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Subject: Liver Transplant and Combined Liver-Kidney Transplant

THIS MEDICAL COVERAGE GUIDELINE IS NOT AN AUTHORIZATION, CERTIFICATION, EXPLANATION OF BENEFITS, OR A GUARANTEE OF PAYMENT, NOR DOES IT SUBSTITUTE FOR OR CONSTITUTE MEDICAL ADVICE. ALL MEDICAL DECISIONS ARE SOLELY THE RESPONSIBILITY OF THE PATIENT AND PHYSICIAN. BENEFITS ARE DETERMINED BY THE GROUP CONTRACT, MEMBER BENEFIT BOOKLET, AND/OR INDIVIDUAL SUBSCRIBER CERTIFICATE IN EFFECT AT THE TIME SERVICES WERE RENDERED. THIS MEDICAL COVERAGE GUIDELINE APPLIES TO ALL LINES OF BUSINESS UNLESS OTHERWISE NOTED IN THE PROGRAM EXCEPTIONS SECTION.

DESCRIPTION:

Liver transplantation is now routinely performed as a treatment of last resort for those with end-stage liver disease. Liver transplantation may be performed with liver donation after a brain or cardiac death, or with a liver segment donation from a living donor. Candidates are prioritized for transplant by mortality risk and severity of illness criteria developed by Organ Procurement and Transplantation Network, and United Network of Organ Sharing. The liver allocation system adopted includes the Model for End-stage Liver Disease (MELD) and Pediatric End-stage Liver Disease (PELD) scales. Scoring on the MELD and PELD uses a continuous disease severity scale based entirely on objective laboratory values.

Summary and Analysis of Evidence: The evidence on liver transplantation for a hepatocellular disease includes registry studies and systematic reviews. Long-term survival rates in patients with viral hepatitis are significant in a group of patients who have no other treatment options. Also, survival can be improved by the eradication of the hepatitis virus before transplantation. For patients with nonalcoholic steatohepatitis (NASH), a 2014 systematic review has indicated that overall (OS) rates are similar to other indications for liver transplantation. (Yong et al, 2023; Cholankeril et al, 2017; Wang et al, 2014).

The presence of hepatitis B virus and hepatitis C virus (HCV) have been controversial indications for liver transplantation because of the high potential for recurrence of the virus and subsequent recurrence of liver disease. However, registry data have indicated a long-term survival rate (7 years) of 47% in hepatitis B virus-positive transplant recipients, which is lower than that seen in other primary liver diseases such as primary biliary cirrhosis (71%) or alcoholic liver disease (57%). Recurrence of HCV infection in transplant recipients who are not treated pretransplant has been nearly universal, and 10% to 20% of patients will develop cirrhosis within 5 years (Sheiner, Rochon, 2012; Belle et al, 1995).

Historical data demonstrating inferior survival in transplant recipients with HCV is not applicable to the current treatment landscape with the availability of direct acting antiviral agents, which are associated

with sustained virological response rates of over 95%. Timing the receipt of direct acting antiviral agents either before or after transplantation is still controversial and the decision should be individualized based on the presence of compensated/decompensated disease, Model for End-Stage Liver Disease (MELD) score, current quality of life, and the proportion of HCV-positive donors in the local and regional areas. (Gadiparthi et al, 2018).

Use of standardized patient selection criteria, such as the Milan criteria (a solitary tumor with a maximum tumor diameter of £5 cm, or up to 3 tumors £3 cm and without extrahepatic spread or macrovascular invasion), has led to improved OS rates. A 2012 systematic review reported 5-year OS rates ranged from 65% to 94.7%. In a 2013 meta-analysis a liver transplant was shown to result in higher survival rates than resection. Similar outcomes were identified in a 2017 meta-analysis, in which transplantation showed a significantly improved survival benefit, especially for patients with early HCC. In patients who present with unresectable organ-confined disease, transplant represents the only curative approach (Murali et al, 2017; Zhu et al, 2013; Maggs et al, 2012).

