OPTN

Notice of OPTN Policy and Guidance Changes

Updates to National Liver Review Board (NLRB) Guidance & Further Alignment with Liver Imaging Reporting and Data System (LI-RADS®)

Sponsoring Committee:	**Liver & Intestinal Organ Transplantation**
Policy Affected:	***9.5.I: Requirements for Hepatocellular Carcinoma (HCC) MELD or PELD Score Exceptions***
Guidance Affected:	***Guidance to Liver Transplant Programs and the National Liver Review Board for Adult MELD Exceptions for Transplant Oncology*** ***Guidance to Liver Transplant Programs and the National Liver Review Board for Adult MELD Exception Review*** ***National Liver Review Board Operational Guidelines***
Public Comment:	**January 21, 2025 – March 19, 2025**
Board Approved:	**June 9, 2025**
Effective Date:	**July 1, 2025:** ***Guidance to Liver Transplant Programs and the National Liver Review Board for Adult MELD Exceptions for Transplant Oncology; Guidance to Liver Transplant Programs and the National Liver Review Board for Adult MELD Exception Review; National Liver Review Board Operational Guidelines*** **Pending implementation and notice to OPTN members:** ***9.5.I: Requirements for Hepatocellular Carcinoma (HCC) MELD or PELD Score Exceptions; Guidance to Liver Transplant Programs and the National Liver Review Board for Adult MELD Exceptions for Transplant Oncology***

Purpose of Policy and Guidance Changes

The purpose of this proposal is to continue to improve the National Liver Review Board (NLRB) by creating a more efficient and equitable system for reviewing Model for End-Stage Liver Disease (MELD) and Pediatric End-Stage Liver Disease Model (PELD) exception requests. This proposal includes several changes to the NLRB guidance documents that seek to update content for accuracy and relevancy as well as provide non-standard exception MELD and PELD score recommendations for certain diagnoses to ensure more equitable access to transplant through non-standard exceptions. NLRB Operational

Guidelines updates are included to ensure that review boards reflect appropriate expertise. Additionally, the Committee is proposing modifications to hepatocellular carcinoma (HCC) policy and guidance to add contrast-enhanced ultrasound (CEUS) as an acceptable diagnostic tool for standard HCC exceptions and align imaging classification criteria to liver imaging reporting and data system (LI-RADS) terminology in *Policy 9.5.I: Requirements for Hepatocellular Carcinoma (HCC) MELD or PELD Score Exceptions*.

Proposal History

Prior to the implementation of the NLRB, MELD, and PELD exception requests were reviewed by regional review boards (RRBs). The implementation of the NLRB was a significant change in the process for reviewing MELD or PELD exception requests and because of the significance and complexity of the change, the Committee has continued to receive feedback on areas for improvement to the NLRB guidance and policy. This project is the latest in a series of improvements to the NLRB since it was implemented.

Summary of Changes

- Modifications to Adult Transplant Oncology and Adult Other guidance documents include the addition of score recommendations for each diagnosis as well as updated content based on recent literature.
- Updates to *Policy 9.5.I: Requirements for HCC MELD or PELD Score Exceptions* allow CEUS as an acceptable independent diagnostic tool for HCC.
- Updates to *Policy 9.5.I: Requirements for HCC MELD or PELD Score Exceptions* align imaging classification criteria to LI-RADS terminology.
- Modifications to the Adult Transplant Oncology guidance document include reference tables for CEUS imaging and LI-RADS 5 criteria.
- Modifications to NLRB Operational Guidelines ensure that non-standard exceptions for adults with pediatric diagnoses are reviewed by the Adult Other Review Board.

Implementation

Transplant programs will need to be familiar with the proposed changes to the NLRB guidance documents when submitting non-standard exception requests for liver candidates. Transplant programs will also need to be aware of the changes related to imaging options and LI-RADS when submitting HCC exceptions.

Upon implementation, any HCC initial case that is in pending state or submitted to the review board will remain in the current form. Implemented changes will be reflected in the new HCC initial forms.

Additionally, all pending, submitted, and appealed forms for exception requests for adults with pediatric diagnoses will still be sent to the Pediatric Review Board. Should transplant programs want these cases to be reviewed by the Adult Other Diagnosis Review Board, they can withdraw their currently submitted form and file a new exception form. Upon implementation, any adult exception requests for adults with pediatric diagnoses will be sent to the Adult Other Diagnosis Review Board.

Relevant guidance documents will be updated. The OPTN Computer System will be updated to reflect changes to the HCC policy modifications. CEUS is proposed as an additional imaging option to diagnose a

Class 5 lesion. System users will be able to input “CEUS of abdomen” and an associated imaging date in the existing section, "Imaging Study.”

The OPTN will communicate any changes prior to implementation and will provide educational resources as appropriate.

Affected Policy Language

New language is underlined (example) and language that is deleted is struck through (~~example~~).

9.5.I Requirements for Hepatocellular Carcinoma (HCC) MELD or PELD Score Exceptions

Upon submission of the first exception request, a candidate with hepatocellular carcinoma (HCC) will receive a score according to *Policy 9.5.I.vii: Extensions of HCC Exceptions* if the candidate meets the criteria according to *Policies 9.5.I.i through 9.5.I.vi.*

9.5.I.i Initial Assessment and Requirements for HCC Exception Requests

Prior to applying for a standardized MELD or PELD exception, the candidate must undergo a thorough assessment that includes *all* of the following:

1. An evaluation of the number and size of lesions ~~before locoregional therapy~~ using multiphase contrast-enhanced computer tomography (CT) or magnetic resonance imaging (MRI) before locoregional therapy.
2. An evaluation that the lesions ~~that~~ meet Class 5 criteria according to *Table 9-9* using a ~~dynamic~~ multiphase contrast-enhanced ~~computed tomography (~~CT~~), or (~~MRI~~), or ultrasound (CEUS).
3. A CT of the chest to rule out metastatic disease. This is only required prior to applying for an initial exception. A CT of the chest is not required for exception extensions.
4. A CT or MRI to rule out any other sites of extrahepatic spread or macrovascular involvement
5. An indication that the candidate is not eligible for resection
6. An indication whether the candidate has undergone locoregional therapy
7. The candidate’s alpha-fetoprotein (AFP) level

The transplant hospital must maintain documentation of the radiologic images and assessments of all OPTN Class 5 lesions in the candidate’s medical record. If growth criteria are used to classify a lesion as HCC, the radiology report must contain the prior and current dates of imaging, type of imaging, and measurements of the lesion.

For those candidates who receive a liver transplant while receiving additional priority under the HCC exception criteria, the transplant hospital must submit the *Post-Transplant Explant Pathology Form* to the OPTN within 60 days of transplant. If the *Post-Transplant Explant Pathology Form* does not show evidence of HCC or liver-directed therapy for HCC, the transplant program must also submit documentation or imaging studies confirming HCC at the time of assignment.

The Liver and Intestinal Organ Transplantation Committee will review the submitted documentation or imaging studies when more than 10 percent of the *Post-Transplant Explant Pathology Forms* submitted by a transplant program in a one year period do not show evidence of HCC or liver-directed therapy for HCC.

9.5.I.ii Eligible Candidates Definition of T2 Stage

Candidates with hepatic lesions that meet T2 stage are eligible for a standardized MELD or PELD exception if they have an alpha-fetoprotein (AFP) level less than or equal to 1000 ng/mL. T2 stage is defined as candidates with *either* of the following:

- One Class 5 lesion greater than or equal to 2 cm and less than or equal to 5 cm in size.
- Two or three Class 5 lesions each greater than or equal to 1 cm and less than or equal to 3 cm in size.

A candidate who has previously had an AFP level greater than 1000 ng/mL at any time must qualify for a standardized MELD or PELD exception according to *Policy 9.5.I.iv: Candidates with Alpha-fetoprotein (AFP) Levels Greater than 1000.*

9.5.I.iii Lesions Eligible for Downstaging Protocols

Candidates are eligible for a standardized MELD or PELD exception if, before completing locoregional therapy, they have lesions that meet *one* of the following criteria:

- One Class 5 lesion greater than 5 cm and less than or equal to 8 cm
- Two or three Class 5 lesions that meet all of the following:
    - At least one lesion greater than 3 cm
    - Each lesion less than or equal to 5 cm, and
    - A total diameter of all lesions less than or equal to 8 cm
- Four or five Class 5 lesions each less than 3 cm, and a total diameter of all lesions less than or equal to 8 cm

For candidates who meet the downstaging criteria above and then complete locoregional therapy, the viable lesions must subsequently meet the size requirements for T2 stage according to *Policy 9.5.I.ii: Eligible Candidates Definition of T2 Stage* to be eligible for a standardized MELD or PELD exception. Downstaging to meet eligibility requirements for T2 stage must be demonstrated by ~~dynamic~~ multiphase contrast-enhanced CT or MRI performed after locoregional therapy. Candidates with lesions that do not initially meet the downstaging protocol inclusion criteria who are later downstaged and then meet eligibility for T2 stage are not automatically eligible for a standardized MELD or PELD exception and must be referred to the NLRB for consideration of a MELD or PELD exception.

9.5.I.iv Candidates with Alpha-fetoprotein (AFP) Levels Greater than 1000

Candidates with lesions meeting T2 stage according to *Policy 9.5.I.ii Eligible Candidates Definition of T2 Stage* but with an alpha-fetoprotein (AFP) level greater than 1000 ng/mL may be treated with locoregional therapy. If the candidate's AFP level falls below 500 ng/mL after treatment, the candidate is eligible for a standardized MELD or PELD exception as long as the candidate's AFP level remains below 500 ng/mL. Candidates with an AFP level greater than or equal to 500 ng/mL following locoregional therapy at any time must be referred to the NLRB for consideration of a MELD or PELD exception.

9.5.I.v Requirements for ~~Dynamic~~ Multiphase Contrast-enhanced CT or MRI of the Liver

CT scans or MRIs performed for a HCC MELD or PELD score exception request must be interpreted by a radiologist at a transplant hospital. If the lesion cannot be categorized due to image degradation or omission, then the lesion will be classified as Not categorizable (NC) and imaging must be repeated or completed to receive an HCC MELD or PELD exception. If the lesion cannot be fully categorized due to image degradation or omission, then imaging must be repeated or completed. Contrast-enhanced ultrasound (CEUS) can be used to determine class 5 classification, in accordance with *Table 9-9*.

