

Evolving Trends in Liver Transplantation



Listing and Liver Donor Allocation

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KEYWORDS

• Liver transplantation • MELD • Liver donor allocation • Chronic liver disease

KEY POINTS

- The MELD-based allocation policy is excellent at prioritizing patients with chronic liver disease on the waiting list based on survival.
- Exception criteria are needed because of such conditions as hepatocellular cancer, with tumor progression being used as a surrogate for patient survival.
- MELD can be tweaked by adding serum sodium and other variables; but overall the impact would be minimal and reprogramming is expensive and cumbersome.

INTRODUCTION

The success of liver transplantation in the past three decades as a life-saving procedure for patients with end-stage liver disease has led to the ever-increasing disparity between the demands for liver transplantation and the supply of donor liver organs. This demand has been fueled by an increasing prevalence of cirrhosis and hepatocellular cancer (HCC) related to the hepatitis C epidemic, and to the increase in obesity-related liver disease.¹ Today, nearly 1 in 10 patients waiting for a donor liver organ die on the waiting list.² Therefore, donor allocation and distribution remains a challenge and a moral issue as to how these organs can be equitably distributed. This article reviews the evolution of the liver allocation policy and discusses in detail the challenges we face today.

HISTORY

Donor liver allocation dates back to the Transplantation Act of 1983 when there were only a few liver transplant centers in the United States. However, with the increasing success of liver transplantation and expanded indications, the number of patients seeking this life-saving procedure continued to grow. At the same time, the number

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of institutions offering liver transplantation also increased. By the mid-1990s, livers were allocated based on blood type; time on the liver transplant waiting list; and whether a patient was in the intensive care unit (ICU), hospital, or an outpatient. There was no criterion to define which patients should be in the ICU or which patients should be hospitalized. Indeed, many centers admitted patients to the ICU solely to facilitate their placement at the top of the liver waiting list. In retrospect, it was noted in the model for end-stage liver disease (MELD) era that the number of patients proceeding to liver transplantation from the ICU dropped dramatically from 24% in the pre-MELD era to 13% in the post-MELD era.³ There was also noted to be a strong relationship between the number of centers in an organ procurement unit, and the number of patients undergoing liver transplant directly from the ICU.

An attempt to rectify this problem was made in 1998 by implementation of a new system incorporating the Child-Turcotte-Pugh score (CTP) as an index for liver disease severity and prognosis. This scoring system was originally used to predict the outcome of portal-cava shunt surgery in patients with cirrhosis.⁴ Adoption of the CTP-based allocation system was intended primarily to reflect waiting list mortality and severity of liver disease. However, the use of the CTP score for the prioritization of liver transplant candidates had several major drawbacks. First, ascites and encephalopathy were subjectively assessed and were influenced by such therapies as diuretics, albumin administration, and lactulose therapy. In addition, a score of three points was allocated for any serum bilirubin value higher than 3.0 mg/dL and any serum albumin level value of 2.8 mg/dL or less. This “ceiling and floor affect” for bilirubin and albumin, respectively, meant that many patients ended up with the same overall CTP score, even though they may have had vastly different values of these two variables. Indeed, a patient with a serum bilirubin of 25 mg/dL received the same CTP score as the patient who had a serum bilirubin of 3 mg/dL. As a result, time spent on the waiting list became the major selection factor of liver candidates having identical CTP scores. Finally, there was no parameter in the CTP score that reflected renal function, a key prognostic marker in patients with end-stage cirrhosis. Two studies found time spent on the waiting list was not associated with risk of death on the waiting list.^{5,6} In the end, the revised allocation policy based on the CTP score ultimately proved unworkable and unfair to patients with the most severe liver disease. Because of considerable disagreement among transplant centers on how livers should be allocated, the United Network for Organ Sharing (UNOS) and the Department of Health and Human Services intervened in 1999 and challenged the transplant community with “The Final Rule.”⁷ Among the conditions of the Final Rule were that allocation policies should be based on objective and measurable medical criteria of patients or categories of patients who are medically suitable candidates for liver transplantation. In addition, it noted that patients should be rank-ordered according to severity of disease and predicted mortality on the liver waiting list. The Final Rule stipulated that waiting time should be deemphasized, that allocation should be designed to achieve equitable allocation of organs among patients, and that organs should be distributed over as broad a geographic area as feasible in order of decreasing medical urgency. Finally, the Final Rule noted that neither place of residence nor place of listing should be a major determinant of access to a liver transplant. This challenge was ultimately met by the adoption of the MELD score by UNOS in February 2002.

MELD

The MELD score was first used and published in 2000 by Malinchoc and colleagues⁸ to predict survival in patients undergoing elective transjugular intrahepatic portal-cava

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