The evidence on liver transplantation in patients with extrahepatic (hilar or perihilar) cholangiocarcinoma includes systematic reviews and observational studies. For patients with extrahepatic cholangiocarcinoma treated with a liver transplant and adjuvant chemotherapy, 5-year survival rates have been reported to be as high as 76%. (Cambridge et al, 2021; Gu et al, 2012; Darwish Murad et al, 2012)

The evidence on liver transplantation in patients with intrahepatic cholangiocarcinoma includes systematic reviews, as well as a systematic review of observational studies. In a registry study comparing outcomes in patients with intrahepatic cholangiocarcinoma who received liver transplantation to those who received surgical resection of the liver, no differences were found in OS, length of stay, or unplanned 30-day readmission rates between groups. Additional studies reporting survival rates in patients with intrahepatic cholangiocarcinoma or in mixed populations of patients with extrahepatic and intrahepatic cholangiocarcinoma have reported 5-year survival rates of less than 30% (Ziogas et al, 2021; Hue et al, 2020).

The evidence on liver transplant for neuroendocrine tumors (NETs) includes systematic reviews of NETs for metastases of any origin. In select patients with nonresectable, hormonally active liver metastases refractory to medical therapy, liver transplantation has been considered as an option to extend survival and minimize endocrine symptoms. While there may be centers that perform liver transplantation in select patients with NETs, the available studies were limited by their heterogeneous populations. Further studies are needed to define the appropriate selection criteria (Fan et al, 2015; Mathe et al, 2011).

Hepatoblastoma is a rare malignant primary solid tumor of the liver that occurs in children. Treatment consists of chemotherapy and resection; however, tumors are often not discovered until they are unresectable. In cases of unresectable tumors, liver transplantation with pre- and/or postchemotherapy is a treatment option with reports of good outcomes and high rates of survival. The UNOS guidelines list nonmetastatic hepatoblastoma as a condition eligible for pediatric liver transplantation (UNOS, 2023; Czauderna et al, 2005)

Observational studies have evaluated the risk factors with a failed liver transplant for survival after liver retransplantation. Reported OS rates are lower after retransplantation than after initial liver

transplantation, but survival rates are acceptable in appropriately selected patients given the lack of treatment-related options (Salimi et al, 2021; Bellido et al, 2012).

The evidence on combined liver-kidney transplantation includes a systematic review of retrospective observational studies in adult patients and several registry studies that have compared combined organ transplantation with liver or with kidney transplantation alone. In adults undergoing liver transplant with kidney failure, a systematic review did not find differences in 1-, 3-, or 5-year survival when comparing combined liver-kidney transplantation to liver transplantation alone. Individual registry studies showed that combined liver-kidney transplantation resulted in a modest improvement in patient survival compared with liver transplantation alone. Liver allograft survival was also higher in the patients who received combined liver-kidney transplantation compared with patients who received a liver transplant alone. Relatively few children have received combined liver-kidney transplantation. Patient survival has been reported to be worse with combined liver-kidney transplantation than with kidney transplantation alone, but no worse than for liver transplant alone. For kidney grafts that survive the first 6 months, the organ survival rate may be better than for a kidney graft alone. Together, these results would suggest that combined liver-kidney transplantation is no worse, and possibly better, for graft and patient survival in adults and children who meet the requirements for liver transplantation and have concomitant renal failure. Indications for combined liver-kidney transplantation in children are rare and often congenital and include liver-based metabolic abnormalities affecting the kidney, along with structural diseases affecting both the liver and kidney (Bouari et al, 2021; Lunsford et al, 2017; Calinescu et al, 2014; Fong et al, 2012; de la Cerda et al, 2010; Ruiz et al, 2010).

POSITION STATEMENT:

Certificate of Medical Necessity

Submit a completed Certificate of Medical Necessity (CMN) along with your request to expedite the medical review process.

1. Click the link Solid Organ Transplant under Certificates of Medical Necessity in the side navigation of this page to access the form.
2. Complete all fields on the form thoroughly.
3. Print and submit a copy of the form with your request.

Note: Florida Blue regularly updates CMNs. Ensure you are using the most current copy of a CMN before submitting to Florida Blue.

A liver transplant, using a cadaver or living donor, **meets the definition of medical necessity** for carefully selected individuals with end-stage liver failure resulting from irreversible liver damage. Etiologies of end-stage liver disease include, but are not limited to:

A. **Hepatocellular disease**

- Alcoholic liver disease
- Viral hepatitis (A, B, C, or non-A, non-B)

- Autoimmune hepatitis
- Alpha-1 antitrypsin deficiency
- Hemochromatosis
- Non-alcoholic steatohepatitis
- Protoporphyria
- Wilson's disease

B. **Cholestatic liver disease**

- Primary biliary cirrhosis
- Primary sclerosing cholangitis with development of secondary biliary cirrhosis
- Biliary atresia