9.5.I.vi Imaging Requirements for Class 5 Lesions

Lesions found on imaging in ~~patients~~ candidates at risk for HCC are classified according to *Table 9-9*. The imaging criteria within the table apply only to observations which do not represent benign lesions or non-HCC malignancy (i.e. targetoid or LR-M) by imaging.

Table 9-9: Classification System for Lesions Seen on Imaging of Livers[1]

Seen on Imaging of Livers Class	Description
NC – Not Categorizable	Incomplete or technically inadequate study due to image degradation or omission

5A	Must meet *all* of the following:
	• Maximum diameter of at least 1 cm and less than 2 cm, as measured on late arterial or portal phase images
	• ~~Nonrim arterial phase hyper-enhancement~~
	• Either of the following:
	  • ~~Non-peripheral washout~~
	  • LI-RADS 5 classification on CT, MRI, or CEUS
	  • Biopsy

~~5A-g~~	~~Must meet *all* of the following:~~ • ~~Maximum diameter of at least 1 cm and less than 2 cm, as measured on late arterial or portal phase images~~ • ~~Nonrim arterial phase hyper-enhancement~~ • ~~Threshold growth defined as size increase of a mass by ≥ 50% in ≤ 180 days on MRI or CT~~

[1] LI-RADS criteria is determined by the American College of Radiology. https://www.acr.org/-/media/ACR/Files/RADS/LI-RADS/LI-RADS-2018-Core.pdf.

Seen on Imaging of Livers Class	Description

5B	Must meet *all* of the following:
	• Maximum diameter of at least 2 cm and less than or equal to 5 cm, as measured on late arterial or portal phase images
	• ~~Nonrim arterial phase hyper-enhancement~~
	• ~~*One*~~ Either of the following:
	  • ~~Nonperipheral washout~~
	  • ~~Enhancing capsule~~
	  • ~~Threshold growth defined as size increase of a mass by ≥ 50% in ≤ 180 days on MRI or CT~~
	  • LI-RADS 5 classification on CT, MRI, or CEUS
	  • Biopsy

5T	Any Class 5A, ~~5A-g,~~ 5B lesion that was automatically approved upon initial request or extension and has subsequently been treated by locoregional therapy

9.5.I.vii Extensions of HCC Exception

A candidate with an approved exception for HCC is eligible for automatic approval of an extension if the transplant program enters a MELD or PELD Exception Score Extension Request that contains the following:

1. Documentation of the tumor stage using multiphase contrast-enhanced CT or MRI
2. The type of treatment if the number of tumors decreased since the last request
3. The candidate's alpha-fetoprotein (AFP) level

A CT of the chest to rule out metastatic disease is not required after the initial exception request.

The candidate's exception extension will then be automatically approved unless *any* of the following occurs:

- The candidate's lesions progress beyond T2 criteria, according to *9.5.I.ii: Eligible Candidates Definition of T2 Stage*
- The candidate's alpha-fetoprotein (AFP) level was less than or equal to 1,000 ng/mL on the initial request but subsequently rises above 1,000 ng/mL
- The candidate's AFP level was greater than 1,000 ng/mL, the AFP level falls below 500 ng/mL after treatment but before the initial request, then the AFP level subsequently rises to greater than or equal to 500 ng/mL
- The candidate's tumors have been resected since the previous request
- The program requests a score different from the scores assigned in Table 9-10.

When a transplant program submits either an initial exception request or the first extension request for a liver candidate at least 18 years old at the time of registration that meets the requirements for a standardized MELD score exception, the candidate will appear on the match run according to the calculated MELD score.

A candidate who meets these requirements for a MELD or PELD score exception for HCC will receive a score according to *Table 9-10* below.

Table 9-10: HCC Exception Scores

Age	Age at registration	Exception Request	Score
At least 18 years old	At least 18 years old	Initial and first extension	Calculated MELD
At least 18 years old	At least 18 years old	Any extension after the first extension	3 points below MMaT
At least 12 years old	Less than 18 years old	Any	40
Less than 12 years old	Less than 12 years old	Any	40

Affected Guidance Language

New language is underlined (example) and language that is deleted is struck through (~~example~~). (~~example~~).

Guidance to Liver Transplant Programs and the National Liver Review Board for: Adult MELD Exceptions for Transplant Oncology

Summary and Goals

For many ~~patients~~ candidates with chronic liver disease the risk of death without access to liver transplant can be accurately predicted by the MELD score, which is used to prioritize candidates on the waiting list. However, for some ~~patients~~ candidates the need for liver transplant is not based on the degree of liver dysfunction due to the underlying liver disease but rather a complication of the liver disease. These complications have an increased risk of mortality or waitlist dropout without access to timely transplant and are no reflected in the calculated MELD score.[2] This document summarizes available evidence to assist clinical reviewers in approving candidates for MELD exceptions in the specific setting of hepatic neoplasms. It contains guidance for specific clinical situations for use by the review board to evaluate common exception case requests for adult candidates with the following diagnoses:

- Hepatocellular Carcinoma (HCC)
- Intrahepatic Cholangiocarcinoma (iCCA)
- Neuroendocrine Tumors (NET)
- Colorectal Liver Metastases (CRLM)

[2] Waitlist dropout is removal from the waiting list due to the candidate being too sick to transplant.

- Hepatic Epithelioid Hemangioendothelioma (HEHE)
- Hepatic Adenomas
- ~~Colorectal Liver Metastases (CRLM)~~
- ~~Intrahepatic Cholangiocarcinoma (iCCA)~~

These guidelines are intended to promote consistent review of these diagnoses and summarize the Committee's recommendations to the OPTN Board of Directors.

This resource is not OPTN Policy, so it does not carry the monitoring or enforcement implications of policy. It is not an official guideline for clinical practice, nor is it intended to be clinically prescriptive or to define a standard of care. This resource is intended to provide guidance to transplant programs and the review board.

Background

A liver candidate receives a MELD[3] or, if less than 12 years old, a PELD[4] score that is used for liver allocation. The score is intended to reflect the candidate's disease severity, or the risk of 3-month mortality without access to liver transplant. When the calculated score does not reflect the candidate's medical urgency, a liver transplant program may request an exception score. A candidate that meets the criteria for one of nine diagnoses in policy is approved for a standardized MELD exception.[5] If the candidate does not meet criteria for standardized exception, the request is considered by the Review Board.

The OPTN Liver and Intestinal Organ Transplantation Committee (hereafter, "the Committee") has developed guidance for adult MELD exceptions for Transplant Oncology. This guidance document is intended to provide recommendations for the review board considering hepatic neoplasm cases which are outside standard policy.

This guidance replaces any independent criteria that OPTN regions used to request and approve exceptions, commonly referred to as "regional agreements." Review board members and transplant centers should consult this resource when considering MELD exception requests for adult candidates with the following diagnoses.

Instructions for Submitting a Non-Standard exception Request

Instructions for how to submit a non-standard exception request can be found in each relevant diagnosis section. For any other diagnosis that should be reviewed by the Adult Transplant Oncology review board, select "other liver cancer or tumor specify", indicate the diagnosis, and submit a written justification narrative.

[3]Model for End-Stage Liver Disease.
[4]Pediatric End-Stage Liver Disease.
[5]See OPTN Policy 9.5: Specific Standardized MELD or PELD Exceptions, Available at https://optn.transplant.hrsa.gov/.

Recommendations

Hepatocellular Carcinoma (HCC)

1. ~~Patients with t~~The following are contraindications for HCC exception score:

    - Macro-vascular invasion of main portal vein or hepatic vein
    - Extra-hepatic metastatic disease
    - Ruptured HCC
    - T1 stage HCC

While in most cases, ruptured HCC and primary portal vein branch invasion of HCC would be contraindications, some ~~patients~~ candidates who remain stable for a prolonged (minimum of 12 months) interval after treatment for primary portal vein branch invasion or after ruptured HCC may be suitable for consideration.

Evidence for the use of immunotherapy as a downstaging or bridging therapy is preliminary. However, based on the published data in transplant and non-transplant setting, the use of immunotherapy does not preclude consideration for an HCC exception.[6]

- ~~Patients~~ Candidates beyond standard criteria who have continued progression while waiting despite locoregional are generally not acceptable candidates for HCC MELD exception.
- ~~Patients~~ Candidates with AFP greater than ~~>~~1000 who do not respond to treatment to achieve an AFP below 500 are not eligible for standard MELD exception, and must be reviewed by the Adult Transplant Oncology Review Board to be considered. In general, these ~~patients~~ candidates are not suitable for HCC MELD exception but may be appropriate in some cases.
- ~~Patients~~ Candidates with HCC beyond standard down-staging criteria who are able to be successfully downstaged to T2 may be appropriate for MELD exception, as long as there is no evidence of metastasis outside the liver, or macrovascular invasion, or AFP greater than ~~>~~1,000. Imaging should be performed at least 4 weeks after last down-staging treatment. ~~Patients~~ Candidates must still wait for 6 months from the time of the first request to be eligible for an HCC exception score.
- ~~Patients~~ Candidates who presented with stage T2 HCC (LI-RADS 5 or biopsy proven; one lesion greater than ~~>~~2 cm and less than ~~<~~5 cm in size, two or three lesions greater than ~~>~~1 cm and less than ~~<~~3 cm in size) which was treated by locoregional therapy or resected but developed T1 or T2 HCC (LI-RADS 5 or biopsy proven) recurrence and the transplant program is requesting an initial HCC exception more than 6 months but less than 60 months following initial treatment or resection are eligible for a MELD score exception without a six month delay period.

~~Patients~~ Candidates with cirrhosis and HCC beyond T2 but within generally accepted criteria for down-staging (such as up to 5 lesions, total tumor volume less than ~~<~~8 cm based on resection pathology) who underwent complete resection with negative margins and developed T1 or T2 HCC (LI-RADS 5 or biopsy proven) recurrence may also be considered for MELD score exception for HCC. Because the larger tumor size, the 6 month delay is appropriate to ensure favorable tumor biology.

