

INVITED COMMENTARY

MELD-based allocation of deceased donor livers: is equality possible?

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Equality may be a right, but no power on earth can convert it to a fact Honore de Balzac (1799–1850)

The imbalance between the number of livers available for transplant from deceased donors and the number of patients dying awaiting a transplant demands that countries develop and implement clear and transparent processes for allocation of those livers that are offered. These processes have developed over time and have the challenges of balancing the often conflicting requirements of equity, justice, ethics, utility, benefit, legal compliance and maintenance of public confidence.

MELD-based allocation

In 2002, the United States introduced an allocation system based on the need to reduce the mortality on the waiting list. The risk of death was assessed using the MELD score, a scoring system designed to assess short-term survival for patients with chronic liver disease undergoing surgery and using solely laboratory values. The so-called MELD approach has been widely adopted in many countries and by Eurotransplant in 2006 [1]. There have been criticisms of both the model and the approach but whatever the concerns, there is little doubt that its implementation has been successful in achieving its intended goal. Certainly, some candidates

have been disadvantaged by the simplistic implementation; two groups are of particular note: those in whom the prognosis is not determined simply by liver function as assessed by the serological components of MELD, such as those with liver cancer of variant syndromes such as hepatopulmonary syndrome, and those with a better prognosis but an unacceptable quality of life, such as those with intractable encephalopathy or itching. The former groups have been incorporated in the allocation system but the latter are less well catered for.

MELD-based allocation and equity of access

There have been legitimate concerns that an allocation process designed to reduce mortality on the waiting list may result in inequity of access to transplantation. One potential cause for inequity (as assessed by the risk of death on the waiting list) is blood group.

Although livers are allocated according to need rather than benefit or utility, livers have been allocated according to blood group as evidence suggests that outcomes are best for ABO identical matches and least good for incompatible grafts [2,3]. Novel approaches, such as use of newer agents and interventions such as splenectomy may improve outcomes. In the US system [4], for status 1A and 1B patients (roughly those with acute liver

failure and a life expectancy of <7 days), those with the same donor/recipient blood group match will receive 10 points, those where the match is compatible but not identical will obtain 5 and those with incompatible match 0 points. Blood group O candidates who accept a liver from a blood type A, non-A1 blood type will receive 5 points; within each MELD score, donor livers are offered first to identical, then compatible and then incompatible offer. Eurotransplant [5] does not allow ABO incompatible liver transplants but does allow compatible transplants in some situations: so for high urgent adults, recipients with blood group O and B can receive donor O group livers and all high urgent paediatric recipients can receive O donors.

Does the distribution of blood groups in deceased donors mirror that of the transplant candidates?

In Eurotransplant area, the distribution of deceased donors in 2010–2014 was 40%, 44%, 12% and 4% for blood group O, A, B and AB, respectively [6], whereas the distribution for the liver-only waiting list was similar at 40%, 45%, 13% and 2%, respectively. The distribution of transplants was 37%, 43%, 15% and 5%, respectively.

In the UK, the distribution of deceased donors livers is similar to the transplant recipients mirrors that of the transplant recipients but not that of the active transplant list (for O, A, B and AB, respectively the donor distribution is 48%, 38%, 10% and 3%, for transplant recipients 45%, 40%, 9% and 3% and for active transplant list patients 57%, 29%, 13% and 1% [7].

Do the blood allocation rules disadvantage any patients?

The policies adopted have the potential to disadvantage blood group O candidates. Ijstma *et al.* in Groningen [8] have analysed access to liver transplantation in the Netherlands over a 6-year period to see whether blood group affected the risk of death on the waiting list. Using a competing risk analysis, they showed that, in the multivariate analysis, blood group did not affect the risk of death awaiting a transplant. This is reassuring. Even if there is need for some caution as numbers are relatively small and the possibility of a type 2 error exists, the death rate was lowest for those who were blood group O and greatest for those who are B and AB (but no statistically significant).