C. Vascular disease

- Budd-Chiari syndrome

D. **Primary hepatocellular carcinoma** with **ONE** of the following:

- A single tumor 5 cm or less, **OR** 2 to 3 tumors that are 3 cm or less (Milan criteria), **OR**
- A single tumor 6.5 cm or less, **OR** up to 3 tumors 4.5 cm or less, and a total tumor size of 8 cm or less (University of California, San Francisco Expanded Criteria), **OR**
- A single tumor 2 cm or greater, and up to 5 cm or less, **OR** 2 to 3 tumors 1 cm or greater, and up to 3 cm or less and without extrahepatic spread or macrovascular invasion (UNOS Stage T2 Criteria)

E. **Inborn errors of metabolism**

F. **Trauma and toxic reactions**

G. **Miscellaneous**

- Familial amyloid polyneuropathy*

Liver transplantation **meets the definition of medical necessity** in candidates with polycystic disease of the liver who have massive hepatomegaly causing obstruction or functional impairment.

Liver transplantation **meets the definition of medical necessity** in candidates with unresectable hilar cholangiocarcinoma.

Liver transplantation **meets the definition of medical necessity** in pediatric candidates with non-metastatic hepatoblastoma.

Liver re-transplantation **meets the definition of medical necessity** in those with:

- Primary graft non-function
- Hepatic artery thrombosis

- Chronic rejection
- Ischemic type biliary lesions after donation after cardiac death
- Recurrent non-neoplastic disease-causing late graft failure

Combined liver-kidney transplantation **meets the definition of medical necessity** in those who qualify for liver transplantation and have advanced irreversible kidney disease.

Liver transplant **does not meet the definition of medical necessity** for the following:

- Hepatocellular carcinoma that has extended beyond the liver
- The transplant candidate is not approved by the transplant committee for the institution where the transplant will be performed

Liver transplant is considered **experimental or investigational** for the following conditions, as available clinical evidence does not support safety and effectiveness:

- Intrahepatic cholangiocarcinoma
- Neuroendocrine tumors metastatic to the liver

Potential contraindications to liver transplant (subject to the judgment of the transplant center) include:

- Known current malignancy, including metastatic cancer
- Recent malignancy with high risk of recurrence
- Untreated systemic infection making immunosuppression unsafe, including chronic infection
- Other irreversible end-stage disease not attributed to liver disease
- History of cancer with a moderate risk of recurrence
- Systemic disease that could be exacerbated by immunosuppression
- Psychosocial conditions or chemical dependency affecting ability to adhere to therapy

BILLING/CODING INFORMATION:

CPT Coding:

47133	Donor hepatectomy (including cold preservation), from cadaver donor
47135	Liver allotransplantation; orthoptic; partial or whole, from cadaver or living donor, any age
47140	Donor hepatectomy (including cold preservation), from living donor; left lateral segment only (segments II and III)
47141	Donor hepatectomy, with preparation and maintenance of allograft, from living donor; total left lobectomy (segments II, III and IV)

47142	Donor hepatectomy, with preparation and maintenance of allograft, from living donor; total right lobectomy (segments V, VI, VII and VIII)
47143	Backbench standard preparation of cadaver donor whole liver graft prior to allotransplantation, including cholecystectomy, if necessary, and dissection and removal of surrounding soft tissues to prepare the vena cava, portal vein, hepatic artery, and common bile duct for implantation; without tri-segment or lobe split
47144	Backbench standard preparation of cadaver donor whole liver graft prior to allotransplantation, including cholecystectomy, if necessary, and dissection and removal of surrounding soft tissues to prepare the vena cava, portal vein, hepatic artery, and common bile duct for implantation; with tri-segment split of whole liver graft into 2 partial liver grafts (i.e., left lateral segment (segments II and III) and right tri-segment (segments I and IV through VIII)
47145	Backbench standard preparation of cadaver donor whole liver graft prior to allotransplantation, including cholecystectomy, if necessary, and dissection and removal of surrounding soft tissues to prepare the vena cava, portal vein, hepatic artery, and common bile duct for implantation; with lobe split of whole liver graft into 2 partial liver grafts (i.e., left lobe (segments II, III, and IV) and right lobe (segments I and V thorough VIII)
47146	Backbench reconstruction of cadaver or living donor liver graft prior to allotransplantation; venous anastomosis, each
47147	Backbench reconstruction of cadaver or living donor liver graft prior to allotransplantation; arterial anastomosis, each

REIMBURSEMENT INFORMATION:

None applicable.

