and the Quality of Care and Outcomes Research Interdisciplinary Working Group. *Circulation*. 2007 Feb;115(5):658-76.

Chou AS, Habberthuer A, Chin AL, et al. Heart-Kidney and Heart-Liver Transplantation Provide Immunoprotection to the Cardiac Allograft. *Ann Thorac Surg*. 2019 Aug;108(2):458-466. Doi: 10.1016/j.athoracsur.2019.02.012. Epub 2019 Mar 15. PMID: 30885846.

Colvin M, Smith JM, Ahn Y, et al. OPTN/SRTR 2019 Annual Data Report: Heart. *Am J Transplant*. 2021 Feb;21 Suppl 2:356-440. Doi: 10.1111/ajt.16492. PMID: 33595196.

Cotter TG, Wang J, Peeraphatdit T, et al. Simultaneous Heart-Liver Transplantation for Congenital Heart Disease in the United States: Rapidly Increasing With Acceptable Outcomes. *Hepatology*. 2021 Apr;73(4):1464-1477. Doi: 10.1002/hep.31426. PMID: 32559317.

Crone CC, Marcangelo MJ, Shuster JL Jr. An approach to the patient with organ failure: transplantation and end-of-life treatment decisions. *Med Clin North Am*. 2010;94(6):1241-xii. Doi:10.1016/j.mcna.2010.08.005

Everly MJ. Cardiac transplantation in the United States: an analysis of the UNOS registry. *Clin Transpl*. 2008 Jan;35-43.

Hong KN, Merlo A, Chauhan D, et al. Evidence supports severe renal insufficiency as a relative contraindication to heart transplantation. *J Heart Lung Transplant*. 2016 Jul;35(7):893-900.

Jessup M, et al. Optimal pharmacologic and non-pharmacologic management of cardiac transplant candidates: approaches to be considered prior to transplant evaluation: International Society for Heart and Lung Transplantation guidelines for the care of cardiac transplant candidates—2006. *J Heart Lung Transplant*. 2006;25(9):1003-23. Doi: 10.1016/j.healun.2006.06.007.

Johnson MR. When is retransplantation a viable option? *Heart Fail Clin*. 2007 Jan;3(1):97-105.

Johnson MR, Nadim MK. Simultaneous heart-kidney transplant: Working together to define when one organ is not enough. *Am J Transplant*. 2021 Jul;21(7):2323-2324. Doi: 10.1111/ajt.16564. Epub 2021 Mar 26. PMID: 33721402.

Kobashigawa J, Dadhania DM, Farr M. et al., Consensus conference on heart-kidney transplantation. *Am J Transplant*. 2021 Feb 2. Doi: 10.1111/ajt.16512. Epub ahead of print. PMID: 33527725.

Mancini D, Lietz K. Selection of cardiac transplantation candidates in 2010. *Circulation* 2010;122:173-83.

Mehra MR, Canter CE, Hannan MM, et al. The 2016 International Society for Heart Lung Transplantation Listing Criteria for Heart Transplantation: A 10-year update. *J Heart Lung Transplant*. 2016;35(1):1-23.

Ohio Administrative Code (OAC) 5160-1-01. Medicaid medical necessity: definitions and principles. Available at: [Rule 5160-1-01 - Ohio Administrative Code | Ohio Laws](#). Accessed March 28, 2023.

Ohio Department of Medicaid Managed Care Provider Agreements. Available at: [Managed Care Agreements \(ohio.gov\)](#). Accessed April 1, 2023.

Ohio Solid Organ Transplantation Consortium. [The Ohio Solid Organ Transplantation Consortium \(OSOTC\)](#). Accessed April 1, 2023.

Organ Procurement and Transplantation Network (OPTN), National data; multiple organ transplant in the U.S. Available at: [National data – OPTN \(hrs.gov\)](#). Accessed 3/26/23.

Patel ND. Heart transplantation for adults with congenital heart disease: analysis of the United Network for Organ Sharing database. *Ann Thorac Surg*. 2009 Sep;88(3):814-21;discussion 821-2.

Rosa VE, Lopes AS, Accorsi TA, et al., Heart Transplant in Patients with Predominantly Rheumatic Valvular Heart Disease. *J Heart Valve Dis*. 2015 Sep;24(5):629-34. PMID: 26897843.

SynCardia Systems, LLC, Tucson, AZ. <https://syncardia.com/clinicians/clinical-resources/download-clinician-guides/> Accessed March 16, 2022.

Tracy KM, Matsuoka LK, Alexopoulos SP. Update on combined heart and liver transplantation: evolving patient selection, improving outcomes, and outstanding questions. *Curr Opin Organ Transplant*. 2023 Apr 1;28(2):104-109. Doi: 10.1097/MOT.0000000000001041. Epub 2022 Dec 1. PMID: 36454232; PMCID: PMC9994850.

Weill D, Benden C, Corris PA, et al. A consensus document for the selection of lung transplant candidates: 2014—an update from the Pulmonary Transplantation Council of the International Society for Heart and Lung Transplantation. *J Heart Lung Transplant*. Jan 2015;34(1):1-15.