Comparison with a non-MELD-based allocation system

The UK currently allocates livers from deceased donors to the centre to nonsuper-urgent recipients so, in contrast to the MELD-based approaches, the unit will select the most appropriate candidate. In the early years (before 2000), blood group O donor livers could be grafted into B recipients as the waiting time to transplant was similar for all blood groups but by 2004 it had become clear that blood group O candidates waited longer and had a higher mortality on the waiting list, with 4% of O donor livers being transplanted into non-O recipients. In 2006, the rules were amended to restrict O livers into O recipients for elective adult liver-only patients [7]. A recent analysis [7] in 2015 showed that in the year 2014/5, the waiting time for blood group O adult elective patients was twice that of blood group B (301 and 154 days, respectively), the percentage of blood group O patients transplanted was lower (35% for blood group O, 50% group B, 59% group A and 79% group B); however, there was no significant difference in the proportion of deaths in the four blood groups.

Missing the wood for the trees

Of course, it is important to examine the outcomes of any allocation process and look for any unintended consequences. The aim of the MELD-based approach appears simple, to reduce mortality on the waiting list but this simplistic goal ignores other legitimate goals: the inclusion of blood group allocation rules confirms that utility is another valid goal.

Nonetheless, in the quest for the perfect allocation system that can take into account the huge variation not only in the transplant waiting list but also the risks associated with the donor, we often lose sight of the fact that these are not actually allocation policies but in practice offering policies. It is quite rightly the responsibility of the implanting surgeon to decide whether or not to use an offered liver for a designated patients, but this should not let us lose sight of the fact that one of the biggest areas of inequity in the transplant process is the variation in the policies of both transplant units and individual surgeons and their various appetites for risk. Goldberg [9] in the analysis of US data between 2007 and 2013, confirming previous analyses in the United States, concluded there was marked variability in centre practices regarding accepting livers allocated to the

highest priority patients, and this was significantly associated with a patient's odds of dying on the waiting list.

Conclusions

Evaluating outcomes of allocation policies is essential, although there are several measures by which equity of access can and should be assessed (such as risk of death awaiting a transplant or waiting time) but surely we need to consider too quality of life and outcomes, be that utility or benefit. The paper from Groningen is reassuring that the MELD-based allocation policy does not disadvantage candidates of any one blood group. However, while it is important to look at the impact of

allocation policies on access to transplant, this must not allow attention to be diverted from the larger issues such as inequities because of variation in referral to transplant units, access to the waiting list and the usage of organs nor the need to maximize the potential pool of donors.

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REFERENCES

1. Cholongitas E, Burroughs AK. The evolution in the prioritization for liver transplantation. *Ann Gastroenterol* 2012; **25**: 6.
2. Thorsen T, Dahlgren US, Aandahl EM, *et al*. Liver transplant with deceased ABO-incompatible donors is life-saving but associated with increased risk of rejection and post-transplant complications. *Transpl Int* 2015; **28**: 800.
3. Adam R, Karam V, Delvart V, *et al*. Evolution of indications and results of liver transplantation in Europe. A report from the European Liver Transplant Registry (ELTR). *J Hepatol* 2012; **57**: 675.
4. Organ Procurement and Transplantation Network. Policies. www.optn.transplant.hrsa.gov/media/1200/optn_policies.pdf#nameddest=Policy_09.
5. Eurotransplant. ET Liver allocation system. www.eurotransplant.org/cms/mediaobject.php?file=chapter5_elas9.pdf.
6. Eurotransplant. Annual Report 2014. www.eurotransplant.org/cms/mediaobject.php?file=ar_2014.pdf.
7. Liver Advisory Group. Waiting times and deaths on the list by blood group. www.odt.nhs.uk/pdf_advisory_group_papers_LAG_blood_group_paper_-_final_nov15.pdf.
8. Ijtsma A, van der Hilst C, Nijkamp D, Fidler V, Porte R, Slooff M. Does the MELD system provide equal access to liver transplantation for patients with different ABO Blood groups? *Transpl Int* 2016; **29**: 883.
9. Goldberg DS, French B, Lewis JD, *et al*. Liver transplant center variability in accepting organ offers and its impact on patient survival. *J Hepatol* 2016; **64**: 843.