PROGRAM EXCEPTIONS:

Federal Employee Program (FEP): Follow FEP guidelines.

State Account Organization (SAO): Follow SAO guidelines.

Medicare Advantage: The following National Coverage Determinations (NCDs) were reviewed on the last guideline reviewed date: Adult Liver Transplantation (260.1) and Pediatric Liver Transplantation (260.2), located at cms.gov.

If this Medical Coverage Guideline contains a step therapy requirement, in compliance with Florida law 627.42393, members or providers may request a step therapy protocol exemption to this requirement if based on medical necessity. The process for requesting a protocol exemption can be found at Coverage Protocol Exemption Request.

DEFINITIONS:

Allotransplantation: transplantation of tissue from one individual to another of the same species, but of different genotypes.

Biliary atresia: obliteration of one or more components of the bile ducts due to arrested fetal development resulting in persistent jaundice and liver damage ranging from biliary stasis to cirrhosis, with spleen enlargement as portal hypertension progresses.

Budd-Chiari syndrome: symptomatic obstruction or occlusion of the hepatic veins eventually resulting in liver failure; death can occur within days in cases of complete occlusion.

Hemochromatosis: disorder where deposits of intercellular storage of iron in the parenchymal cells of the liver, causing tissue damage and dysfunction of the liver.

Hepatectomy: excision of all or part of the liver.

Sclerosing cholangitis: fibrosing inflammation of the bile ducts of unknown cause, most commonly in young men and frequently associated with chronic ulcerative colitis.

UNOS: United Network of Organ Sharing.

Wilson's disease: inherited disease involving metabolism of copper and resulting in accumulation of copper in the liver, brain, kidney, cornea, and other tissues; characterized by cirrhosis of the liver and generative changes in the brain.

RELATED GUIDELINES:

Isolated Small Bowel Transplant, 02-40000-18

Small Bowel, Liver and Multivisceral Transplant, 02-40000-19

Kidney Transplant, 02-50300-01

Allogeneic Pancreas Transplant, 02-40000-17

OTHER:

Florida Statute 765.523 Discrimination in access to anatomical gifts and organ transplants prohibited. (excerpt)

(3)(d) "Organ transplant" means the transplantation or transfusion of a part of a human body into the body of another individual for the purpose of treating or curing a medical condition.

Florida Statute 627.64197 Coverage for organ transplants. —A health insurance policy issued, delivered, or renewed on or after July 1, 2020, in this state by an insurer which provides coverage for organ transplants on an expense-incurred basis may not deny coverage for an organ transplant solely on the basis of an insured's disability. This section may not be construed to require such insurer to provide coverage for an organ transplant that is not medically necessary. For purposes of this section, the term "organ transplant" has the same meaning as in s. 765.523.

Florida Statute 627.65736 Coverage for organ transplants. —A group health insurance policy delivered, issued, or renewed on or after July 1, 2020, in this state by an insurer or nonprofit health care services plan which provides coverage for organ transplants on an expense-incurred basis may not deny coverage for an organ transplant solely on the basis of an insured's disability. This section may not be

construed to require such insurer or nonprofit health care service plan to provide coverage for an organ transplant that is not medically necessary. For purposes of this section, the term "organ transplant" has the same meaning as in s. 765.523.

Florida Statute 641.31075 Coverage for organ transplants. - A health maintenance contract issued or renewed on or after July 1, 2020, in this state by a health maintenance organization which provides coverage for organ transplants may not deny coverage for an organ transplant solely on the basis of a subscriber's disability. This section may not be construed to require such health maintenance organization to provide coverage for an organ transplant that is not medically necessary. For purposes of this section, the term "organ transplant" has the same meaning as in s. 765.523.

