Introduction

• The Organ Procurement and Transplantation Network (OPTN) is working to modify the organ allocation system to a continuous allocation framework.
• This framework will remove hard boundaries precipitated by discrete classification groups and allocate organs based on one score.
• That score will be developed using weighted factors agreed on by each organ-specific committee.
• One factor proposed for use in a lung continuous allocation score is predicted posttransplant survival.
• There is concern that increases in distances between donors and recipients could increase total ischemia time and compromise posttransplant survival.
• Some experts have recommended using travel distance or time as a proxy for ischemia time in a prediction of posttransplant survival.
• To assess the appropriateness of that strategy, we examined the associations of total ischemia time and compromise posttransplant survival.
• We also examined the relationships of each of these individual predictors with 1-year posttransplant outcomes.

Methods

• Using SRTR data, we constructed a cohort of adult (age ≥18) lung transplant recipients, January 1, 2015–December 31, 2018.
• Recipients of donor lungs that underwent perfusion were excluded; it was unclear how perfusion would have been accounted for in total ischemia time.
• Using geolocation and a Google application programming interface, we estimated travel time and travel distance between donor hospitals and recipient transplant centers.
• Both of these measures included driving time and distance to nearby airports when flying was thought to have occurred.
• We computed straight-line distance using each facility’s latitude and longitude values.
• We computed Pearson linear correlation coefficients (ρ) and percent of variability explained (p2) among total ischemia time and the three distance and time measures.
• To assess effects of ischemia time and proxies on 1-year posttransplant survival, we fit six Cox proportional hazards models.
• Each model included the same donor and recipient factors, as well as one of each of the following: linear ischemia time, ischemia time linear splines with a knot at 4 or 6 hours, travel time, travel distance, and straight-line distance.
• Factors in the model included donor race, donor-recipient weight ratio, recipient age, steroid use, bilirubin, dialysis, serum creatinine, LUS, cardiac output, PCO2, and CVP.

Results

• Our cohort included 8803 adult transplant recipients, 927 of whom died within the first posttransplant year.
• Table 1 shows that all three proxies of ischemia time were correlated with ischemia time, with correlations ranging from 0.413 for straight-line distance to 0.448 for travel time. All correlations were statistically significant at P < .0001.
• Only 17.0% to 19.4% of the variability in total ischemia time is explained by proxies, however. This means that over 80% of variability in ischemia time is explained by factors other than travel time or distance.
• Figures 1-3 graph the relationship of ischemia time with proxies. In each case, there was a clear pattern of increase in ischemia time with increases in travel time or distance.
• It is also clear that variation in ischemia time was large. At travel distances of 0 miles and travel times of 0 hours, total ischemia time ranged from roughly 0 to 15 hours (Figures 1-3).
• Figure 4 summarizes the effects of ischemia time, travel time, travel distance, and straight-line distance, adjusted for donor and recipient factors.
• Only ischemia time was a significant predictor of 1-year posttransplant survival. All ischemia time variables were significant predictors at P < .0001.

Summary and Conclusions

• Relationships between total ischemia time and time/distance proxies were weak.
• Ischemia time was a significant predictor of 1-year posttransplant survival, but neither travel time nor travel distance nor straight-line distance improved the model of adjusted 1-year posttransplant survival.
• If we wish to use predictors of ischemia time to predict outcomes, we need to better understand which factors in addition to travel time drive changes in ischemia time.

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