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[6] Parissa Tabrizian, Sander S. Florman, and Myron E. Schwartz, "PD-1 Inhibitor as Bridge Therapy to Liver Transplantation?," *American Journal of Transplantation* 21, no. 5 (February 2021): pp. 1979-1980, https://doi.org/10.1111/ajt.16448.

LI-RADS 5 requires the below criteria, which differ based on size and modality. Threshold growth is defined as greater than or equal to 50% increase in longest diameter in less than or equal to 6 months on CT/MRI.[7]

Table 1: LI-RADS 5 Criteria

Imaging Modality[8]	Observation size, mm	LR-5 criteria
CT/MRI	10-19mm	Nonrim arterial phase hyperenhancement (APHE) with at least one of the following: • nonperipheral washout • threshold growth
CT/MRI	Greater than or equal to 20 mm	Nonrim APHE with at least one of the following: • nonperipheral washout • threshold growth • enhancing "capsule"
CEUS	Greater than or equal to 10 mm	Nonrim APHE with: • late and mild washout

Recommendations for ~~Dynamic~~ Contrast-enhanced ~~m~~Multiphase CT or MRI of the Liver[9]

Table ~~1~~2: Recommendations for ~~Dynamic~~ Contrast-enhanced ~~m~~Multiphase CT of the Liver

Feature:	CT scans should meet the below specifications:
Scanner type	Multidetector row scanner
Detector type	Minimum of 8 detector rows and must be able to image the entire liver during brief late arterial phase time window
Slice thickness	Minimum of 5 mm reconstructed slice thickness; thinner slices are preferable especially if multiplanar reconstructions are performed
Injector	Power injector, preferably dual chamber injector with saline flush and bolus tracking recommended
Contrast injection rate	3 mL/sec minimum, better 4-6 mL/sec with minimum of 300 mg I/mL or higher, for dose of 1.5 mL/kg body weight

[7] American College of Radiology Committee on LI-RADS® (Liver) The LI-RADS v2018 Manual. Available at: https://www.acr.org/-/media/ACR/Files/Clinical-Resources/LIRADS/LI-RADS-2018-Manual-5Dec18.pdf. Accessed on November 6, 2024.

[9] OPTN Policy 9.5.I requires CT/MRI be Contrast-enhanced Multiphase.

Feature:	CT scans should meet the below specifications:
Mandatory ~~dynamic~~ multiphase ~~phases~~ on contrast-enhanced MDCT	1. Late arterial phase: ~~artery fully enhanced, beginning contrast enhancement of portal vein~~ hepatic arterial branches are fully enhanced, the hepatic veins are not enhancing, and the portal vein is enhancing more than the liver 2. Portal venous phase: ~~portal vein enhanced, peak liver parenchymal enhancement, beginning contrast enhancement of hepatic veins~~ Acquired no more than 120 seconds after injection of a contrast agent when portal and hepatic veins are enhanced more than liver 3. Delayed phase: ~~variable appearance, greater than 120 seconds after initial injection of contrast~~ Acquired at least 120 seconds after injection of contrast when portal and hepatic veins are enhanced more than liver
~~Dynamic~~ Multiphase ~~phases~~ (Timing)	Use the bolus tracking or timing bolus

Table ~~2~~3: Recommendations for ~~Dynamic~~ Contrast-enhanced Multiphase MRI of the Liver

Feature	MRIs should meet the below specifications:
Scanner type	1.5T Tesla or greater main magnetic field strength. Low field magnets are not suitable.
Coil type	Phased array multichannel torso coil, unless patient-related factors precludes its use.
Minimum sequences	Pre-contrast and ~~dynamic~~ multiphase post gadolinium T1-weighted gradient echo sequence (3D preferable), T2 (with and without fat saturation), T1-weighted in and out of phase imaging.
Injector	Dual chamber power injector with bolus tracking recommended.
Contrast injection rate	2-3 mL/sec of extracellular gadolinium chelate that does not have dominant biliary excretion, preferably resulting in vendor-recommended total dose.

Feature	MRIs should meet the below specifications:
Mandatory ~~dynamic~~ multiphase ~~phases~~ on contrast-enhanced multiphase MRI	1. Pre-contrast T1W: do not change scan parameters for post contrast imaging. 2. Late arterial phase: artery fully enhanced, beginning contrast enhancement of portal vein. 3. Portal venous phase: portal vein enhanced, peak liver parenchymal enhancement, beginning contrast enhancement of hepatic veins. 4. Delayed phase: variable appearance, greater than 120 seconds after initial injection of contrast.
~~Dynamic~~ Multiphase ~~phases~~ (Timing)	The use of the bolus tracking method for timing contrast arrival for late arterial phase imaging is preferable. Portal vein phase images should be acquired 35 to 55 seconds after initiation of late arterial phase. Delayed phase images should be acquired 120 to 180 seconds after the initial contrast injection.
Slice thickness	5 mm or less for ~~dynamic~~ multiphase series, 8 mm or less for other imaging.
Breath-holding	Maximum length of series requiring breath-holding should be about 20-seconds with a minimum matrix of 128 x 256. Technologists must understand the importance of patient instruction about breath-holding before and during scan.

Table 4: Recommendations for Contrast-enhanced Ultrasound (CEUS) of the Liver

Feature	CEUS should meet the below specifications:
Scanner type	Ultrasound scanners equipped with appropriate software and hardware packages for contrast-enhanced imaging
Ultrasound transducer selection	CEUS imaging of the liver is typically performed with a curved array transducer, with higher frequency linear transducers reserved for small superficial liver lesions
Suggested imaging parameters	Dual screen imaging format showing a low mechanical index B-mode image alongside the contrast-only display. An acoustic window that allows the examined lesion to be scanned as close to the transducer as possible maintaining an approximately 2 cm distance from the transducer and allow for the target liver observation to be continuously visible during scanning.

Feature	CEUS should meet the below specifications:
Contrast dose	Contrast dose specified by the manufacturer should be used but the contrast dose may be modified in certain circumstances based on patient factors and sensitivity of the equipment used for CEUS examination
Contrast injection	Intravenous contrast bolus delivered over 2 - 3 seconds immediately followed by a 5–10 mL normal saline flush
Minimum required CEUS images	1. B-mode images of the examined observation 2. Continuous cine loop imaging from first bubble arrival through peak arterial phase enhancement. Optionally, the cine loop can be continued beyond the arterial phase enhancement peak until 60 seconds after injection. 3. Static image at 60 seconds and thereafter, imaging intermittently (every 30-60 seconds) saving static images or short cineloops to document and evaluate the presence, timing, and degree of washout.

To submit an HCC exception request, select *Hepatocellular carcinoma (HCC)* and fill out the associated form. If the candidates does not meet the standardized criteria per *Policy 9.5.I* or seeks a different exception score, the system will direct the transplant program to write and submit a justification narrative that will be reviewed by the Adult Transplant Oncology Review Board.

Intrahepatic Cholangiocarcinoma

Candidates with biopsy proven unresectable solitary intrahepatic cholangiocarcinoma (iCCA) or mixed hepatocellular carcinoma/intrahepatic cholangiocarcinoma (mixed HCC-iCCA) less than or equal to 3 cm with 6 months of tumor stability after locoregional or systemic therapy should be considered for MELD exception points based on existing data supporting the role of liver transplantation in this setting.[10, 11, 12, 13]

Based on current evidence-based medicine, transplant programs should provide the following elements when submitting an initial MELD exception for iCCA:

[10] Sapisochin G, de Lope CR, Gastaca M, de Urbina JO, Lopez-Andujar R, Palacios F, et al. Intrahepatic cholangiocarcinoma or mixed hepatocellular-cholangiocarcinoma in patients undergoing liver transplantation: a Spanish matched cohort multicenter study. Ann Surg; 2014. p. 944-52.
[11] Fu BS, Zhang T, Li H, Yi SH, Wang GS, Xu C. The role of liver transplantation for intrahepatic cholangiocarcinoma: a single-center experience. European Surgical; 2011.
[12] Hayashi A, Misumi K, Shibahara J, Arita J, Sakamoto Y, Hasegawa K, et al. Distinct Clinicopathologic and Genetic Features of 2 Histologic Subtypes of Intrahepatic Cholangiocarcinoma. The American Journal of Surgical Pathology. 2016;40(8):1021-30.
[13] Sapisochin G, Facciuto M, Rubbia-Brandt L, Marti J, Mehta N, Yao FY, et al. Liver transplantation for "very early" intrahepatic cholangiocarcinoma: International retrospective study supporting a prospective assessment. Hepatology. 2016;64(4):1178-88.

- Biopsy proven iCCA or mixed HCC-iCCA[14]
- Presence of cirrhosis
- Unresectable
- Locoregional or systemic therapy for iCCA
- 6 months from time of diagnosis or last treatment of tumor stability meaning less than or equal to 3 cm, no new lesions, or extrahepatic disease before applying for exception

Candidates with iCCA should be considered for a MELD exception extension if they continue to meet *all of* the following criteria:

- Imaging every 3 months to ensure tumor less than or equal to 3 cm
- No extrahepatic disease prior to extending the MELD exception

Candidates meeting the criteria described above should be considered for a MELD exception score equal to MMaT-3.

To submit an iCCA exception request, select *Cholangiocarcinoma (CCA)* and fill out the associated form. The transplant program will then be directed to submit a justification narrative that will be reviewed by the Adult Transplant Oncology Review Board. Utilize this same process if submitting an exception request for mixed HCC-iCCA.

Neuroendocrine Tumors (NET)

~~A review of the literature supports that candidates with NET are expected to have a low risk of waiting list drop-out.~~

~~Transplant programs should be aware of the following criteria when submitting exceptions for NET. The review board should consider the following criteria when reviewing exception applications for candidates with NET.~~

- ~~Resection of primary malignancy and extra-hepatic disease without any evidence of recurrence for at least six months prior to MELD exception request.~~
- ~~Neuroendocrine Liver Metastasis (NLM) limited to the liver, Bi-lobar, not amenable to resection.~~

~~Tumors in the liver should meet the following radiographic characteristics on *either* CT or MRI:~~

1. ~~If CT Scan:~~
    a. ~~Triple phase contrast Lesions may be seen on only one of the three phases~~
    b. ~~Arterial phase: may demonstrate a strong enhancement~~
    c. ~~Large lesions can become necrotic/calcified~~
2. ~~If MRI Appearance:~~
    a. ~~Liver metastasis are hypodense on T1 and hypervascular in T2 wave images~~
    b. ~~Diffusion restriction~~
    c. ~~Majority of lesions are hypervascular on arterial phase with wash –out during portal venous phase~~
    d. ~~Hepatobiliary phase post Gadoxetate Disodium (Eovist): Hypointense lesions are characteristics of NET~~

[14] There may be worse survival outcomes with poor differentiation of tumor on biopsy.