REFERENCES:

1. Ahmed O, Doyle MBM. Liver transplantation: expanding the donor and recipient pool. Chin Clin Oncol. 2021 Feb;10(1):6. doi: 10.21037/cco-20-212. Epub 2020 Dec 14.
2. American Association for the Study of Liver Diseases (AASLD). Practice Guidelines: Evaluation of the Patient for Liver Transplantation. 2005. Accessed at: http://www.aasld.org/practiceguidelines/Documents/Bookmarked%20Practice%20Guidelines/Liver%20Transplant.pdf.
3. Belle SH, Beringer KC, Detre KM. An update on liver transplantation in the United States: recipient characteristics and outcome. Clin Transpl. 1995: 19-33. PMID 8794252.
4. Bellido CB, Martínez JM, Artacho GS, et al. Have we changed the liver retransplantation survival?. Transplant Proc. 2012; 44(6): 1526-9.
5. Blue Cross Blue Shield Association Evidence Positioning System®. 7.03.06 - Liver Transplant and Combined Liver-Kidney Transplant, 09/23.
6. Borakati A, Froghi F, Bhogal RH, Mavroeidis VK. Liver transplantation in the management of cholangiocarcinoma: Evolution and contemporary advances. World J Gastroenterol. 2023 Apr 7;29(13):1969-1981. doi: 10.3748/wjg. v29.i13.1969.
7. Bouari S, Rijkse E, Metselaar HJ, et al. A comparison between combined liver kidney transplants to liver transplants alone: A systematic review and meta-analysis. Transplant Rev (Orlando). Dec 2021; 35(4): 100633.
8. Calinescu AM, Wildhaber BE, Poncet A, et al. Outcomes of combined liver-kidney transplantation in children: analysis of the scientific registry of transplant recipients. Am J Transplant. Dec 2014; 14(12): 2861-8.
9. Cambridge WA, Fairfield C, Powell JJ, et al. Meta-analysis and Meta-regression of Survival After Liver Transplantation for Unresectable Perihilar Cholangiocarcinoma. Ann Surg. Feb 01 2021; 273(2): 240-250.
10. Centers for Medicare and Medicaid Services (CMS), National Coverage Determination Manual, Adult Liver Transplantation (260.1) (06/21/12).
11. Centers for Medicare and Medicaid Services (CMS), National Coverage Determination Manual, Pediatric Liver Transplantation (260.2) (04/12/91).
12. Cholankeril G, Wong RJ, Hu M, et al. Liver Transplantation for Nonalcoholic Steatohepatitis in the US: Temporal Trends and Outcomes. Dig Dis Sci. Oct 2017; 62(10): 2915-2922.
13. Chuncharunee L, Yamashiki N, et al. Alcohol relapse and its predictors after liver transplantation for alcoholic liver disease: a systematic review and meta-analysis. BMC Gastroenterology. 2019;19.

14. Clavien PA, Lesurtel M, Bossuyt PM et al. Recommendations for liver transplantation for hepatocellular carcinoma: an international consensus conference report. Lancet Oncol 2012; 13(1):e11-22.
15. Clinical Trials.gov. Liver Transplants in People with HIV Infection. Identifier: NCT00473629. Sponsored by National Institute of Allergy and Infectious Diseases (NIAID).
16. Crabb DW, Im GY et al. MR. Diagnosis and Treatment of Alcohol-Associated Liver Diseases: 2019 Practice Guidance from the American Association for the Study of Liver Diseases. Hepatology (Baltimore, Md.). 2020 Jan;71(1):306.
17. Czauderna P, Otte JB, Aronson DC, et al. Guidelines for surgical treatment of hepatoblastoma in the modern era--recommendations from the Childhood Liver Tumour Strategy Group of the International Society of Paediatric Oncology (SIOPEL). Eur J Cancer. May 2005; 41(7): 1031-6.
18. Darwish Murad S, Kim WR, Harnois DM, et al. Efficacy of neoadjuvant chemoradiation, followed by liver transplantation, for perihilar cholangiocarcinoma at 12 US centers. Gastroenterology. Jul 2012; 143(1): 88-98.e3; quiz e14.
19. de la Cerda F, Jimenez WA, Gjertson DW, et al. Renal graft outcome after combined liver and kidney transplantation in children: UCLA and UNOS experience. Pediatr Transplant. Jun 2010; 14(4): 459-64.
20. Della Guardia B, Boteon APCS, Matielo CEL, Felga G, Boteon YL. Current and future perspectives on acute-on-chronic liver failure: Challenges of transplantation, machine perfusion, and beyond. World J Gastroenterol. 2022 Dec 28;28(48):6922-6934. doi: 10.3748/wjg. v28.i48.6922.
21. ECRI Health Technology Assessment: Liver Transplantation for Treatment of Hereditary Amyloidosis-Transthyretin Type (ATTR), (09/05).
22. ECRI. Custom Hotline Response. Liver and kidney Transplantation in HIV – Positive Patients. Plymouth Meeting, PA. ECRI. Updated 12/11/07.
23. ECRI. Target Report. Kidney/Liver transplantation in human immunodeficiency virus (HIV) + patients. Plymouth Meeting, PA. ECRI. 04/08.
24. Erard-Poinsot D, Guillaud O, et al. Severe Alcoholic Relapse After Liver Transplantation: What Consequences on the Graft? A Study Based on Liver Biopsies Analysis. Liver transplantation: official publication of the American Association for the Study of Liver Diseases and the International Liver Transplantation Society. 2016 Jun;22(6):773-84.
25. Fan ST, Le Treut YP, Mazzaferro V, et al. Liver transplantation for neuroendocrine tumour liver metastases. HPB (Oxford). Jan 2015; 17(1): 23-8.
26. Faure S, Herrero A, et al. Excessive Alcohol Consumption After Liver Transplantation Impacts on Long-Term Survival, Whatever the Primary Indication. Journal of hepatology. 2012 Aug;57(2):306-12.
27. Firl DJ, Kimura S, McVey J, et al. Reframing the approach to patients with hepatocellular carcinoma: Longitudinal assessment with HALTHCC improves ablate and wait strategy. Hepatology. Mar 31, 2018.
28. Florida State Statutes 765.523 – Discrimination in access to anatomical gifts and organ transplants prohibited; Florida Statute 627.64197 – Coverage for organ transplants; 627.65736 – Coverage for organ transplants; and 641.31075 – Coverage for organ transplants. Accessed at http://www.flsenate.gov/.
29. Fong TL, Khemichian S, Shah T, et al. Combined liver-kidney transplantation is preferable to liver transplant alone for cirrhotic patients with renal failure. Transplantation. Aug 27 2012; 94(4): 411-6. PMID 22805440.
30. Friman S, Foss A, Isoniemi H et al. Liver transplantation for cholangiocarcinoma: selection is essential for acceptable results. Scand J Gastroenterol 2011; 46(3):370-5.