Writing Committee; Kittleson MM, Ruberg FL, Ambardekar AV, et al. 2023 ACC Expert Consensus Decision Pathway on Comprehensive Multidisciplinary Care for the Patient With Cardiac Amyloidosis: A Report of the American College of Cardiology Solution Set Oversight Committee. *J Am Coll Cardiol*. 2023 Mar 21;81(11):1076-1126. Doi: 10.1016/j.jacc.2022.11.022. Epub 2023 Jan 23. Erratum in: *J Am Coll Cardiol*. 2023 Mar 21;81(11):1135. PMID: 36697326.

Yamani MH, Taylor DO. Heart Transplantation. In: Cleveland Clinic. *Current Clinical Medicine*, 2<sup>nd</sup> ed. Philadelphia, PA: Saunders;2010.

Zhao K, Mclean RC, Hoteit MA, Olthoff KM. Combined Heart and Liver Transplant: Indication, Patient Selection, and Allocation Policy. *Clin Liver Dis (Hoboken)*. 2019 Jul 2;13(6):170-175. Doi: 10.1002/cld.812. PMID: 31316764; PMCID: PMC6605737.

# Lung

Medical necessity determinations must comply with the definitions and principles established in [Rule 5160-1-01 - Ohio Administrative Code | Ohio Laws](#)

## General Information

- The indications for lung transplantation include a diverse array of pulmonary diseases of the airways, parenchyma, and vasculature.
- According to the Consensus Document for the Selection of Lung Transplant Candidates: An Update from the International Society for Heart and Lung Transplantation (Leard et al., 2021), lung transplantation should be considered in adults with chronic end-stage lung disease who meet both of the following criteria:
  - High (>50%) risk of death from lung disease within 2 years if lung transplantation is not performed
  - High (>80%) likelihood of 5-year post-transplant survival from a general medical perspective provided that there is adequate graft function
- In early 2023, the OPTN implemented policy change that better aligns lung allocation policy regulatory requirements, community and ethical goals identified by OPTN, and medical advancements, while considering each candidate holistically. It moves lung allocation into a continuous distribution framework, removes rigid boundaries in lung allocation, and introduces the composite allocation score for lung candidates (OPTN, March 2023).
- The lung composite allocation score (CAS) is the combined total of the candidate's lung medical urgency score, lung post-transplant outcomes score, lung biological disadvantages score, and lung placement efficiency score. The lung CAS is awarded on a scale from 0 to 100. The lung CAS calculator may be found at: [Lung Composite Allocation Score \(CAS\) Calculator - OPTN \(hrsa.gov\)](#)
- The choice of single or double lung transplantation is a clinical decision that is left to the treating physicians.
- Emerging data suggest an association between frailty and greater morbidity and mortality pre- and post-transplantation. Frailty measurements pre-transplant offer the potential for improving risk stratification and refining candidate selection (Kobashigawa et al., 2018)
- Simultaneous referral to palliative care at the time of transplant evaluation may be appropriate to provide decision support and treatment selection that is consistent with goals of care throughout the evaluation, listing, surgery, and post-transplant periods (Leard et al., 2021)

## Indications

Unless otherwise cited, the following disease-specific criteria are consistent with the Consensus Document for the Selection of Lung Transplant Candidates: An Update from the International Society for Heart and Lung Transplantation (Leard et al., 2021).

- Chronic Obstructive Pulmonary Disease (COPD)
  - Clinical deterioration despite maximal treatment including medication, pulmonary rehabilitation, oxygen therapy, and as appropriate, nocturnal non-invasive positive pressure ventilation
  - BODE score 7-10 *and any of the following*:
    - $FEV_1 < 20\%$  predicted
    - Moderate to severe pulmonary hypertension

- History of severe exacerbations
- Chronic hypercapnia
- Cystic Fibrosis (CF)
  - FEV<sub>1</sub> < 30% predicted in adults (or < 40% predicted in children)
  - FEV<sub>1</sub> < 40% predicted in adults (or < 50% predicted in children) and any of the following:
    - Six-minute walk distance < 400 meters
    - PaCO<sub>2</sub> > 50 mmHg
    - Hypoxemia at rest or with exacerbation
    - Pulmonary hypertension (PA systolic pressure > 50 mmHg on echocardiogram or evidence of right ventricular dysfunction)
    - Worsening nutritional status particularly with BMI < 18 kg/m<sup>2</sup> despite nutritional intervention
    - Frequent hospitalization, particularly if > 28 days hospitalized in the preceding year
    - Any exacerbation requiring mechanical ventilation
    - Chronic respiratory failure with hypoxemia or hypercapnia
    - Recurrent massive hemoptysis despite bronchial artery embolization
    - World Health Organization functional class IV
- Non-CF bronchiectasis
  - Similar criteria as with CF (identified above) is reasonable, recognizing that prognosis is highly variable with many patients experiencing a more stable course
- Interstitial Lung Disease (ILD), including Idiopathic Pulmonary Fibrosis (IPF)
  - Any form of pulmonary fibrosis with one of the following in the past 6 months despite optimal treatment:
    - Absolute decline in FVC > 10%
    - Absolute decline in DLCO > 10%
    - Absolute decline in FVC > 5% with radiographic progression
  - Desaturation to < 88% in 6-minute walk test or > 50 m decline in 6-minute walk test distance in the past 6 months
  - Pulmonary hypertension on right heart catheterization or 2-dimensional echocardiography (in the absence of diastolic dysfunction)
  - Hospitalization due to respiratory decline, pneumothorax, or acute exacerbation
- Pulmonary Arterial Hypertension (PAH)
  - ESC/ERS (European Society of Cardiology/European Respiratory Society) high risk or REVEAL (Registry to Evaluate Early and Long-term Pulmonary Arterial Disease Management) risk score > 10 on appropriate PAH therapy, including IV or SC prostacyclin analogues
  - Progressive hypoxemia
  - Progressive, but not end-stage, liver or kidney dysfunction due to PAH
  - Life-threatening hemoptysis
- Acute Respiratory Distress Syndrome (ARDS), including COVID-19-associated ARDS

