American Journal of Transplantation 2010; 10: 1507–1508
Wiley Periodicals Inc.

doi: 10.1111/j.1600-6143.2010.03154.x

Editorial

Unfair Priority for HCC: A Problem Whose Ideal Solution Remains Unsolved

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Received 01 April 2010, revised 22 April 2010 and accepted for publication 29 April 2010

Since the inception of the model for end-stage liver disease (MELD) liver transplant allocation system in 2002, it has been recognized that some diseases exist for which mortality risk is not adequately measured by MELD score. For this reason patients with hepatocellular carcinoma (HCC) have been assigned an exception MELD score. In this issue of *AJT* (1), Washburn and colleagues attempted to determine whether the current exception score results in an unfair advantage for HCC patients. They used competing risk methods to compare rates of dropout from the waiting list between adults who received an exception for HCC, versus those without HCC who were listed with their laboratory MELD score. They found that HCC patients have substantially lower dropout rates than non-HCC patients: 12% versus 18% at 1 year after listing. The authors also analyzed factors independently associated with dropout among HCC patients, which included tumor size, laboratory MELD score and level of alpha-fetoprotein.

In considering the policy implications of these findings, we must first ask which is the most relevant comparison to make. Currently patients with HCC receive an initial priority score of 22, which is upgraded to 25 after 3 months. Therefore, based upon an ethical allocation framework of 'sickest first', HCC patients would be receiving unfair priority if their 6-month dropout rates were lower than non-HCC patients having MELD scores of 22–25. Although this exact comparison was not reported by Washburn et al., the fact that dropout rates for patients with MELD <21 were higher than rates for HCC patients suggests that HCC patients are indeed unfairly advantaged. This conclusion is also supported by evidence that HCC patients receive higher quality organs than non-HCC patients (2), suggesting that HCC patients can afford to turn down marginal organs because of their high-priority status for future organ offers.

If the current priority for HCC is unfairly high, then how should it be adjusted? The easiest approach would be to simply reduce the initial priority score awarded from 22 points down to 18 or 20 points. However, this approach would ignore the fact that HCC patients are a heterogeneous group with varying tumor biology and degree of underlying liver dysfunction. A continuous priority score such as proposed by Washburn et al. is conceptually appealing for several reasons. In keeping with the Final Rule, a continuous priority score could potentially reduce waiting list mortality by transplanting patients at higher risk of disease progression. It would eliminate the incentive to list patients quickly in order to accrue waiting time, thus potentially selecting out some patients with poor tumor biology. Finally, a continuous priority score might encourage the use of alternative treatment modalities such as resection or radiofrequency ablation for patients with small tumors and preserved liver function.

Despite these theoretical advantages, it is unclear how such a continuous scoring system would function in actual practice. First, the unfortunate reality is that factors such as tumor size, MELD score and level of alpha-fetoprotein, which predict dropout from the waiting list, also predict worse outcomes posttransplant (3). In particular, HCC patients with high MELD scores likely represent two groups: (1) those with advanced liver disease that limits ablative therapies but who would do well with transplant, and (2) those with infiltrating HCC and unfavorable tumor biology, whose tumor burden is greater than appreciated on cross-sectional imaging. An ideal prognostic system would be able to discriminate between these types of patients in order to measure survival benefit from liver transplantation. Despite effort by many investigators, such a prognostic system has yet to be well validated. Second, the proposed continuous score represents one snapshot in time, and does not reflect the dynamic nature of HCC. How would such a score incorporate change in imaging characteristics after loco-regional therapies, and would this actually create a disincentive to use such therapies? Or would the Milan criteria still play the role of a ceiling? Finally, the proposed continuous score does not address the prominent disparities in organ availability between regions of the country (4). Although limited by sample size, Figure 1 of the paper by Washburn et al. suggests that reduction in priority for

HCC at the national level might actually disadvantage HCC patients in some regions such as 5 and 7. Discussion of geographic variation in organ availability is beyond the scope of this editorial, except to point out that such disparities are more pronounced than those between HCC and non-HCC patients.

In summary, the study by Washburn et al. adds to a growing body of literature indicating that the current priority score provides HCC patients an unfair advantage in organ allocation. The authors have identified an important problem, for which the ideal solution remains unsolved. Further work is needed to develop and validate a scoring system, which accurately and reproducibly predicts the survival benefit of liver transplantation for HCC.

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