31. Gadiparthi C, Cholankeril G, Perumpail BJ, et al. Use of direct-acting antiviral agents in hepatitis C virus-infected liver transplant candidates. World J Gastroenterol. Jan 21 2018; 24(3): 315-322.

32. Gu J, Bai J, Shi X, et al. Efficacy and safety of liver transplantation in patients with cholangiocarcinoma: a systematic review and meta-analysis. Int J Cancer. May 01 2012; 130(9): 2155-63. PMID 21387295.

33. Hartl J, Scherer MN, et al. Strong predictors for alcohol recidivism after liver transplantation: non-acceptance of the alcohol problem and abstinence of <3 months. Scand J Gastroenterol. 2011 Oct;46(10):1257-66. doi: 10.3109/00365521.2011.603160. Epub 2011 Aug 5. PMID: 21815863.

34. HAYES, Inc. Medical Technology Directory: Liver Transplantation, Adult. Lansdale, PA: Hayes, Inc 07/02; updated 07/29/07.

35. HAYES, Inc. Medical Technology Directory: Liver Transplantation, Pediatric. Lansdale, PA: Hayes, Inc; 07/02; updated 07/31/07.

36. HAYES, Inc. Medical Technology Directory: Living Donor Liver Transplantation. Lansdale, PA: Hayes, Inc; 05/22/02; updated 03/20/07.

37. HCFA Program Memorandum, Transmittal AB-00-17: Clarification of Liver Transplant Policy, (March 2000).

38. Hamilton EC, Balogh J, Nguyen DT, et al. Liver transplantation for primary hepatic malignancies of childhood: The UNOS experience. J Pediatr Surg. 2017 3468(17):30657-30657. PMID 29108844.

39. Hue JJ, Rocha FG, Ammori JB, et al. A comparison of surgical resection and liver transplantation in the treatment of intrahepatic cholangiocarcinoma in the era of modern chemotherapy: An analysis of the National Cancer Database. J Surg Oncol. Mar 2021; 123(4): 949-956. PMID 33400841.

40. Imai D, Sambommatsu Y, Sharma A, Kumaran V, Cotterell AH, Khan AA, Lee SD, Gupta G, Levy MF, Bruno DA. Single incision simultaneous liver kidney transplantation: Feasibility and outcomes. Clin Transplant. 2023 Jan;37(1):e14849. doi: 10.1111/ctr.14849. Epub 2022 Nov 25. PMID: 36343925.

41. Lim J, Curry MP, Sundaram V. Risk factors and outcomes associated with alcohol relapse after liver transplantation. World journal of hepatology. 2017 Jun 18;9(17):771.