- Persistent requirement for mechanical ventilatory support and/or extracorporeal life support without expectation of clinical recovery and evidence of irreversible lung destruction
- In patients diagnosed with COVID-19-associated ARDS the following must be met: (Bharat et al., 2021)
  - At least 4 weeks have elapsed since the onset of severe acute respiratory syndrome, unless potentially lethal pulmonary complications exist that cannot be managed medically or through the use of ECMO
  - Lung recovery is deemed unlikely by at least 2 physicians from 2 different specialties (surgery, critical care, or pulmonary medicine) despite optimized medical care
  - Two negative PCR test of bronchoalveolar lavage fluid are obtained, 24 hours apart
  - If separated from the ventilator with no tracheostomy, 2 negative PCR tests of nasopharyngeal swabs are obtained, 24 hours apart
  - When available, viral cultures are negative, confirming the absence of replication-competent virus; bronchoalveolar lavage should be used when possible
- There may be pathological reasons other than COVID-related ARDS, such as pulmonary fibrosis, for which lung transplant may be indicated. These will be considered on an individual basis.
- Multi-organ transplantation
  - Member should meet the criteria for lung transplant listing and have significant dysfunction of one or more additional organs, or meet the listing criteria for a non-pulmonary organ transplant and have significant pulmonary dysfunction

## Organ-specific Contraindications

*Please review the universal contraindications found at the beginning of the Guidelines. These apply to all transplants unless otherwise noted below. Additional contraindications specific to a particular type of transplant are noted below.*

Unless otherwise cited, these recommendations are consistent with the International Society for Heart and Lung Transplantation (ISHLT) Consensus Document for the Selection of Lung Transplant Candidates (Leard et al., 2021)

- Significant chest wall/spinal deformity. (Moreno, 2008)
- Active substance use or dependence that is deemed by the treating team to negatively impact the patient and/or the transplanted organ including current tobacco use, vaping, marijuana smoking, or IV drug use
- Glomerular filtration rate < 40 mL/min/1.73m<sup>2</sup> unless being considered for multi-organ transplant
- Acute coronary syndrome or myocardial infarction within 30 days (excluding demand ischemia)
- Stroke within 30 days
- Liver cirrhosis with portal hypertension or synthetic dysfunction unless being considered for multi-organ transplant
- Acute liver failure
- Acute renal failure with rising creatinine or on dialysis and low likelihood of recovery

## Considerations for Substance Use Disorder

For patients experiencing catastrophic decompensation where a period of abstinence is not realistic the transplant center must have an institutional protocol that requires, at a minimum:

- Appropriate patient and psychosocial support profile. Transplant center must have an institutional protocol to conduct psychosocial evaluation and proactively implement interventions to promote post-transplant success.
- Presence of close supportive social network
- Absence of severe coexisting behavioral health disorders that would negatively impact a treatment plan
- Agreement by patient (with support of his/her social network) to post-transplant rehabilitation and monitoring, and to lifelong abstinence from addictive substances
- Evaluation by addiction specialist indicating high likelihood of success of post-transplant rehabilitation and abstinence
- Approval by a transplant selection committee that includes in addition to the regular members, a psychiatrist and/or an addiction specialist
- No special consideration for acute decompensation with illicit drug addiction and/or abuse
- Any other substance abuse needs to be addressed
- Inactive alcohol and/or substance abuse (alcohol, crystal meth, heroin, cocaine, methadone, and/or narcotics, etc.) is not a contraindication

## Special Considerations

*Additional consultation and/or evaluation may be indicated in these situations.*

Unless otherwise cited, the following disease-specific criteria are consistent with the Consensus Document for the Selection of Lung Transplant Candidates: An Update from the International Society for Heart and Lung Transplantation (Leard et al., 2021).

- Patients with a history of malignancy require an oncology evaluation to determine status of disease. Recommendations for suitability and timing of a solid organ transplant following successful treatment of malignancy may be found in Appendix B. The recommendations are based on Al-Adra et al. (2021)
- Social and psychiatric issues can have significant impact on the outcomes of a transplant. It is expected that a psychosocial evaluation and/or a psychiatry consultation is obtained as part of the standard transplant evaluation. (Crone et al., 2020). The evaluation should address the following:
  - Overall functioning
  - Understanding of underlying illness and need for proposed treatment
  - History of adherence and compliance and barriers to compliance
  - Quality of relationships
  - Presence of a supportive caregiver
  - Social history including educational level and employment history
  - Housing and living situation including reliable transportation to attend medical visits
  - Socioeconomic status including sufficient funding to pay for immunosuppressive medications post-transplant
  - Current and past history of alcohol and substance use and abuse
  - Current and past psychiatric history including baseline cognitive status and coping skills