~~1. Consider for exception only those with a NET of Gastro-entero-pancreatic (GEP) origin tumors with portal system drainage. Note: Neuroendocrine tumors with the primary located in the lower rectum, esophagus, lung, adrenal gland and thyroid are not candidates for automatic MELD exception.~~
~~2. Lower - intermediate grade following the WHO classification. Only well differentiated (Low grade, G1) and moderately differentiated (intermediate grade G2). Mitotic rate <20 per 10 HPF with less than 20% ki 67 positive markers.~~
~~3. Tumor metastatic replacement should not exceed 50% of the total liver volume.~~
~~4. Negative metastatic workup should include one of the following:~~
~~a. Positron emission tomography (PET scan)~~
~~b. Somatostatin receptor scintigraphy~~
~~c. Gallium-68 (68Ga) labeled somatostatin analogue 1,4,7,10-tetraazacyclododedcane-N, N', N",N'" tetraacetic acid (DOTA)-D-Phe1-Try3-octreotide (DOTATOC), or other scintigraphy to rule out extra-hepatic disease, especially bone metastasis.~~

Candidates with unresectable neuroendocrine liver metastasis limited to the liver, may benefit from liver transplantation. Tumors in the liver should have radiographic or histologic characteristics consistent with neuroendocrine liver metastasis.[15]

1. Only those with a NET of Gastro-entero-pancreatic (GEP) origin tumors with portal system drainage. Neuroendocrine tumors with the primary located in the lower rectum, esophagus, lung, adrenal gland and thyroid are not candidates for MELD exception.
2. Resection of primary malignancy and extra-hepatic disease without any evidence of recurrence at least six months prior to MELD exception request.
3. Lower - intermediate grade following the WHO classification, i.e. well differentiated (low grade, G1) and moderately differentiated (intermediate grade G2), based on primary lesion or the liver metastasis, with mitotic rate less than 20 per 10 HPF and index less than 20%.
4. No evidence for extra-hepatic tumor recurrence based on metastatic radiologic workup at least 3 months prior to initial or extension MELD exception request (submit date). Negative metastatic workup should include functional imaging, e.g. somatostatin receptor scintigraphy, gallium-68 somatostatin receptor imaging, and/or positron emission tomography (PET).

Note: Exploratory laparotomy and or laparoscopy is not required prior to MELD exception request.

Occurrence of extra-hepatic progression – for instance lymph-nodal Ga68 positive locations – should indicate de-listing. Candidates may be re-considered for MELD exception if any extra-hepatic disease is zeroed and remained so for at least 6 months. Presence of extra-hepatic solid organ metastases (i.e. lungs, bones) should be a permanent exclusion.

Candidates meeting the criteria described above should be considered for a MELD exception score equal to MMaT -3.

~~1. No evidence for extra-hepatic tumor recurrence based on metastatic radiologic workup at least 3 months prior to MELD exception request (submit date).~~
~~2. Recheck metastatic workup every 3 months for MELD exception increase consideration by the review board. Occurrence of extra-hepatic progression – for instance lymph-nodal Ga68 positive~~

[15] Reference: Mazzaferro V, Pulvirenti A, Coppa J. Neuroendocrine tumors metastatic to the liver: how to select patients for liver transplantation? Journal of Hepatology, Oct 2007; 47(4): 460-6.

~~locations – should indicate de-listing. Patients may come back to the list if any extra-hepatic disease is zeroed and remained so for at least 6 months.~~

3. ~~Presence of extra-hepatic solid organ metastases (i.e., lungs, bones) should be a permanent exclusion criteria~~

~~To submit an exception request for NET, select the *Neuroendocrine Tumor (NET)* option. Transplant programs will be directed to write and submit a justification narrative that will be reviewed by the Adult Transplant Oncology Review Board.~~

Colorectal Liver Metastases

The diagnosis of unresectable colorectal liver metastases (CRLM) has a poor prognosis despite improved local and systemic treatments. Published studies support liver transplantation in highly selected ~~patients~~ candidates and has demonstrated a survival benefit in initial prospective clinical trials.[16, 17, 18, 19]

Based on currently available published studies, transplant programs should provide the following elements when submitting an initial MELD exception for CRLM:

Initial MELD Exception Criteria
Candidates can be considered for MELD exception points for CRLM if all of the following criteria are met:

Primary diagnosis:

- Histological diagnosis of colon/rectal adenocarcinoma
- BRAF wild type, microsatellite stable[20]
- At least 12 months from time of CRLM diagnosis to time of initial exception request

Treatment of primary colorectal cancer

- Standard resection of the primary tumor with negative resection margins
- No evidence of local recurrence by colonoscopy within 12 months prior to time of initial exception request

Evaluation of extrahepatic disease

- No signs of extrahepatic disease or local recurrence, based on CT/MRI (chest, abdomen and pelvis) and PET scan within one month of initial exception request.[21]

Evaluation of hepatic disease and prior systemic/liver directed treatment

- Received or receiving first-line chemotherapy/immunotherapy
- Relapse of liver metastases after liver resection or liver metastases not eligible for curative resection
- No hepatic lesion should be greater than 10 cm before start of treatment

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[16] Hagness, M., et al., *Liver transplantation for nonresectable liver metastases from colorectal cancer.* Ann Surg, 2013. 257(5): p. 800-6.

[17] Dueland, S., et al., *Survival Outcomes After Portal Vein Embolization and Liver Resection Compared With Liver Transplant for Patients With Extensive Colorectal Cancer Liver Metastases.* JAMA Surgery, 2021. 156(6): p. 550-557.

[18] Line, P.-D. and S. Dueland, *Liver transplantation for secondary liver tumours: The difficult balance between survival and recurrence.* Journal of Hepatology, 2020. 73(6): p. 1557-1562.

[19] Dueland, S., et al., *Survival Following Liver Transplantation for Patients With Nonresectable Liver-only Colorectal Metastases.* Annals of Surgery, 2020. 271(2).

[20] Insufficient data to include KRAS as exclusionary factor but should be considered as a negative prognostic factor.

[21] Pre transplant PET should be performed after a chemotherapy pause of at least 4 weeks.

- Must have stability or regression of disease with systemic and/or locoregional therapy for at least 6 months.[22]

In cases of synchronous colon lesions, in addition to above criteria, all of the following are required:

- Resection of the primary tumor is performed more than 6 months after initial diagnosis
- Minimum of 6 months of chemotherapy after primary tumor resection before exception request with stability of disease for a total of at least 12 months after initial diagnosis.[23]

Candidates meeting the criteria described should be considered for a MELD exception score equal to MMaT-20. If MMaT-20 results in an exception score below 15, the candidate's exception score will automatically be set to a MELD score of 15 per OPTN Policy 9.4.E: *MELD or PELD Exception Scores Relative to Median MELD or PELD at Transplant*.

Exclusion Criteria

Candidates should not be considered for an initial MELD exception for CRLM if any of the following criteria are met:

- Extra-hepatic disease after primary tumor resection (including lymphadenopathy outside of the primary lymph node resection)
- Local relapse of primary disease
- Carcinoembryonic antigen (CEA) greater than ~~>~~80 µg/L with or without radiographic evidence of disease progression or new lesion.

MELD Exception Extension Criteria

Candidates with CRLM should be considered for a MELD exception extension if they continue to meet *all of* the following criteria:

- Every 3 months from initial MELD exception:
    - Perform CT or MRI (chest, abdomen and pelvis)
    - Perform CEA testing
- No progression of hepatic disease[24]
- No development of extrahepatic disease
- CEA less than ~~<~~ 80 µg/L

To submit an exception request for CRLM, select the *Colorectal liver metastases* option. Transplant programs will be directed to write and submit a justification narrative that will be reviewed by the Adult Transplant Oncology Review Board.

Hepatic Epithelioid Hemangioendothelioma

Approval of MELD exception points for adult candidates with unresectable Hepatic Epithelioid Hemangioendothelioma (HEHE) may be appropriate in some instances. ~~Biopsy must be performed to establish the diagnosis of HEHE, and exclude hemangiosarcoma.~~ HEHE is a rare, low grade

[22] Progression is defined as more than 10% increase in diameter of existing lesions (according to RECIST 1.1) OR any new lesions detected on imaging.
[23] Progression is defined as more than 10% increase in diameter of existing lesions (according to RECIST 1.1) OR any new lesions detected on imaging.
[24] Pre transplant PET should be performed after a chemotherapy pause of at least 4 weeks.

primary liver tumor of mesenchymal cell origin. [25, 26, 27] The presence of extrahepatic disease is not an absolute contraindication. Candidates who are being considered for MELD exception should meet the following criteria.

- Biopsy proven diagnosis of HEHE and exclude hemangiosarcoma.
- Absence of macrovascular invasion on biopsy or imaging.
- Lesions are unresectable.

Candidates meeting the criteria described above should be considered for a MELD exception score equal to MMaT-3.