42. Lombardo-Quezada J, Colmenero J, et al. Prediction of Alcohol Relapse Among Liver Transplant Candidates with Less Than 6 Months of Abstinence Using the High-Risk Alcoholism Relapse Score. Liver Transpl. 2019 Aug;25(8):1142-1154. doi: 10.1002/lt.25460. Epub 2019 Jun 25.

43. Lunsford KE, Bodzin AS, Markovic D, et al. Avoiding futility in simultaneous liver-kidney transplantation: analysis of 331 consecutive patients listed for dual organ replacement. Ann Surg. May 2017;265(5):1016-1024. PMID 27232249.

44. Maggs JR, Suddle AR, Aluvihare V, et al. Systematic review: the role of liver transplantation in the management of hepatocellular carcinoma. Aliment Pharmacol Ther. May 2012; 35(10): 1113-34.

45. Máthé Z, Tagkalos E, Paul A, et al. Liver transplantation for hepatic metastases of neuroendocrine pancreatic tumors: a survival-based analysis. Transplantation. Mar 15 2011; 91(5): 575-82. PMID 21200365.

46. Mathurin P, Moreno C, et al. Early liver transplantation for severe alcoholic hepatitis. N Engl J Med. 2011 Nov 10;365(19):1790-800. doi: 10.1056/NEJMoa1105703.

47. Mikulic D, Mrzljak A. Liver transplantation and aging. World J Transplant. 2020 Sep 18;10(9):256-266. doi: 10.5500/wjt. v10.i9.256.

48. Murali AR, Patil S, Phillips KT, et al. Locoregional Therapy With Curative Intent Versus Primary Liver Transplant for Hepatocellular Carcinoma: Systematic Review and Meta-Analysis. Transplantation. Aug 2017; 101(8): e249-e257. PMID 28282359.

49. National Comprehensive Cancer Network. Clinical Practice Guidelines in Oncology. Hepatobiliary Cancers; v2:2014. Accessed at: http://www.nccn.org/professionals/physician_gls/pdf/hepatobiliary.pdf on 04/26/14.
50. National Guideline Clearinghouse Guideline Summary NGC-8006: Management of hepatocellular carcinoma: an update. Alexandria (VA): American Association for the Study of Liver Diseases; 2010 Jul.
51. National Institute for Health and Clinical Excellence (NICE). Interventional Procedure Guidance (IPG) 194: Living-donor liver transplantation (May 2006). Accessed at http://www.nice.org.uk/ on 04/27/14.
52. Newsome PN, Allison ME, Andrews PA et al. Guidelines for liver transplantation for patients with non-alcoholic steatohepatitis. Gut 2012; 61(4):484-500.
53. Organ Procurement and Transplantation Network Policies (04/10/14). Accessed at: http://optn.transplant.hrsa.gov/policiesAndBylaws/policies.asp.
54. Organ Procurement and Transplantation Network (OPTN). Policy 9: Allocation of Livers and Liver-Intestines. Updated March 16, 2023; accessed at https://optn.transplant.hrsa.gov/media/1200/optn_policies.pdf#nameddest=Policy_01.
55. Remiszewski P, Kalinowski P, Dudek K et al. Influence of selected factors on survival after liver retransplantation. Transplant Proc 2011; 43(8):3025-8.
56. Rice JP, Eickhoff J, et al. Abusive drinking after liver transplantation is associated with allograft loss and advanced allograft fibrosis. Liver Transpl. 2013 Dec;19(12):1377-86. doi: 10.1002/lt.23762.
57. Ruiz R, Jennings LW, Kim P, et al. Indications for combined liver and kidney transplantation: propositions after a 23-yr experience. Clin Transplant. 2010; 24(6): 807-11. PMID 20002463.
58. Salimi J, Jafarian A, Fakhar N, et al. Study of re-transplantation and prognosis in liver transplant center in Iran. Gastroenterol Hepatol Bed Bench. 2021; 14(3): 237-242.
59. Sheiner P, Rochon C. Recurrent hepatitis C after liver transplantation. Mt Sinai J Med. 2012; 79(2): 190-8. PMID 22499490.
60. Singal AK, Bataller R, Ahn J, Kamath PS, Shah VH. ACG Clinical Guideline: Alcoholic Liver Disease. Am J Gastroenterol. 2018 Feb;113(2):175-194. doi: 10.1038/ajg.2017.469. Epub 2018 Jan 16.
61. Tandon P, Goodman KJ, et al. A Shorter Duration of Pre-Transplant Abstinence Predicts Problem Drinking After Liver Transplantation. The American journal of gastroenterology. 2009 Jul;104(7):1700-6.
62. UpToDate. Liver transplantation for alcoholic-associated liver disease. 2024. Accessed at uptodate.com.
63. UpToDate. Liver transplantation in adults: Patient selection and pre-transplantation evaluation. 2024. Accessed at uptodate.com.
64. Wang X, Li J, Riaz DR, et al. Outcomes of liver transplantation for nonalcoholic steatohepatitis: a systematic review and meta-analysis. Clin Gastroenterol Hepatol. Mar 2014; 12(3): 394-402.e1.
65. Yadav DK, Chen W, Bai X, et al. Salvage Liver Transplant versus Primary Liver Transplant for Patients with Hepatocellular Carcinoma. Ann Transplant. 2018 Aug 3; 23:524-545.
66. Yong JN, Lim WH, Ng CH, et al. Outcomes of Nonalcoholic Steatohepatitis After Liver Transplantation: An Updated Meta-Analysis and Systematic Review. Clin Gastroenterol Hepatol. Jan 2023; 21(1): 45-54.e6.
67. Zhu Y, Dong J, Wang WL, et al. Short- and long-term outcomes after salvage liver transplantation versus primary liver transplantation for hepatocellular carcinoma: a meta-analysis. Transplant Proc. Nov 2013; 45(9): 3329-42. PMID 24182812.