- Mechanical ventilation and ECMO.
- Patients with human immunodeficiency virus (HIV) infection must be on a highly active antiretroviral therapy (HAART) regimen and there must be documented evidence of sustained viral load suppression.
- BMI > 35 kg/m<sup>2</sup>
  - Refer to transplant center patient selection criteria
- BMI < 16 kg/m<sup>2</sup>
  - Refer to transplant center patient selection criteria
- Gastrointestinal (GI) clearance may be indicated in patients with a history of complicated or active GI disorders
- Patients over the age of 70 years
  - Refer to transplant center patient selection criteria
- The presence of other medical comorbidities such as diabetes mellitus, osteoporosis, gastroesophageal reflux, and coronary artery disease must be assessed individually based on severity of disease, presence of end-organ damage, and ease of control with standard therapies. (Lee, 2010).
  - Refer to transplant center patient selection criteria.

## References

- Bharat A, Machuca TN, Querrey M, et al. Early outcomes after lung transplantation for severe COVID-19: a series of the first consecutive cases from four countries. *Lancet Respir Med*. 2021 May;9(5):487-497. Doi: 10.1016/S2213-2600(21)00077-1. Epub 2021 Mar 31. PMID: 33811829; PMCID: PMC8012035.
- Crone CC, Marcangelo MJ, Shuster JL Jr. An approach to the patient with organ failure: transplantation and end-of-life treatment decisions. *Med Clin North Am*. 2010;94(6):1241-xii. Doi:10.1016/j.mcna.2010.08.005
- Kanaan R. Indications and contraindications to lung transplant. *Rev Pneumol Clin* 2010; 67(1): 5-14.
- Kobashigawa J, Dadhania D, Bhorade S. et al., Report from the American Society of Transplantation on frailty in solid organ transplantation. *Am J Transplant*. 2019 Apr;19(4):984-994. Doi: 10.1111/ajt.15198. Epub 2018 Dec 22. PMID: 30506632; PMCID: PMC6433498.
- Kreider M. Selection of candidates for lung transplantation. *Proc Am Thorac Soc* 2009; 6(1): 20-7.
- Leard LE, Holm AM, Valapour M, et al. Consensus document for the selection of lung transplant candidates: An update from the International Society for Heart and Lung Transplantation. *J Heart Lung Transplant*. 2021 Nov;40(11):1349-1379. Doi: 10.1016/j.healun.2021.07.005. Epub 2021 Jul 24. PMID: 34419372; PMCID: PMC8979471.
- Lee JC. Lung Transplantation in Autoimmune Diseases. *Clin Chest Med* 31 (2010) 589–603.
- Machuca TN. Lung transplantation for patients older than 65 years: is it a feasible option? *Transplant Proc* 2011; 43(1): 233-5.
- Moreno P. Incidence, management and clinical outcomes of patients with airway complications following lung transplantation. *Eur J Cardiothorac Surg* 2008; 34(6): 1198-205.
- Ohio Administrative Code (OAC) 5160-1-01. Medicaid medical necessity: definitions and principles. Available at: [Rule 5160-1-01 - Ohio Administrative Code | Ohio Laws](#). Accessed March 28, 2023.
- Ohio Administrative Code (AOC) 5160-2-65 (L). Available at: [Rule 5160-2-65 - Ohio Administrative Code | Ohio Laws](#). Accessed March 28, 2023.
- Organ Procurement & Transplantation Network (OPTN). Notice of OPTN Policy, Guidance, and Guideline Changes. Establish Continuous Distribution of Lungs. Available at: [OPTN Policy Notice Lung Continuous Distribution Jan 2023 PC \(hrsa.gov\)](#)

Orens JB, et al. International guidelines for the selection of lung transplant candidates: 2006 update—a consensus report from the Pulmonary Scientific Council of the International Society for Heart and Lung Transplantation. *Journal of Heart and Lung Transplantation* 2006; 25(7):745-55.

Spahr JE, Meyer KC. Lung transplantation. In: Hricik D, editor. *Primer on Transplantation*. 3<sup>rd</sup> ed. West Sussex, UK: Wiley Blackwell; 2011:205-37.

Weill D, Benden C, Corris PA et al. A Consensus Document for the Selection of Lung Transplant Candidates: 2014—An Update from the Pulmonary Transplantation Council of the International Society for Heart and Lung Transplantation. *J Heart Lung Transplant* 2015 Jan; 34(1):1-15.doi:10.1016/j.healun.2014.06.14. Epub 2014 Jun 26.

Weiss ES et al. Indications and age issues – Impact of Advanced Age in Lung Transplantation: Analysis of United Network for Organ Sharing Data. *J.jamcollsurg*.2008.12.010

# Heart/Lung

Medical necessity determinations must comply with the definitions and principles established in [Rule 5160-1-01 - Ohio Administrative Code | Ohio Laws](#)

## General Information

In 2022, 51 heart/lung transplants were completed, 2 of which were in children, according to the United Network for Organ Sharing (UNOS).