~~Because of the rarity of the diagnosis, as well as the variability in presentation, the optimal treatment strategies are not fully established. However, for lesions which cannot be resected, liver transplant is associated with 1, 5, and 10-year patient survival rates of 97%, 83%, and 74%; with more favorable results occurring in patients without microvascular invasion. The presence of extra-hepatic disease has not been associated with decreased survival post liver transplant and therefore should not be an absolute contraindication. Controversy regarding the role of liver transplant in treating HEHE relates to the variable course of disease in the absence of liver transplant, with some patients demonstrating regression or stabilization of disease and prolonged survival.[7]~~

~~To submit an exception request for HEHE, select the *Hepatic Epithelioid Hemangioendothelioma (HEHE)* option. Transplant programs will be directed to write and submit a justification narrative that will be reviewed by the Adult Transplant Oncology Review Board.~~

Hepatic Adenomas

~~Orthotopic liver transplantation for~~ Liver transplantation for hepatic adenomas (HA) remains a~~n extremely~~ rare ~~indication; however, it is a valid therapeutic option in select patients with adenoma meeting one of the following categories:~~ but viable treatment for select candidates. Candidates may qualify for an exception, if they meet *one* of the following criteria:

- Adenoma in the presence of g~~G~~lycogen s~~S~~torage ~~D~~isease or Abernethy malformation
- Unresectable adenoma with β-c~~C~~atenin ~~(+) Adenoma~~ mutation
- Unresectable adenoma in a ~~patient~~ candidate with liver adenomatosis (great than ~~>~~10 HA)
- Adenoma(s) with all three of the following criteria: ~~below:~~
  - ~~Unresponsive to medical management~~
  - Unresectable
  - Unresponsive to non-operative management (e.g., observation after withholding estrogen-containing medications, observation after efforts to maintain an ideal body weight, transarterial embolization, or radiofrequency ablation)
  - Progressive or with complication such as hemorrhage, rupture, or malignant transformation (~~must specify~~ please provide supportive details including size)

[25] Lai Q, et al. HEHE and Adult Liver Transplantation: Proposal for a Prognostic Score Based on the Analysis of the ELTR-ELITA Registry. Transplantation. 2017;101(3):555-564.

[26] Lerut, J.P., G. Orlando, R. Adam, et al. "The place of liver transplantation in the treatment of hepatic epitheloid hemangioendothelioma: report of the European liver transplant registry." Ann Surg 246 (2007): 949-57.

[27] Nudo, C.G., E.M. Yoshida, V.G. Bain, et al. "Liver transplantation for hepatic epithelioid hemangioendothelioma: the Canadian multicentre experience." Can J Gastroenterol 22 (2008):821-4.

The identification of these criteria is mandatory to aid in the decision-making process.[28,29,30,31]

Candidates meeting the criteria described above should be considered for a MELD exception score equal to MMaT-3.

To submit an exception request for HA, select the *Hepatic Adenomas* option. Transplant programs will be directed to write and submit a justification narrative that will be reviewed by the Adult Transplant Oncology Review Board.

Guidance to Liver Transplant Programs and the National Liver Review Board for:

Adult MELD Exception Review

Summary and Goals

For many ~~patients~~ candidates with chronic liver disease the risk of death without access to liver transplant can be accurately predicted by the MELD score, which is used to prioritize candidates on the waiting list. However, for some ~~patients~~ candidates the need for liver transplant is not based on the degree of liver dysfunction due to the underlying liver disease but rather a complication of the liver disease. These complications have an increased risk of mortality or waitlist dropout without access to timely transplant and are not reflected in the calculated MELD score.[32] This document summarizes available evidence to assist clinical reviewers in approving candidates for MELD exceptions. It contains guidance for specific clinical situations for use by the review board to evaluate common exceptional case requests for adult candidates with the following diagnoses, not all of which are appropriate for MELD exception:

- Ascites
- Budd Chiari
- GI Bleeding
- Hepatic Encephalopathy
- Hepatic Hydrothorax
- Hereditary Hemorrhagic Telangiectasia
- Polycystic Liver Disease (PLD)
- ~~Portopulmonary Hypertension~~
- Primary Sclerosing Cholangitis (PSC) or Secondary Sclerosing Cholangitis (SSC)
- Metabolic Disease
- Multivisceral Transplant Candidates
- Post-Transplant Complications, including Early Allograft Dysfunction (EAD) in Reduced Size Livers (Small for Size Syndrome), Chronic Rejection, Diffuse Ischemic Cholangiopathy~~, and Late Vascular Complications~~
- Pruritus

[28] Blanc, J.F., N. Frulio, L. Chiche, et al. "Hepatocellular adenoma management: call for shared guidelines and multidisciplinary approach." Clinics and research in hepatology and gastroenterology 39 (2015): 180-187.
[29] Chiche, L., A. David, R. Adam, et al. "Liver transplantation for adenomatosis: European experience." Liver Transplantation 22 (2016): 516-526.
[30] Alagusundaramoorthy, S. S., V. Vilchez, A. Zanni, et al. "Role of transplantation in the treatment of benign solid tumors of the liver: a review of the United Network of Organ Sharing data set." JAMA Surgery 150 (2015): 337-342.
[31] Dokmak, S., V. Paradis, V. Vilgrain, et al. "A single-center surgical experience of 122 patients with single and multiple hepatocellular adenomas." Gastroenterology 137 (2009): 1698-1705.
[32] Waitlist dropout is removal from the waiting list due to the candidate being too sick to transplant.

These guidelines are intended to promote consistent review of these diagnoses and summarize the Committee's recommendations to the OPTN Board of Directors.

This resource is not OPTN Policy, so it does not carry the monitoring or enforcement implications of policy. It is not an official guideline for clinical practice, nor is it intended to be clinically prescriptive or to define a standard of care. This resource is intended to provide guidance to transplant programs and the review board.

Background

A liver candidate receives a MELD[33] or, if less than 12 years old, a PELD[34] score that is used for liver allocation. The score is intended to reflect the candidate's disease severity, or the risk of 3-month mortality without access to liver transplant. When the calculated score does not reflect the candidate's medical urgency, a liver transplant program may request an exception score. A candidate that meets the criteria for one of nine diagnoses in policy is approved for a standardized MELD exception.[35] If the candidate does not meet criteria for standardized exception, the request is considered by the review board.

The OPTN Liver and Intestinal Organ Transplantation Committee (hereafter, "the Committee") has developed guidance for adult MELD exception candidates. The MELD Exceptions and Enhancements Subcommittee proposed these recommendations after reviewing the 2006 MELD Exception Study Group (MESSAGE) Conference, a descriptive analysis of recent MELD exception requests submitted to the OPTN, and available peer-reviewed literature. To support a recommendation for approving additional MELD exception points, there must have been adequate evidence of increased risk of mortality associated with the complication of liver disease.

This guidance replaces any independent criteria that OPTN regions used to request and approve exceptions, commonly referred to as "regional agreements." Review board members and transplant centers should consult this resource when considering MELD exception requests for adult candidates with the following diagnoses.

Recommendation

Ascites

There is inadequate evidence to support granting a MELD exception for ascites in adult candidates with the typical clinical symptoms associated with this diagnosis.
Ascites is a common clinical finding in liver transplant candidates. Refractory ascites, as defined by the International Ascites Club, occurs in 5-10% of patients with portal hypertension and has a 1-year

[33] Model for End-Stage Liver Disease.
[34] Pediatric End-Stage Liver Disease.
[35] Policy 9.3.C: Specific MELD/PELD Exceptions, Organ Procurement and Transplantation Network Policies.

mortality rate of approximately 50%.[36,37,38,39] Hyponatremia is common in patients with cirrhosis and refractory ascites from portal hypertension.[40,41,42] In January 2016, the OPTN implemented a modification to the MELD score to incorporate serum sodium for candidates with a calculated MELD greater than 11.[43] Much of the excess mortality risk related to ascites is similar to portal hypertension and hepatorenal syndrome and will be accurately reflected in the lab values used to calculate the MELD score, specifically the serum creatinine and serum sodium. Therefore, MELD exception for ascites is not recommended.

Budd Chiari

Approval of MELD exception points for adult candidates with Budd Chiari may be appropriate in some instances.

Liver transplant candidates with Budd Chiari syndrome can be considered for a MELD exception based on severity of liver dysfunction and failure of standard management. Documentation submitted for case review should include all of the following:

- Failed medical or surgical management (please specify)
- Any contraindications to Transjugular Intrahepatic Portosystemic Shunt (TIPS) or TIPS failure; specify specific contraindication
- Documentation that extrahepatic malignancy, which would exclude transplant eligibility, has been ruled out

Candidates meeting the criteria described above should be considered for a MELD exception score equal to MMaT-3.

Gastrointestinal Bleeding

There is inadequate evidence to support granting a specific MELD exception for gastrointestinal bleeding in adult candidates who experience acute or chronic blood loss independent of their calculated MELD.

There is also inadequate evidence to support a MELD exception for transfusion dependence independent of MELD with one exception, spur cell hemolytic anemia (SCHA).[44] However, due to the

[36] Moore, K.P., F. Wong, P. Gines, et al. "The management of ascites in cirrhosis: report on the consensus conference of the International Ascites Club." Hepatology 38 (2003): 258-66.
[37] Runyon, B.A., AASLD. "Introduction to the revised American Association for the Study of Liver Diseases Practice Guideline management of adult patients with ascites due to cirrhosis 2012." Hepatology 57 (2013): 1651-3.
[38] Runyon, B.A., Committee APG. "Management of adult patients with ascites due to cirrhosis: an update." Hepatology 49 (2009): 2087-107.
[39] Gines P., A. Cardenas, V. Arroyo, et al. "Management of cirrhosis and ascites." N Engl J Med 350 (2004):1646-54.
[40] Biggins, S.W., W.R. Kim, N.A. Terrault, et al. "Evidence-based incorporation of serum sodium concentration into MELD." Gastroenterology 130 (2006):1652-60.
[41] Porcel, A., F. Diaz, P. Rendon, et al. "Dilutional hyponatremia in patients with cirrhosis and ascites." Arch Intern Med 162 (2002):323-8.
[42] Gines, A., A. Escorsell, P. Gines, et al. "Incidence, predictive factors, and prognosis of the hepatorenal syndrome in cirrhosis with ascites." Gastroenterology 105 (1993):229-36.
[43] Biggins, S.W. "Use of serum sodium for liver transplant graft allocation: a decade in the making, now is it ready for primetime?" Liver Transpl 21 (2015):279-81.
[44]Alexopoulou, A., L. Vasilieva, T. Kanellopoulou, et al. "Presence of spur cells as a highly predictive factor of mortality in patients with cirrhosis." J Gastroenterol Hepatol. 4 (2014):830-4.

