Heart and Lung Offer Acceptance Practices are Associated with Organ Yield and Waitlist Mortality

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Introduction

Variability in offer acceptance practices may affect organ yield because below average offer acceptance may lead to non-local organ placement, longer cold ischemia times, and discard. Offer acceptance practices may also affect the probability of dying on the waiting list because programs with above average offer acceptance may perform transplants in more candidates before death.

These associations exist for liver and kidney transplant, but establishing the associations for thoracic organs is challenging due to two reasons:

1. Thoracic organs are more difficult to transport, and may have a stronger dependence on local offer acceptance practices. Offer acceptance metrics are based on organs eventually accepted. OPOs may avoid offering and/or recovering thoracic organs unacceptable to nearby programs. In this situation, the association between offer acceptance and donor yield could be attenuated.
2. The hypothesized association of offer acceptance with incidence of waitlist mortality is based on the assumption that offer acceptance identifies candidate access to transplant. However, since programs can screen offers out of match runs, offer acceptance may fail to identify the access to transplant provided by a program.

Thus, we need to empirically investigate the association of thoracic offer acceptance practices with donor yield and waitlist mortality.

Methods

Offer Acceptance Model

Heart and lung offer acceptance models were estimated with match runs of eventually accepted organs for donors recovered between July 1, 2016, and June 30, 2017. The models adjusted for donor factors, candidate factors, donor-candidate factors, and number of previous offers; the complete list of covariates is available at https://www.srtr.org/reports-tools/risk-adjustment-models-offer-acceptance/. Additionally, each model was stratified by donor quality.

Program- and DSA-Level Offer Acceptance Ratios

Offer acceptance ratios were estimated separately from the offer acceptance models. Separate generalized linear mixed models with a logit-link estimated the heart and lung offer acceptance ratios through a random intercept term for programs and DSAs. The models accounted for candidate and donor factors by setting the offset to the linear predictors from the appropriate offer acceptance model.

Donor Yield

A logistic regression estimated the association between DSA-level offer acceptance ratio and donor yield. The model accounted for the potential effect of several donor factors, and used donors from whom any solid organ was recovered for the purpose of transplant. The regression included offer acceptance ratios on the log base 2 scale. Thus, the interpretation is the multiplicative difference in donor yield per doubling in the DSA-level offer acceptance ratio.

Methods (Cont'd)

Waitlist Mortality

A competing risk framework assessed the association of offer acceptance with time to removal from the waiting list. The competing risks of waitlist removal were: removal for transplant, death, becoming too sick to undergo transplant, or other removal reasons. The analyses used a period-prevalent cohort of candidates on the waiting list between July 1, 2016, and June 30, 2017.

The association of program-level offer acceptance with the *incidence* of waitlist mortality was estimated with Fine and Gray methodology adapted to left-truncation. The association with the *rate* of waitlist mortality was estimated with a Cox proportional hazards model that censored for removal due to transplant or other reasons.

Results

Eventual Removal Status of Candidates

|	Lung	Heart
Candidates	4237	7619
Waiting list status on June 30, 2017		
Still waiting	1372 (32%)	3600 (47%)
Death or too sick	333 (8%)	571 (7%)
Transplant	2344 (55%)	2855 (37%)
Other	188 (4%)	593 (8%)