## Indications

- Patients with end-stage pulmonary vascular disease with end-stage non-reversible cardiac disease secondary to one of the following:
  - Primary pulmonary hypertension
  - Eisenmenger syndrome with a cardiac defect not correctable by surgical repair
  - Patients who are appropriate for single or double lung transplantation and who have severe cardiac disease not otherwise treatable

## Organ-specific Indications

*Please review the universal contraindications found at the beginning of the Guidelines. These apply to all transplants unless otherwise noted below. Additional contraindications specific to a particular type of transplant are noted below.*

- Refer to the organ-specific contraindications in both the heart and lung transplantation sections of this guideline

## Consideration for Substance Use Disorder

For patients experiencing catastrophic decompensation where a period of abstinence is not realistic the transplant center must have an institutional protocol that requires, at a minimum:

- Appropriate patient and psychosocial support profile. Transplant center must have an institutional protocol to conduct psychosocial evaluation and proactively implement interventions to promote post-transplant success.
- Presence of close supportive social network
- Absence of severe coexisting behavioral health disorders that would negatively impact a treatment plan
- Agreement by patient (with support of his/her social network) to post-transplant rehabilitation and monitoring, and to lifelong abstinence from addictive substances
- Evaluation by addiction specialist indicating high likelihood of success of post-transplant rehabilitation and abstinence
- Approval by a transplant selection committee that includes in addition to the regular members, a psychiatrist and/or an addiction specialist
- No special consideration for acute decompensation with illicit drug addiction and/or abuse
- Any other substance abuse needs to be addressed

- Inactive alcohol and/or substance abuse (alcohol, crystal meth, heroin, cocaine, methadone, and/or narcotics, etc.) is not a contraindication

## Special Considerations

*Additional consultation and/or evaluation may be indicated in these situations.*

- Candidates for simultaneous heart lung transplant should undergo evaluation by both organ transplant teams

## References

Ohio Administrative Code (OAC) 5160-1-01. Medicaid medical necessity: definitions and principles. Available at: [Rule 5160-1-01 - Ohio Administrative Code | Ohio Laws](#). Accessed March 28, 2023.

Ohio Administrative Code (AOC) 5160-2-65 (L). Available at: [Rule 5160-2-65 - Ohio Administrative Code | Ohio Laws](#). Accessed March 28, 2023.

United Network for Organ Sharing: <https://optn.transplant.hrsa.gov/data/view-data-reports/national-data/#> Accessed April 3, 2023.

# Appendix A

## National Kidney Foundation Definition of Chronic Kidney Disease (CKD)

- Kidney damage for  $\geq 3$  months, as defined by structural or functional abnormalities of the kidney, with or without decreased GFR, manifest by either:
  - Pathological abnormalities; or
  - Markers of kidney damage, including abnormalities in the composition of the blood or urine, or abnormalities in imaging tests
- GFR  $< 60$  ml/min/1.73 m<sup>2</sup> for  $\geq 3$  months, with or without kidney damage

## Reference

[What is the Criteria for CKD | National Kidney Foundation](#)

# Appendix B

## Pretransplant solid organ malignancy and organ transplant candidacy: recommendations for time interval to transplant

The recommendations below are adapted from the consensus expert opinion statement of the American Society of Transplantation published in 2021.

<b>Breast cancer</b>		
<b>Risk/stage</b>	<b>Time interval to transplant</b>	<b>Additional considerations</b>
Low risk DCIS Stage I	No wait time necessary after completion of all standard treatments.	Endocrine therapy does not need to be completed prior to transplant.
Intermediate risk Stage II	1-2 years, no evidence of disease after completion of all standard treatments.	Mammogram prior to transplant recommended.
High risk stage III	3-5 years, no evidence of disease after completion of all standard treatments.	
Prohibitive risk Stage V	Not a solid organ transplant candidate.	
<b>Colon cancer</b>		
<b>Risk/stage</b>	<b>Time interval to transplant</b>	<b>Additional considerations</b>
Low risk Stage I (T1 or T2, N0, M0)	1 year	<u>Low-risk features:</u> <ul style="list-style-type: none"> <li>MSI without BRAF mutations</li> </ul>
Low intermediate risk Stage II (T3, N0, M0)	2 years, consider longer if high-risk features present.	<u>High-risk features:</u> <ul style="list-style-type: none"> <li>Lymphovascular invasion (LVI) or perineural invasion (PVI)</li> <li>Mucinous, Signet, or poorly differentiated histology</li> <li>Bowel obstruction</li> <li>Tumor perforation</li> <li>&lt; 12 lymph nodes examined</li> </ul>
High intermediate risk Stage II (T4, N0, M0)	3 years, 5 years if high-risk features present.	
Stage III (Any T, N+, M0)		Consider chemotherapy prior to transplant for high-risk stage II disease. Patients with Stage III disease should complete chemotherapy.
High risk Stage IV (Any T, Any N, M+)	5 years, no evidence of disease.	Transplant not recommended prior to 5 years.
<b>Rectal cancer</b>		
<b>Risk/stage</b>	<b>Time interval to transplant</b>	<b>Additional considerations</b>
Low risk Stage I (T1 or T2, N0, M0) Full oncologic resection	1 year, consider 2 years of high-risk features present.	<u>Low-risk features:</u> <ul style="list-style-type: none"> <li>MSI without BRAF mutations</li> <li>Upper 1/3 rectum or rectosigmoid</li> </ul> <u>High-risk features:</u> <ul style="list-style-type: none"> <li>LVI or PNI</li> </ul>