infrequent occurrence of SCHA in a transplant candidate, and its common association with recent alcohol use or active infection, MELD exception is not recommended. Similarly there is no evidence to support that candidates with transfusion dependence who develop antibodies while waiting warrant a MELD exception.[45,46]

Hepatic Encephalopathy

Hepatic encephalopathy (HE) is a complication of chronic liver with an associated mortality independent of MELD scoring. Presently, no additional MELD priority for HE is recommended in the absence of a widely available, reliable, objective assessment of its severity. [47, 48,49,50]

Hepatic Hydrothorax

~~**There is inadequate evidence to support granting a MELD exception for hepatic hydrothorax in adult candidates with the typical clinical symptoms associated with this diagnosis. Liver transplant candidates with chronic, recurrent, confirmed hepatic hydrothorax could be considered on individual basis for a non-standard MELD exception.**~~

~~Hepatic hydrothorax is a relatively uncommon complication of endstage liver disease occurring in only 5-10% of patients with cirrhosis and portal hypertension.[7] Hepatic hydrothorax can occur in either or both pleural spaces and can occur with or without portal hypertensive ascites. By definition, hepatic hydrothorax is a transudative pleural effusion due to portal hypertension without a cardiopulmonary source. Infectious and malignant pleural effusions must be excluded. In this context, a serum pleural fluid albumin gradient (SPAG) of at least 1.1 g/dL may be more accurate in identifying hepatic hydrothorax than the more traditional Light's criteria for a transudative pleural effusion.[22] The mostly like explanation for hepatic hydrothorax is passage of fluid from the peritoneal space to the pleural space through diaphragmatic defects which can be documented by intraperitoneal injection of 99MTc-tagged nannocolloids followed by scintigraphy. Unlike ascites, relatively small amounts of fluid in the pleural space (1 to 2 L) lead to severe symptoms such as shortness of breath and hypoxia. Initial management with dietary sodium restriction, diuretics, intravenous albumin, and therapeutic thoracentesis can be successful. Hepatic hydrothorax can be complicated by spontaneous bacterial empyema or iatrogenic complication of thoracentesis (infections, pneumothorax, or hemothorax). For chronic, recurrent, confirmed hepatic hydrothorax, transjugular intrahepatic portosystemic shunt, indwelling pleural catheter, and surgical repair of diaphragmatic defects can be effective in some patients yet risk additional complications. Like ascites, hepatic hydrothorax is similar to portal~~

[45] Lyles, T., A. Elliott, D.C. Rockey. "A risk scoring system to predict in-hospital mortality in patients with cirrhosis presenting with upper gastrointestinal bleeding." J Clin Gastroenterol 48 (2014):712-20.

[46] Flores-Rendón, A.R., J.A. González-González, D. García-Compean, et al. "Model for end stage of liver disease (MELD) is better than the Child-Pugh score for predicting in-hospital mortality related to esophageal variceal bleeding." Ann Hepatol 7 (2008):230-4.

[47] Kerbert, Annarein J., Enric Reverter, Lara Verbruggen, Madelon Tieleman, Miguel Navasa, Bart J. Mertens, Sergio Rodríguez-Tajes, et al. "Impact of Hepatic Encephalopathy on Liver Transplant Waiting List Mortality in Regions with Different Transplantation Rates." *Clinical Transplantation* 32, no. 11 (2018). https://doi.org/10.1111/ctr.13412.

[48] Chiranjeevi Gadiparthi et al., "Waitlist Outcomes in Liver Transplant Candidates with High MELD and Severe Hepatic Encephalopathy," *Digestive Diseases and Sciences* 63, no. 6 (February 2018): pp. 1647-1653, https://doi.org/10.1007/s10620-018-5032-5.

[49] Cristina Lucidi et al., "Hepatic Encephalopathy Expands the Predictivity of Model for End-Stage Liver Disease in Liver Transplant Setting: Evidence by Means of 2 Independent Cohorts," *Liver Transplantation* 22, no. 10 (2016): pp. 1333-1342, https://doi.org/10.1002/lt.24517.

[50] Robert J. Wong, Robert G. Gish, and Aijaz Ahmed, "Hepatic Encephalopathy Is Associated with Significantly Increased Mortality among Patients Awaiting Liver Transplantation," *Liver Transplantation*, 2014, https://doi.org/10.1002/lt.23981.

~~hypertension and hepatorenal syndrome and will be accurately reflected in the lab values used to calculate the MELD score, specifically the serum creatinine and serum sodium. Therefore, MELD exception for hepatic hydrothorax is not recommended in the majority of circumstances.~~

Candidates with refractory hepatic hydrothorax have an increased mortality that may not otherwise be reflected in the candidate's MELD score and exceeds mortality due to refractory ascites.[51] In addition, the need for inpatient thoracentesis increases risk of acute-on-chronic liver failure (ACLF) compared to candidates with refractory ascites alone.[52] While TIPS can be a viable treatment in some candidates, this may be contraindicated in others. Therefore, a~~A~~dult liver transplant candidates with chronic, recurrent, ~~confirmed~~ hepatic hydrothorax that are *medically refractory* and for which *TIPS is contraindicated or has failed* [53] could be considered ~~an individual basis~~ for a MELD exception provided that infectious and malignant causes have been ruled out.

Documentation submitted for initial case review should include the following:

- At least ~~1 thoracentesis over~~ 1 L of pleural fluid removed four separate times in 6 weeks ~~weekly in last 4 weeks~~; report date and volume of each ~~thoracentesis~~ pleural fluid removal (including witness attestation by provider or RN if drainage catheter in place).
- Pleural fluid is transudative ~~by pleural albumin-serum albumin gradient of at least 1.1 and by cell count~~ or portal hypertension related by one of the following:
    - Evidence of ascites
    - Pleural albumin-serum albumin gradient greater than or equal to 1.1
- ~~No~~ Echocardiogram without evidence of heart failure~~; provide objective evidence excluding heart failure~~
- Negative pPleural fluid culture or cell count (provide date) ~~negative on 2 separate occasions~~
- Negative pPleural fluid cytology (provide date) ~~is benign on 2 separate occasions~~
- ~~There is contraindications to TIPS; specify specific contraindication~~
- ~~Diuretic refractory~~

Documentation submitted for subsequent maintenance of exception should include the following:

• At least 1 L of pleural fluid removed four separate times in last 6 weeks; report date and volume of each pleural fluid removal (including witness attestation by provider or RN if drainage catheter in place).

Candidates meeting the criteria described above should be considered for a MELD exception score equal to MMaT-3. Centers will need to update documentation every 90 days to maintain exception status.

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[51] Higher mortality is associated with HH and mortality rates of 18, 30, and 60% at 6 months, 1 year, and 2 years have been demonstrated (PMID: 36148461). Refractory HH is associated with a higher 1-year mortality than refractory ascites (51% vs 19%, p=0.001) (PMID: PMID: 35534742).

[52] In patients with recurrent ascites, the development of HH was associated with a high mortality-hazard ratio of 4.35 (95% CI: 2.76–6.97)(doi.org/10.1007/s10620-021-07134-8). In addition, HH requiring inpatient thoracentesis associated with increased risk of ACLF (HR = 2.37 vs. refractory ascites alone, p = 0.01, controlling for MELD, AKI, infection, and prior 6-month hospitalizations) (PMID: 33185787). Multivariable modeling also showed that HH increased the risk of inpatient mortality (HR = 2.22 vs. refractory ascites alone, p = 0.04).

[53] Per AASLD guidelines, TIPS placement in patients with MELD scores as low as 18 in some studies and more clearly with MELD score >21 incurs higher mortality risk, and the beneficial outcome in hydrothorax highly relates to liver function and age.

Hereditary Hemorrhagic Telangiectasia

Approval of MELD exception points for adult candidates with high output cardiac failure due to multiple arteriovenous (AV) malformations may be appropriate in some instances. Hereditary hemorrhagic telangiectasia is an uncommon, autosomal dominant genetic disorder characterized by mucocutaneous telangiectasias, as well as arteriovenous malformations in the brain, spine, lungs, gastrointestinal tract, and liver. The AV malformations can progress to high output cardiac failure, which eventually may be irreversible[54][55]. ~~In the future, there may be effective non-transplant options, and if such agents become widely available, the recommendation to offer MELD score exception will need to be revisited.~~[7]

Documentation submitted for case review should include ~~both of~~ the following:

- Documentation of high output cardiac failure by echocardiography or right heart catheterization, and symptoms of heart failure
- Imaging supporting intra-hepatic AV malformations or severe diffuse bilobar hepatic necrosis in the setting of hepatic AV malformation

Candidates meeting the criteria described above should be considered for a MELD exception score equal to MMaT -3. Severe ongoing complications of heart failure may warrant MMaT.

Polycystic Liver Disease (PLD)

~~Patients~~ Candidates with PLD who ~~are not clinically eligible for resection/fenestration or alternative therapy~~ failed medical or surgical management (please specify) may benefit from MELD exception points. Indication for an exception include those with PLD with severe symptoms related to PLD plus *any* of the following:

- Hepatic decompensation or severe portal hypertensive complications
- Concurrent hemodialysis
- GFR less than 20 ml/min
- ~~Patient~~ Candidate with a prior kidney transplant
- Moderate to severe protein calorie malnutrition as documented by a registered dietician using any of the following:
  - Modified Global Leadership Initiative on Malnutrition (GLIM) Phenotypic criteria
  - American Society for Enteral and Parenteral Nutrition (ASPEN) criteria
  - Nutrition Focused Physical Exam (NFPE)
  - Subjective Global Assessment (SGA-C score)
- Severe sarcopenia as documented with skeletal muscle index (SMI less than~~<~~ 39 cm^2/m^2 in women and less than~~<~~ 50 cm^2/m^2 in men)[56] or equivalent

~~Patients~~ Candidates ~~who~~ meeting the criteria described above should be considered ~~are eligible~~ for a MELD exception score equal ~~equivalent~~ to MMaT.

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[54] Lee, M., D.Y. Sze, C.A. Bonham, et al. "Hepatic arteriovenous malformations from hereditary hemorrhagic telangiectasia: treatment with liver transplantation." Dig Dis Sci 55 (2010): 3059-62.