Heart Transplant: Association of Offer Acceptance Ratios with the Incidence and Rate of Transplant and Waitlist Mortality.
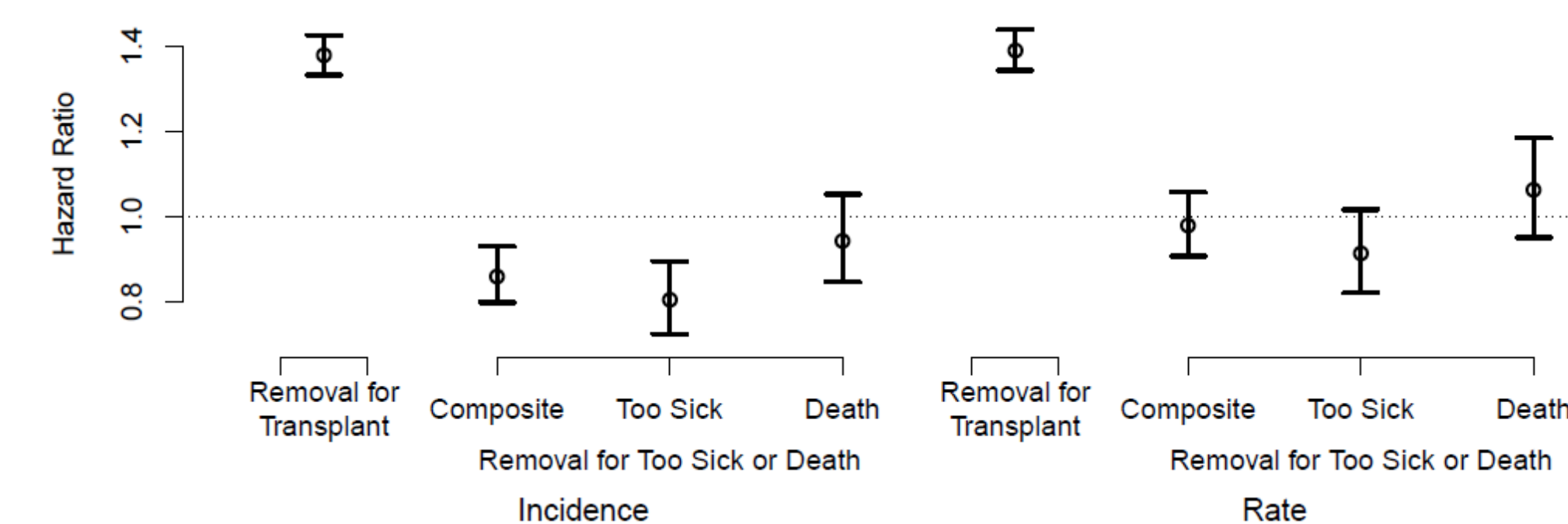
Lung Transplant: Association of Offer Acceptance Ratios with the Incidence and Rate of Transplant and Waitlist Mortality
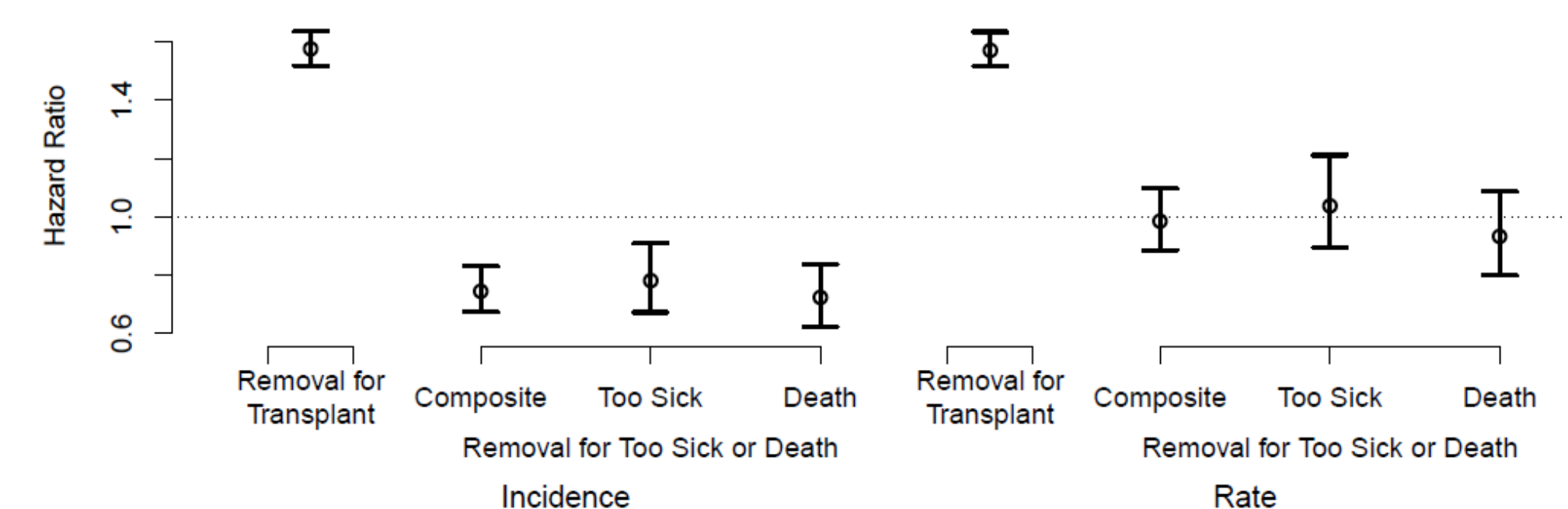
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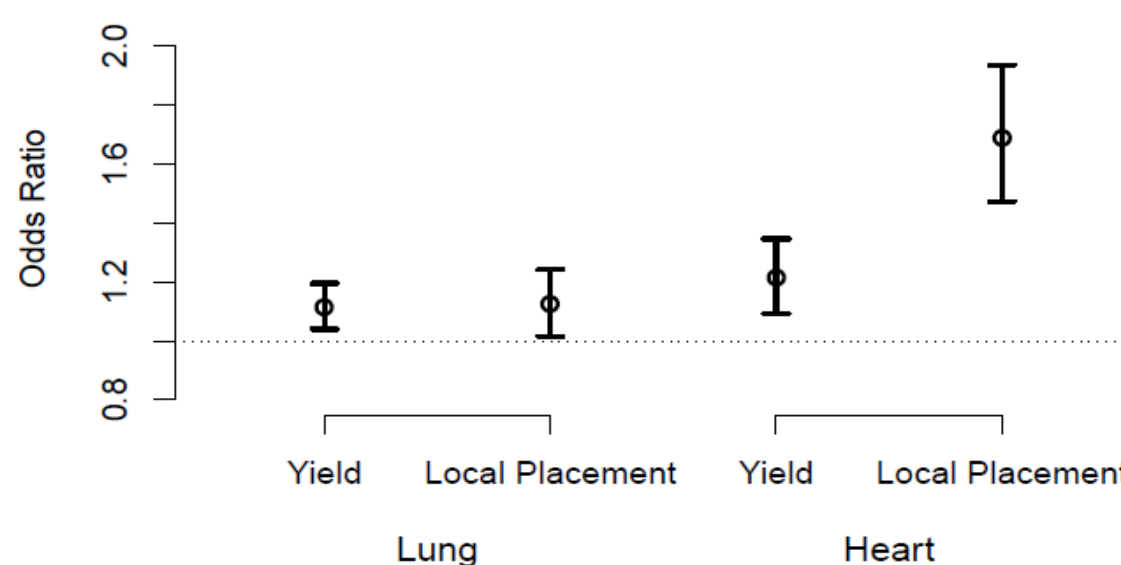
Conclusion

Thoracic offer acceptance was associated with donor yield and contributed to program-level variability in the incidence but not the rate of waitlist mortality. Programs with above average offer acceptance likely have a lower probability of waitlist mortality through better access to transplant rather than differences in waitlist care.

References

Geskus R. Cause-specific cumulative incidence estimation and the Fine and Gray model under both left truncation and right censoring. *Biometrics.* 2011, 39-49.

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