68. Ziogas IA, Giannis D, Economopoulos KP, et al. Liver Transplantation for Intrahepatic Cholangiocarcinoma: A Meta-analysis and Meta-regression of Survival Rates. Transplantation. Oct 01 2021; 105(10): 2263-2271. PMID 33196623.

COMMITTEE APPROVAL:

This Medical Coverage Guideline (MCG) was approved by the Florida Blue Medical Policy and Coverage Committee on 07/25/24.

GUIDELINE UPDATE INFORMATION:

02/15/01	Medical Coverage Guideline Developed.
03/15/02	Reviewed investigational status – maintained.
09/26/02	Revised to include new MELD and PELD scoring system criteria.
01/01/04	Annual HCPCS coding update.
03/15/04	Scheduled reviewed with formatting revisions; no change in coverage statement.
01/01/05	HCPCS coding update: added new codes for liver transplantation; revised 47133 and 47140 descriptors.
06/15/05	Revision to guideline, consisting of removal of investigational statement regarding HIV-positive recipients.
06/15/06	Scheduled review; no change in coverage statement.
06/15/07	Scheduled review; reformatted guideline; updated references.
09/15/07	Revision consisting of removal of criteria restricting coverage to patients over the age of 70 years.
07/15/08	Scheduled review; no change in position statement. Update references.
07/15/09	Scheduled review; no change in position statement. Update description section.
01/01/10	Annual HCPCS coding update: revise descriptors for CPT codes 47144 & 47145.
10/01/10	4th Quarter HCPCS coding update: ICD-9 diagnosis code 275.0 deleted; ICD-9 diagnosis codes 275.01, 275.02, 275.03 and 275.09 added.
10/15/10	Revision; related ICD-10 codes added.
04/01/12	Revision; updated ICD10 coding with new and revised codes.
08/15/12	Revision; added Medicare Advantage program exception in accordance with CMS Decision Memo (CAG-00091R).
06/15/14	Scheduled review. Revised description section, position statement and program exceptions section. Updated references.
01/01/16	Annual CPT/HCPCS coding update. Deleted code 47136.
12/15/19	Scheduled review. Revised description and position statement (added MELD/PELD scoring criteria; revised re-transplantation criteria; added coverage statement for liver/kidney transplant). Updated references.
02/15/20	Revision: Deleted (informational) statements regarding “liver specific criteria” and MELD/PELD scores.
07/01/20	Revision: added Florida statute language regarding discrimination in access to anatomical gifts and coverage of organ transplants. Updated references.
03/15/20	Revision. Revised alcohol and/or drug abuse criterion. Updated references.
09/15/21	Scheduled review. Maintained position statement and updated references.

05/25/23	Update to Program Exceptions section.
09/15/23	Scheduled review. Maintained position statement and updated references.
08/15/24	Scheduled review. Revised description, maintained position statement and updated references.