[55] Boillot, O., F. Bianco, J.P. Viale, et al. "Liver transplantation resolves the hyperdynamic circulation in hereditary hemorrhagic telangiectasia with hepatic involvement." Gastroenterology 116 (1999): 187-92.

[56] Carey, Elizabeth J., Jennifer C. Lai, Connie W. Wang, Srinivasan Dasarathy, Iryna Lobach, Aldo J. Montano-Loza, and Michael A. Dunn. "A Multicenter Study to Define Sarcopenia in Patients with End-Stage Liver Disease." Liver Transplantation 23, no. 5 (2017): 625–33. https://doi.org/10.1002/lt.24750.

~~Portopulmonary Hypertension~~

~~Candidates meeting the criteria in *Policy 9.5: Specific Standardized MELD or PELD Score Exceptions* are eligible for MELD or PELD score exceptions that do not require evaluation by the full review board.~~

Primary Sclerosing Cholangitis or Secondary Sclerosing Cholangitis

Candidates with Primary Sclerosing Cholangitis (PSC) or Secondary Sclerosing Cholangitis (SSC) may be at risk of adverse outcomes secondary to recurrent sepsis from cholangitis, which may not be reflected in the candidate's calculated MELD score.

Based on clinical experience and a review of the available literature, transplant programs should provide the following elements when submitting exceptions for PSC or SSC and the review board should consider the following elements when reviewing exception applications for candidates with PSC or SSC.

Candidates who meet the following criteria should be considered for a MELD exception equal to MMaT-3:

- The candidate has been admitted to the hospital two or more times within a one-year period with either of the following:
    - Documented blood stream infection
    - Evidence of sepsis with hemodynamic instability requiring vasopressors

In addition, candidates should be considered for a MELD exception score equal to MMaT if they meet at least two of following criteria:

- The candidate has a biliary tract stricture(s) which are not responsive to treatment by interventional radiology (i.e. PTC) or therapeutic endoscopy (ERCP/EUS).
- The candidate has been diagnosed with a high-resistant infectious organism (e.g. Vancomycin Resistant Enterococcus (VRE), Extended Spectrum Beta-Lactamase (ESBL) producing gram-negative organism, Carbapenem-resistant Enterobacteriaceae (CRE) and Multi-drug resistant Acinetobacter).
- The candidate has cirrhosis.

~~The candidate must meet both of the following two criteria:~~

1. ~~The candidate has been admitted to the hospital two or more times within a one year period with a documented blood stream infection or evidence of sepsis including hemodynamic instability requiring vasopressors~~
2. ~~The candidate has cirrhosis~~

~~In addition the candidate must have one of the following criteria:~~

- ~~The candidate has biliary tract stricture which are not responsive to treatment by interventional radiology (PTC) or therapeutic endoscopy (ERCP) or~~
- ~~The candidate has been diagnosed with a highly-resistant infectious organism (e.g. Vancomycin Resistant Enterococcus (VRE), Extended Spectrum Beta-Lactamase (ESBL) producing gram negative organisms, Carbapenem-resistant Enterobacteriaceae (CRE), and Multidrug-resistant Acinetobacter.)~~

Metabolic Disease

Adults who develop metabolic symptoms secondary to an inherited organic acidemia or urea cycle defect which are typically transplanted during infancy or childhood may be suitable for MELD exception. A ~~Given~~ later onset of metabolic disease may present with mild symptoms and require a MELD exception score equal to MMaT-3. Candidates who present with life-threatening complications of metabolic disease may be considered for a higher exception score.~~, anticipate a reduced urgency compared to early-onset disease, thus priority for transplant may be similar to other exceptions, though if a patient has more urgent medical condition, as reflected by life-threatening complications, a higher priority score can be considered.~~

Multivisceral Transplant Candidates

Multivisceral transplant (MVT) candidates are typically listed for the following organ combinations:

- Liver-intestine-pancreas
- Liver-intestine
- Liver-intestine-pancreas-kidney
- Liver-intestine-kidney

Because MVT candidates require multiple organs from the same donor, these candidates require access to a selective segment of the donor pool. Specifically, for intestine grafts, donors must typically meet the following criteria:

- Donor age less than 40 years old
- Donor should not be on high dose or multiple vasopressors, as this could cause intestine ischemia and dysfunction

For pancreas grafts, donors must typically meet the following criteria:

- Donor body mass index (BMI) should not be high (ideally less than 30)
- Donor should not have pancreatitis or a history of diabetes.

The liver grafts from donors meeting these criteria are often allocated to liver-alone candidates with high MELD or PELD scores before being allocated to MVT candidates. It should be acknowledged that the MELD exception for MVT candidates is not well established. However, candidates listed for a multivisceral transplant should be considered for an initial MELD exception equal to MMaT+6, in order to provide access to suitable donors and avoid waitlist mortality.

Candidates being listed for any liver and kidney multivisceral combination will have already met simultaneous liver-kidney criteria as outlined in OPTN Policy.

Further, MVT candidates should be considered for an additional 3 point increase (e.g. MMaT+9, MMaT+12), every 90 days they remain on the waitlist.

Transplant programs submitting exception requests for MVT candidates should include information on prior exception requests, if applicable. In addition, transplant programs must indicate in the exception narrative the reason the candidate requires a liver and intestine graft with or without a

pancreas/kidney. A candidate should not be considered for a MELD exception if the reason he or she requires a liver transplant is solely for immunological reasons.

The following diagnoses are typical indications for multivisceral transplant. This list should be referenced by transplant programs when submitting exceptions for MVT candidates. However, the list should not be considered when determining a candidate's eligibility for a MELD exception. Indications for multivisceral transplant include but are not limited to:

- Intestine failure with liver dysfunction
- Diffuse portomesenteric thrombosis
- Neuroendocrine tumor with liver metastasis
- Unresectable intra-abdominal low-grade malignant tumors involving the liver or hepatic hilum, celiac/SMA trunk
- Catastrophic adhesive disease "Frozen abdomen"

Post-Transplant Complications

Early Allograft Dysfunction (EAD) in Reduced Size Livers (Small for Size Syndrome)

~~Small for size syndrome refers to graft dysfunction of varying severity occurring in the early post-operative period, less than 30 days, following transplantation of a size-reduced liver allograft, with no other identified cause of graft dysfunction such as vascular thrombosis, prolonged ischemia, or other etiology. Typical findings include worsening cholestasis and ascites. With optimal care, some patients may recover while others may require re-transplantation.~~

~~**In many cases, the calculated MELD score will provide adequate priority. However, mortality risk may not be adequately reflected by the calculated MELD score in cases of severe dysfunction, and an exception may be appropriate.**~~

Living donor allografts, split allografts, and reduced size allografts are prone to early allograft dysfunction secondary to elevated portal flow or pressure. Symptoms should develop less than 30 days following transplantation without other identified cause of graft dysfunction such as vascular thrombosis, prolonged ischemia, or other etiology. Typical findings include worsening cholestasis, ascites, and renal insufficiency. Key Risk factors include Graft to Recipient Weight Ratio (GRWR) less than 0.8%, Graft Volume to Standard Liver Volume ration of less than 40%, Portal Pressure greater than 15 mm hg or portal cava gradients greater than 10 mm Hg, and Portal flow greater than 250 ml/min/100 gm graft weight.

Documentation submitted for case review should include the anatomy of the split allograft, identified risk factors for small for size syndrome, and any intraoperative or postoperative interventions used for treatment. ~~all of the following:~~

- ~~Risk factor for small for size syndrome~~
- ~~Interventions used to treat small for size syndrome~~
- ~~Clinical status of the patient (hospitalized, requiring ICU care, intubated)~~

With optimal care, many candidates may recover and in many other cases, the calculated MELD score will provide adequate priority. However, candidates with severe allograft dysfunction (Grade C) defined as Total Bilirubin greater than 10 mg/dl and INR greater than 1.6 at day 7 OR Total Bilirubin greater than

20 at day 14 have excess mortality justifying an exception score equal to MMaT.[57]

Chronic Rejection

There is inadequate evidence to support granting a MELD exception for chronic rejection in adult candidates with the typical clinical symptoms associated with this diagnosis.

In cases where re-transplantation is being considered, it is anticipated that progressive injury of the allograft due to rejection will be reflected in the development of liver dysfunction, and prioritization by MELD score may be appropriate. Cases with atypical clinical scenarios in which the degree of liver dysfunction and risk of waitlist mortality are not reflected by the MELD score may be considered on an individual basis.

Diffuse Ischemic Cholangiopathy

Diffuse ischemic cholangiopathy is a complication associated with significant morbidity and may involve multiple biliary interventions and hospitalizations for cholangitis or life-threatening sepsis. It can result from numerous causes including vascular complications, ischemic injury, or receipt of donation after circulatory death (DCD) livers. Due to the highly variable outcomes associated with late hepatic artery thrombosis, there is inadequate evidence to support granting a MELD exception in adult candidates with the typical clinical symptoms, including hepatic abscess and intrahepatic biliary strictures. However, a subset of cases may experience life-threatening infectious complications or persistent long-term morbidity requiring repeat biliary interventions. These candidates may be considered for a MELD exception. ~~donation after circulatory death (DCD) donors. Analysis of waitlist outcomes for patients re-listed after undergoing liver transplant from a DCD donor demonstrates that these patients have a similar or improved waitlist survival compared to donation after brain death (DBD) candidates who are re-listed with similar MELD scores. However, patients with ischemic cholangiopathy may have significant morbidity and require multiple repeat biliary interventions and repeat hospitalizations for cholangitis. Despite similar waitlist outcomes as DBD donor liver recipients who are listed for retransplant, the Committee supports increased priority for prior DCD donor liver recipients to encourage use of DCD livers when appropriate.~~

~~In addition, analyses has shown that patients with a prior DCD transplant and an approved MELD score exception had an improved survival compared to those who never had an exception approved. Patients with biliary injuries and need for biliary interventions also have been demonstrated to have an increased risk of graft loss and death.~~ ~~**Therefore, patients with a prior DCD transplant who demonstrated two or more of the following criteria within 12 months of transplant are eligible for MELD exception equivalent to MMaT:**~~

Documentation for case review should include the following:

1) Risk factor(s) for ischemic cholangiopathy (e.g. hepatic artery thrombosis post-transplant or DCD donor characteristics)
2) Evidence of ischemic cholangiopathy and non-anastomotic biliary stricture, including two or more of the following criteria within 12 months of transplant:
    - Persistent cholestasis as defined by abnormal bilirubin (greater than 2 mg/dl) for greater than 4 weeks
    - Evidence of severe infection, such as:

[57] A. Kow et al. Transplantation. October 2023; Vol. 107:2226-37.