		<ul style="list-style-type: none"> <li>• Mucinous, Signet, or poorly differentiated histology</li> <li>• Bowel obstruction</li> <li>• Tumor perforation</li> <li>• &gt; 12 lymph nodes examined</li> <li>• Lower 1/3 of rectum</li> <li>• Incomplete mesorectal excision</li> </ul>
Low intermediate risk Stage I (T1, N0, M0) Local excision	2 years	
High intermediate risk Stage II (T3 or T4, N0, M0) Stage III (Any T, N+, M0)	3 years, 5 years if high-risk features present.	Patients with stage II and III disease should complete trimodality treatment (chemoradiotherapy, surgery and chemotherapy) unless elimination of one of these is deemed appropriate after multidisciplinary discussion.
High risk Stage IV (Any T, Any N, M+)	5 years, no evidence of disease.	Transplant not recommended prior to 5 years.
<b>Prostate cancer</b>		
<b>Risk/stage</b>	<b>Time interval to transplant</b>	<b>Additional considerations</b>
Very low risk PSA < 10ng/ml 3 or fewer cores of Gleason 6 (grade group 1): no greater than 50% of individual core (T1c-T2a)	None	Surveillance strongly recommended.
Low risk PSA < 10ng/ml Gleason 6 (not meeting very low risk criteria) (T1c-T2a)	None	Surveillance strongly recommended.
Low-volume intermediate risk One of the following criteria: <ul style="list-style-type: none"> <li>• PSA &gt; 10ng/ml</li> <li>• Gleason 7 (grade group 2 or 3)</li> <li>• T2b</li> </ul>	If surveillance, no wait time. If treatment initiated, and nomogram predicts cancer-specific death over the next 15 years < 10%, no wait time.	
High-volume intermediate risk, high risk or very high risk PSA > 20ng/ml or high-volume Gleason 7 or Gleason 8-10, T3	If treatment initiated, and nomogram predicts cancer-specific death over the next 15 years < 10%, no wait time.	
Metastatic castration-sensitive	If stable disease for 2 years with prolonged estimated life expectancy, may consider transplant.	
Metastatic castration-resistant	Not a solid organ transplant candidate.	
<b>Renal cell carcinoma</b>		
<b>Stage</b>	<b>Time interval to transplant</b>	<b>Additional considerations</b>
T1a ( $\leq 4$ cm), N0, M0	No wait time.	
T1b ( $> 4$ cm $\leq 7$ cm), N0, M)	Fuhrman grade (FG) 1-2: no wait time. FG 3-4: 1-2 years.	
T2 (7-10cm, N0, M0)	2 years	
T3, N0, M0	Minimum of 2 years, then reassess.	

T4, N0,M0	Minimum of 2 years, then reassess.	
Any T, Node positive, metastatic disease	Not a candidate (if solitary metastasis +resected, tumor board discussion on candidacy.	
Any T with sarcomatoid and/or rhabdoid histologic features	Not a solid organ transplant candidate.	
Collecting duct or Medullary RCC	Not a solid organ transplant candidate.	
<b>Bladder cancer</b>		
<b>Bladder cancer history</b>	<b>Time interval to transplant</b>	<b>Additional considerations</b>
Non-muscle invasive bladder cancer (NMIBC) low risk Solitary tumor ≤ 3cm, low grade, Ta, absence of carcinoma in situ (CIS)	6 months	
Intermediate risk Solitary tumor > 3cm, recurrence within 12 months with low-grade Ta tumor, multifocal low-grade Ta tumor, low-grade T1 tumor, or high-grade tumor < 3cm	6 months	
High risk Any CIS, high-grade Ta tumor > 3cm, high-grade T1 tumor, multifocal high-grade Ta tumor, any recurrent high-grade Ta tumor, variant histology, lymphovascular invasion, high-grade prostatic urethral involvement, recurrence after Bacillus Calmette-Guerin (BCG) intravesical therapy	2 years	
Muscle invasive bladder cancer (MIBC), post-radical cystectomy	2 years	
MIBC, post-chemoradiation	Not a solid organ transplant candidate.	
<b>Gynecological cancer</b>		
<b>5-year risk recurrence</b>	<b>Type/stage</b>	<b>Time interval to transplant</b>
Low risk < 5% risk of recurrence	Stage IA/IB, grade 1-2 endometrial cancer.  Stage IA/IB/IC grade 1-2 epithelial ovarian cancer.  Stage IA1, IA2 squamous/adenocarcinoma of cervix.	No waiting period after completion of primary treatment.
Intermediate risk 5%-15% risk of recurrence	Stage I/II endometrial cancer + risk factors (older age, lymph-vascular space invasion, grade 2 or 3 endometrioid, deeply invasive tumor).	2-3 years after completion of treatment.
High risk > 30% risk of recurrence	Serous, clear cell, or carcinosarcoma of uterus (all stages). Stage III grade 1-3 endometrioid cancer of uterus. Stage II/III epithelial ovarian cancer.	5 years after completion of treatment.

