SCIENTIFIC REGISTRY OF TRANSPLANT RECIPIENTS

Program-Specific Transplant Rate Ratios: Association with Allocation Priority at Listing, Waitlist Mortality, and Posttransplant Outcomes

Andrew Wey, PhD,[1] Sally Gustafson, MS,[1] Nicholas Salkowski, PhD,[1] Joshua Pyke, PhD,[1] Bertram Kasiske, MD,[1] Ajay Israni, MD,[1] Jon Snyder, PhD[1]
[1] Scientific Registry of Transplant Recipients, Minneapolis, MN

Introduction

Program-specific transplant rate ratios (TRRs) have an important role in public reporting due to the importance of access to transplant for patient outcomes.

The Scientific Registry of Transplant Recipients (SRTR) is considering more prominent reporting of program-specific TRRs and has substantially updated the pretransplant models for transplant and waitlist mortality rates.

The updated pretransplant models include a much wider range of candidate characteristics and linear splines for continuous risk factors, and consider candidate status only at listing rather than at the beginning of the cohort.

At least three common concerns relate to adjusted TRRs:

1. Programs that list candidates with higher allocation priority will have better adjusted TRRs.
2. Programs with better adjusted TRRs will have worse posttransplant outcomes.
3. Programs with better adjusted TRRs will also have better adjusted waitlist mortality rate ratios.

Despite statistical reasons that these concerns are unjustified, an empirical evaluation may help alleviate such concerns.

Methods

The updated pretransplant models were built with a two-stage process that considers a wide range of covariates and implements linear splines for continuous covariates. In the first step, covariates with potentially important effects are identified, and in the second step, the model is estimated with the more limited set of covariates. the least absolute shrinkage and selection operator (LASSO) was used to stabilize model estimation and potentially improve predictive performance.

A period-prevalent cohort between July 1, 2014, and June 30, 2016, assessed both the ability of the deceased donor transplant rate models to remove the effect of allocation priority and the association between adjusted transplant and waitlist mortality rate ratios.

To assess the association between adjusted TRRs and posttransplant outcomes, the transplant rate model used the period-prevalent cohort between July 1, 2013, and December 31, 2015, which is the same cohort used to estimate the 1-year posttransplant outcomes in the January 2017 release of the program-specific reports (PSRs).

Similar to posttransplant outcomes, the transplant and waitlist mortality rate ratios were estimated in a Bayesian Gamma-Poisson framework. The shape and rate parameters of the Gamma distribution were equal to 2. Thus, the program-specific transplant and waitlist mortality rate ratios are estimated by the observed number of events plus 2 divided by the expected number of events plus 2.

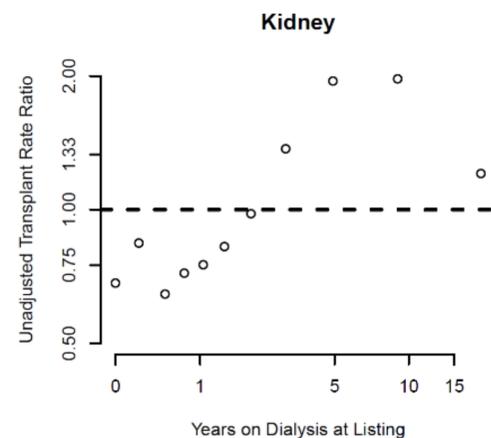Figure 1. The association of dialysis at listing with **unadjusted** TRRs.

Figure 2. The association of dialysis at listing with **adjusted** TRRs.

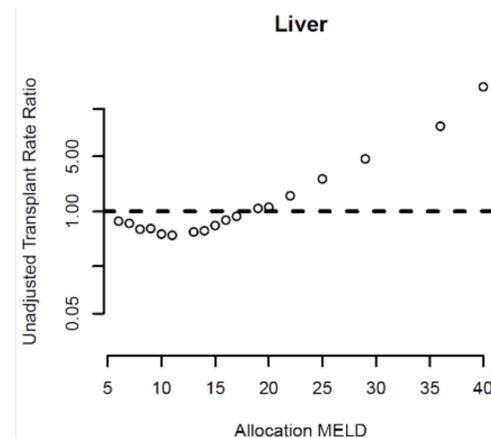Figure 3. The association of allocation MELD at listing with **unadjusted** TRRs.
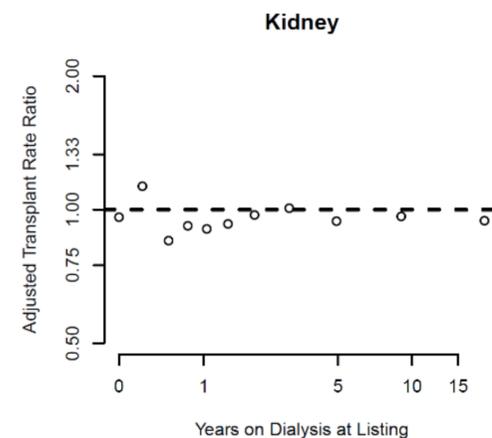

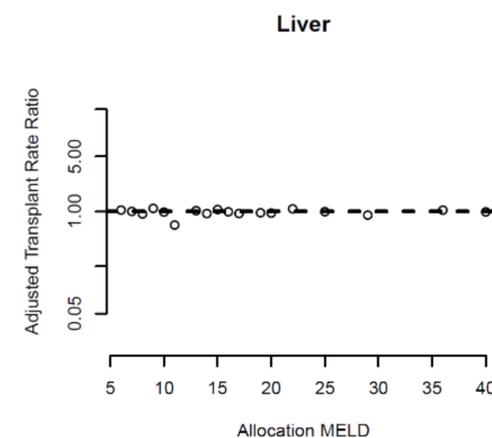Figure 4. The association of allocation MELD at listing with **adjusted** TRRs.

Table 1. Pearson Correlation of Adjusted TRRs with Unadjusted and Adjusted Posttransplant 1-Year Graft Survival (p-value in parentheses). In kidney transplant, a higher TRR was associated with better unadjusted and adjusted posttransplant outcomes

Organ	Unadjusted	Adjusted
Kidney	0.17 (0.013)	-0.14 (0.035)
Liver	0.03 (0.728)	-0.11 (0.217)
Lung	0.01 (0.940)	0.08 (0.553)
Heart	0.10 (0.294)	-0.11 (0.217)

Table 2. Pearson Correlation between Adjusted TRRs and Adjusted Waitlist Mortality Rate Ratios

Organ	Correlation
Kidney	-0.15 (0.022)
Liver	0.12 (0.168)
Lung	0.06 (0.624)
Heart	0.09 (0.329)

Conclusions

As expected from inclusion in the risk-adjustment models, measures of allocation priority are not associated with adjusted TRRs (Figure 1). In isolation, listing candidates with higher allocation priority is therefore unlikely to improve the adjusted TRR.

As expected, higher adjusted TRRs were not associated with worse adjusted posttransplant outcomes. Interestingly, higher adjusted TRRs were also not associated with worse unadjusted posttransplant outcomes.

Higher adjusted TRRs were weakly or not associated with lower adjusted waitlist mortality rate ratios.

References

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The authors have no conflicts to disclose.