- Two or more episodes of cholangitis with an associated bacteremia requiring hospital admission.
- Repeated multidrug-resistant bacteremia
- Abscesses and/or biliary strictures requiring frequent interventions (e.g. PTBD, ERCP) requiring at least two documented readmissions over 6 months.

- ~~Evidence of non-anastomotic biliary strictures not responsive to further treatment~~

Candidates meeting the criteria described above should be considered for a MELD exception score equal to MMaT-3.

~~Late Vascular Complications~~

~~Patients with hepatic artery thrombosis occurring within 7 days of transplant with associated severe graft dysfunction may be eligible for Status 1A, or occurring within 14 days of transplantation without severe graft dysfunction may be eligible for a standard exception of 40. Cases of late hepatic artery thrombosis which do not meet these criteria are not eligible for standard MELD exception.~~ ~~**Due to the highly variable outcomes associated with late hepatic artery thrombosis, there is inadequate evidence to support granting a MELD exception in adult candidates with the typical clinical symptoms, including hepatic abscess and intrahepatic biliary strictures that may be associated with late HAT. However, patients with atypical severe complications may be considered for MELD exception on an individual basis.**~~ ~~Complications that warrant consideration of MELD exception are similar to those criteria noted for DCD cholangiopathy (with 2 or more episodes of cholangitis requiring hospital admission over a 3 months period plus biliary strictures not responsive to further treatment or bacteremia with highly resistant organisms). Patients with early HAT just beyond 7 or 14 day cut off with evidence of severe graft dysfunction may be considered for MELD exception, depending on the clinical scenario.~~

Pruritus

There is inadequate evidence to support granting a MELD exception for pruritus in adult candidates with the typical clinical symptoms associated with this diagnosis. Pruritus is a manifestation of predominantly cholestatic liver diseases. It had been reported that chronic pruritus may lead to a decreased quality of life, prolonged wound healing, skin infections, and sleep disturbance.[58] The frequency ranges from 80-100% for patients suffering from Primary Biliary Cirrhosis; 20-40% for patients with primary Sclerosing Cholangitis and Chronic Viral Hepatitis among other diseases.[59] The pruritus increases as the disease is progresses. So far data have failed to support an endpoint related to quantity but rather of quality of life and were considered inappropriate for additional MELD points.[60] Due to inadequate evidence of increased risk of pre-transplant mortality, or a widely-accepted threshold for access to liver transplant, MELD score exception for isolated clinical finding of pruritus is not recommended.

[58] Pruritus in chronic cholestatic liver disease. Bunchorntavakul C, Reddy KR Clin Liver Dis. 2012 May;16(2):331-46.
[59] Elman, S., L.S. Hynan, V. Gabriel, et al. "The 5-D itch scale: a new measure of pruritus." Br J Dermatol 162 (2010): 587-93.
[60] Martin, P., A. DiMartini, S. Feng, et al. "Evaluation for liver transplantation in adults: 2013 practice guideline by the AASLD and the American Society of Transplantation." (2013): 61.

Conclusion

Review board members should consult this resource when assessing adult MELD exception requests. Liver programs should also consider this guidance when submitting exception requests for adult candidates with these diagnoses. However, these guidelines are not prescriptive of clinical practice.

National Liver Review Board Operational Guidelines

Overview

The purpose of the National Liver Review Board (NLRB) is to provide fair, equitable, and prompt peer review of exceptional candidates whose medical urgency is not accurately reflected by the calculated MELD/PELD score. The NLRB will base decisions on policy, the guidance documents, and in cases which lack specific guidance, the medical urgency of the candidate as compared to other candidates with the same MELD or PELD score adjustment or specific MELD or PELD score.

The NLRB is comprised of specialty boards, including:

- Adult Transplant Oncology
- Adult Other Diagnosis
- Pediatrics, which reviews requests made on behalf of any candidate registered prior to turning 18 years old ~~and adults with certain pediatric diagnoses~~

The immediate past-Chair of the Liver and Intestinal Organ Transplantation Committee serves as the Chair of the NLRB for a two year term.

Representation

Every active liver transplant program may appoint a representative and alternate to each of the adult specialty boards. A liver transplant program with an active pediatric component may appoint a representative and alternate to the pediatric specialty board. Individuals may serve on more than one specialty board at the same time. Transplant programs are encouraged to appoint representatives from both hepatology and surgery who have active transplant experience. Liver transplant programs are not required to provide a representative to the NLRB.

Representatives and alternates serve a one year term. A liver transplant program may appoint the same representative or alternate to serve consecutive terms.

If a transplant hospital withdraws or inactivates its liver program, it may not participate in the NLRB. However, the transplant hospital's participation may resume once it has reactivated its liver program.

Representative and Alternate Responsibilities

Prior to each term of service, representatives and alternates are required to sign the *OPTN Confidentiality and Conflict of Interest Statement* and complete orientation training.

Representatives must vote within 7 days on all exception requests, exception extension requests, and appeals. A representative will receive an e-mail reminder after day 3 and day 5 if the representative has an outstanding vote that must be completed. On the eighth day, if the vote has not been completed,

then the request will be randomly reassigned to another representative. The original reviewer will receive a notification that the request has been reassigned.

The representative must notify the OPTN in the OPTN Computer System of an absence, during which the alternate will fulfill the responsibilities of the representative

If a representative or alternate does not vote on an open request within 7 days on more than 5% of the cases assigned to that reviewer within a 6 month period, the Chair may remove the individual from the NLRB. If a representative or alternate does not vote because a case is approved and closed before the 7 day timeframe expires, it is not considered a failure to vote. A representative or alternate who has been removed for failure to perform the duties required is not eligible to serve again for 3 years.

If a transplant program exhibits a pattern of non-responsiveness, as evidenced by the removal of two members from the NLRB, the Chair may suspend the program's participation for a period of three months after notifying the program director. Further non-compliance with the review board process may result in cessation of the program's representation on the NLRB until such a time as the transplant hospital can satisfactorily assure the Chair that it has addressed the causes of non-compliance.

Voting Procedure

An exception request is randomly assigned to five representatives of the appropriate specialty board. A representative may vote to approve or deny the request, or ask that the request be reassigned. The request must achieve four out of five affirmative votes in order to be approved. If the request does not achieve the necessary four affirmative votes, it is denied.

As part of the MELD/PELD Exception program in the OPTN Computer System NLRB members are notified of new cases by email.

Voting on an exception request is closed either at the end of the appeal period or when no additional votes will change the outcome of the vote, whichever occurs earlier. Members no longer have the ability to vote once a request is closed.

Appeal Process

A liver program may appeal the NLRB's decision to deny an exception request. ~~Patients~~ Candidates are not eligible to appeal exception requests. All reviewer comments are available in the OPTN Computer System. The NLRB advises programs to respond to the comments of dissenting reviewers in the appeal.

The same five members that reviewed the original request will review the appeal. The appeal must achieve four out of five affirmative votes in order to be approved. If the appeal does not achieve the necessary four affirmative votes, it is denied. If the appeal is denied, the liver program may request a conference call with the Appeals Review Team (ART).

If the ART denies the request, the liver program may initiate a final appeal to the Liver and Intestinal Organ Transplantation Committee (Liver Committee). Referral of cases to the Liver Committee will include information about the number of previous referrals from that program and the outcome of those referrals.

Appeals Review Team (ART)

At the beginning of each new service term, nine NLRB members from the Adult Other Diagnosis and Adult Transplant Oncology specialty boards are assigned to serve each month of the year on the Adult ART and nine NLRB members from the Pediatric specialty board are assigned to serve each

month of the year on the Pediatric ART. There may be multiple ARTs, depending on the volume of cases. Each ART will be scheduled to meet via conference call according to a predetermined schedule.

ART appeals from the Adult Other Diagnosis and Adult Transplant Oncology specialty boards will be reviewed by the Adult ART. ART appeals from the Pediatric specialty board will be reviewed by the Pediatric ART.

In the event of a planned absence, the ART member may designate their alternate to serve. The representative must notify the OPTN of this in the OPTN Computer System.

Five members of the ART must participate in the call. If at least five members do not attend the call, the appeal will be rescheduled for the following regularly scheduled conference call. If at least five members do not attend the second attempt to review the appeal, the candidate's exception request is automatically approved.

The appeal must achieve a majority plus one affirmative votes in order to be approved.

A representative at the petitioning program may serve as the candidate's advocate. If a representative is unable to attend the conference call, the program may ask for the appeal to be scheduled for the following regularly scheduled conference call. If after two attempts a representative is unable to attend the call, the ART will review the appeal without the program's participation. In the absence of a representative on the conference call, the program may submit written information for the ART's consideration.

A current member of the Liver Committee serving on either the Adult Other Diagnosis specialty board or Adult Transplant Oncology specialty board will be appointed to serve as the ART leader for the Adult ART prior to each service term. A current member of the Liver Committee or current member of the OPTN Pediatric Transplantation Committee (Pediatric Committee) serving on the Pediatric specialty board will be appointed to serve as the ART leader for the Pediatric ART prior to each service term. If no current member of either the Liver Committee or the Pediatric Committee is available to serve as the ART leader, prior members of each Committee or other members of the NLRB may be appointed to serve as ART leader. The ART leader will be prepared to lead ART discussion and provide feedback to the Liver Committee.

The ART will work with the OPTN to document the content of the discussion and final decision in OPTN Computer System.

Liver Committee Review

The Liver Committee may delegate review to a subcommittee. If the review is delegated, majority is based on the size of the subcommittee.

Appeals to the Liver Committee will be considered electronically unless at least one member of the Liver Committee requests a conference call. If the case is discussed on a conference call, quorum is a majority of the Liver Committee (or the subcommittee, if delegated).

The appeal must achieve a majority affirmative votes in order to be approved.