	Stage II/III squamous cell/adenocarcinoma cervical cancer.	
Very high risk > 80% chance of recurrence	Stage IV endometrial cancer (all grades). Recurrent or metastatic endometrial cancer. Stage IV epithelial ovarian cancer (any grade). Stage IV squamous cell/adenocarcinoma of cervix. Metastatic or recurrent cervical cancer.	Not a solid organ transplant candidate.
<b>Lung Cancer</b>		
<b>Stage, Tumor and node</b>	<b>Time interval to transplant</b>	<b>Work-up pre-transplant</b>
I, T1a, N0	≥ 3 years	PET-CT; consider biopsy post stereotactic body radiation therapy (SBRT).
I, T1b, N0	≥ 3 years	PET-CT; consider biopsy post SBRT.
I, T1c, N0	3-5 years	PET-CT; consider biopsy post SBRT.
IB, T2a, N0	5 years	PET-CT
IIA, T2b, N0	5 years	PET-CT
IIB, T3, N0	5 years	PET-CT
IIIA	5 years	PET-CT
IIIB	Not a solid organ transplant candidate.	N/A
IIIC	Not a solid organ transplant candidate.	N/A
IVA	Not a solid organ transplant candidate.	N/A
IVB	Not a solid organ transplant candidate.	N/A

## Reference

Al-Adra DP, Hammel L, Roberts J, et al. Pretransplant solid organ malignancy and organ transplant candidacy: A consensus expert opinion statement. Am J Transplant. 2021 Feb;21(2):460-474. Doi: 10.1111/ajt.16318. Epub 2020 Oct 23. PMID: 32969590; PMCID: PM

# Appendix C

## Clarke Hypoglycemic Score

Check the category that best describes you: (check only one)

- I always have symptoms when my blood sugar is low (A)
- I sometimes have symptoms when my blood sugar is low
- I no longer have symptoms when my blood sugar is low (R)

Have you lost some of the symptoms you used to have when your blood sugar was low?

- Yes (R)
- No (A)

In the past six months how often have you had moderate hypoglycemia episodes? (Episodes where you might feel confused, disoriented, or lethargic and were unable to treat yourself)

- Never (A)
- Once or twice (R)
- Every other month (R)
- Once a month (R)
- More than once a month (R)

In the past year how often have you had severe hypoglycemic episodes? (Episodes where you were unconscious or had seizure and needed glucagon or intravenous glucose)

- Never (A)
- 1 time (R)
- 2 times (R)
- 3 times (R)
- 5 times (R)
- 6 times (R)
- 7 times (R)
- 8 times (R)
- 9 times (R)
- 10 times (R)
- 11 times (R)
- 12 times (U)

How often in the last month have you had readings < 70 mg/dl with symptoms?

- Never
- 1 to 3 times
- 1 time/week
- 2 to 3 times/week
- 4 to 5 times/week
- Almost daily

How often in the last month have you had readings < 70 mg/dl without any symptoms?

- Never
- 1 to 3 times
- 1 time/week
- 2 to 3 times/week
- 4 to 5 times/week
- Almost daily

(R = answer to 5 < answer to 6, A = answer to 6 > answer to 5)

How low does your blood sugar need to go before you feel symptoms?

- 60 – 69 mg/dl (A)
- 50 – 59 mg/dl (A)
- 40 – 49 mg/dl (R)

< 40 mg/dl (R)

To what extent can you tell by your symptoms that your blood sugar is low?

Never (R)

Rarely (R)

Sometimes (R)

Often (A)

Always (A)

Hypoglycemic unawareness (Clarke score):  $R \geq 4$

## Reference

Geddes J, Wright RJ, Zammit NN, Deary IJ, Frier BM. An evaluation of methods of assessing impaired awareness of hypoglycemia in Type I diabetes. *Diabetes Care*. 2007;30:1868-1870.

# Appendix D

## New York Heart Association (NYHA) Functional Classification

Class	Patient Symptoms
Class I	No limitation of physical activity. Ordinary physical activity does not cause undue fatigue, palpitation feeling heart beats), dyspnea (shortness of breath) or anginal pain.
Class II	(Mild) — Slight limitation of physical activity. Comfortable at rest, but ordinary physical activity results in fatigue, palpitation, dyspnea or anginal pain.
Class III	(Moderate) — Marked limitation of physical activity. Comfortable at rest, but less than ordinary activity causes fatigue, palpitation, dyspnea or anginal pain.
Class IV	(Severe) — Unable to carry out any physical activity without discomfort. Symptoms of cardiac insufficiency or the anginal syndrome may be present at rest. If any physical activity is undertaken, discomfort is increased.

Class	Objective Assessment
A	No objective evidence of cardiovascular disease. No symptoms and no limitation in ordinary physical activity.
B	Objective evidence of minimal cardiovascular disease. Mild symptoms and slight limitation during ordinary activity. Comfortable at rest.
C	Objective evidence of moderately severe cardiovascular disease. Marked limitation in activity due to symptoms, even during less-than-ordinary activity. Comfortable only at rest
D	Objective evidence of severe cardiovascular disease. Severe limitations. Experiences symptoms even while at rest.

### Reference

[Classes of Heart Failure | American Heart Association](#)

# Appendix E

## American College of Cardiology/American Heart Association Stages of Heart Failure

Stage	Definition
Stage A	Patients at risk for heart failure who have not yet developed structural heart changes (i.e., those with diabetes, those with coronary disease without prior infarct)
Stage B	Patients with structural heart disease (i.e., reduced ejection fraction, left ventricular hypertrophy, chamber enlargement)
Stage C	Patients who have developed clinical heart failure
Stage D	Patients with refractory heart failure requiring advanced intervention (i.e., biventricular pacemakers, left ventricular assist device, transplantation)

### Reference

[ACC/AHA Heart Failure Classification | Learn the Heart \(healio.com\)](#)

# Review and approval history

Version	Date of review
1.0	07/19/2012: New clinical guideline. Approved by Medical Technology Assessment Committee
1.0	08/14/2012: Approved by National Medical Care Management Committee
2.0	10/10/2013: Approved by Medical Technology Assessment Committee
2.0	10/16/2013: Approved by Complex Medical Conditions Policy Committee
2.0	11/12/2013: Approved by the National Medical Care Management Committee
3.0	08/07/2014: Approved by Medical Technology Assessment Committee
3.0	09/09/2014: Approved by National Medical Care Management Committee
4.0	8/25/2015: Annual review by Optum Solid Organ Transplantation Expert Panel
4.0	09/03/2015: Approved by Medical Technology Assessment Committee
4.0	10/13/2015: Approved by National Medical Care Management Committee
5.0	08/16/2016: Annual review. Transplant Review Guidelines separated into two documents: Hematopoietic Stem Cell Transplantation and Solid Organ Transplantation.
5.0	09/01/2016: Approved by Medical Technology Assessment Committee
5.0	09/13/2016: Approved by National Medical Care Management Committee
5.0	10/10/2016: Interim revisions: Removed Chagas disease as a contraindication to heart transplantation. Updated special considerations for BMI and poor glycemic control for heart transplantation.
6.0	09/07/2017: Approved by Medical Technology Assessment Committee.
6.0	9/12/2017: Approved by National Medical Care Management Committee.
6.0	9/20/2017: Approved by Optum Policy and Guideline Committee.
7.0	8/8/2018: Optum Abdominal Solid Organ Transplantation Expert Panel review of abdominal organ content.
7.0	10/4/2018: Annual review of abdominal organ transplant content. Approved by Medical Technology Assessment Committee.
7.0	10/9/2018: Annual review of abdominal organ transplant content. Approved by National Medical Care Management Committee.
8.0	12/5/2018: Optum Thoracic Solid Organ Transplantation and Mechanical Circulatory Support Devices Expert Panel annual review of thoracic solid organ content.
8.0	1/10/2019: Annual review of thoracic organ transplant content. Approved by Medical Technology Assessment Committee.
8.0	2/27/2019: Annual review of thoracic organ transplant content. Approved by National Medical Care Management Committee.

9.0	<b>8/7/2019:</b> Optum Abdominal Solid Organ Transplantation Expert Panel annual review of abdominal solid organ content.
9.0	<b>11/7/2019:</b> Annual review of abdominal solid organ transplant content. Approved by Medical Technology Assessment Committee.
9.0	<b>11/12/2019:</b> Annual review of abdominal solid organ transplant content. Approved by National Medical Care Management Committee.
10.0	<b>1/15/2020:</b> Optum Thoracic Solid Organ Transplantation and Mechanical Circulatory Devices Expert Panel annual review of thoracic solid organ content.
10.0	<b>3/19/2020:</b> Annual review of thoracic solid organ content. Approved by Medical Technology Assessment Committee.
11.0	<b>7/29/2020:</b> Optum Abdominal Solid Organ Transplantation Expert Panel annual review of abdominal solid organ content.
11.0	<b>9/3/2020:</b> Annual review of abdominal solid organ transplant content. Approved by Medical Technology Assessment Committee.
11.0	<b>11/11/2020:</b> Interim revision: removed referral requirement for combined kidney/liver transplant.
12.0	<b>2/10/2021:</b> Optum Thoracic Solid Organ Transplantation and Mechanical Circulatory Devices Expert Panel annual review of thoracic solid organ content.
12.0	<b>4/1/2021:</b> Annual review of thoracic solid organ content. Approved by Medical Technology Assessment Committee.
13.0	<b>7/14/2021:</b> Annual review of abdominal solid organ content with the Optum Abdominal Solid Organ Transplantation Expert Panel. Revisions to alcohol abstinence requirement.
13.0	<b>9/9/2021:</b> Annual review of abdominal solid organ content. Approved by Medical Technology Assessment Committee.
13.0	<b>9/14/2021:</b> Presented to National Medical Care Management Committee.
14.0	<b>2/23/2022:</b> Optum Thoracic Solid Organ Transplantation and Mechanical Circulatory Devices Expert Panel annual review of thoracic solid organ content. Lung transplantation indications section revised.
14.0	<b>5/5/2022:</b> Annual review of thoracic solid organ content. Lung transplant indications revised for clarity. SARS-CoV2 Vaccination Statement added. Approved by Medical Technology Assessment Committee.
14.0	<b>9/27/2022:</b> Annual review of abdominal solid organ content by the Optum Abdominal Solid Organ Transplantation Expert Panel. New indication for liver transplant added: hilar and perihilar cholangiocarcinoma.
14.0	<b>11/3/2022:</b> Annual review of abdominal solid organ content by Medical Technology Assessment Committee.
14.0	<b>12/19/2022:</b> Presented to National Medical Care Management Committee.
15.0	<b>3/1/2023:</b> Optum Thoracic Solid Organ Transplantation and Mechanical Circulatory Support Devices Expert Panel
15.0	<b>4/12/2023:</b> Annual review by the Optum Clinical Guideline Advisory Committee.

**15.0**

**5/4/2023:** Annual review of thoracic solid organ content by Medical Technology Assessment Committee.

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