

**OPTN Lung Transplantation Committee
Meeting Summary
March 31, 2021
Conference Call**

**Erika Lease, MD, Chair
Marie Budev, DO, Vice Chair**

Introduction

The Lung Transplantation Committee met via Citrix GoTo teleconference on 03/31/2021 to discuss the following agenda items:

1. 5 year post-transplant mortality model
2. Continuous distribution attribute weights
3. SRTR Thoracic Simulation Allocation Modeling (TSAM) data request

The following is a summary of the Committee's discussions.

1. 5 year Post-transplant Mortality Model

The Committee briefly reviewed the Lung Committee AHP results, the results from the last SRTR Thoracic Simulation Allocation Modeling (TSAM) request, and the goals for the next TSAM request.

The Committee also revisited the results from the 1 year versus 5 year post-transplant survival models.¹ The 5 year post-transplant survival model increased the allocation priority of young candidates and decreased allocation priority of older candidates for continuous allocation systems, but not the current allocation system. Overall, the 1 and 5 year post-transplant survival scores for recipients were similar, and none of the different modeling approaches had meaningfully different predictive performance. Instead, the larger differences across candidate age in the 5 year post-transplant survival model likely increased allocation priority for younger candidates.² The Committee continued to support using the 5 year post-transplant model in order to include the most comprehensive post-transplant outcome prediction.

2. Continuous Distribution Attribute Weights

The Committee reviewed results and information to narrow the focus on attribute weights including pediatric priority status, waitlist mortality, post-transplant survival, placement efficiency, candidate biology, and pediatric age.

Summary of discussion:

Post-transplant Mortality Value for Candidates less than 12 years old

SRTR presented on the comparison between the 1 and 5 year post-transplant models and how they affect priority 1 and 2 pediatric candidates. The Committee was asked for feedback on whether the

¹ "OPTN Lung Transplantation Committee Meeting Summary, March 18, 2021," OPTN, last modified March 18, 2021, https://optn.transplant.hrsa.gov/media/4549/20210318_lung_meeting_summary.pdf

² Andrew Wey, PhD, Melissa Skeans, MS, Maryam Valapour, MD, MPP, and Katie Audette, MS, "The impact of extending follow-up for the PTAUC model from 1 year to 5 years after transplant." SRTR Report. February 17, 2021.

post-transplant mortality value for candidates with pediatric priorities should be based on the calculated mortality for all candidates under 12 or should be separated based on priority. A member asked for clarification on whether or not a value needs to be assigned at all given the results, but SRTR staff clarified that a value other than zero should be given because the equation would behave as if the value is zero which is not accurate and without a post-transplant value pediatric candidates may get less priority. A member stated that there are low volumes for candidates under 12 years old and the values are similar, supporting giving the same post-transplant mortality points to both priority 1 and 2. The Committee supported using the same value of 0.75 on the post-transplant mortality scale for both priority 1 and 2 pediatric candidates under the age of 12 years old.

Waitlist Mortality versus Post-transplant Survival

SRTR staff outlined the results and differences of overall outcomes and transplant rates for the 1:1 Lung Allocation Score (LAS) versus the 2:1 LAS model. The Committee considered that waitlist urgency and post-transplant survival have a large effect in all scenarios when compared to the current system and that the results show waitlist mortality decreasing in all scenarios.

A member asked for clarification since their initial understanding of the distinction for moving to a 5 year post-transplant model while also changing to 1:1 LAS showed a significant difference in waitlist mortality and transplant rates in younger candidates. SRTR staff clarified that the transition to 5 year post-transplant model would increase the transplant rates for younger adults with both 1:1 and 2:1 LAS, but transitioning to a 1:1 LAS would increase slightly more. A member noted that when considering the initial goal of improving transplant benefit and may need to think through both 1:1 and 2:1 LAS and how transplant benefit is going to be affected if they move from a 2:1 to 1:1 LAS. It was clarified that the results being shown utilize a 1 year post-transplant model, and although there are differences in transplant rates for diagnoses groups for 2:1 and 1:1 LAS with the 5 year post-transplant model the overall themes are similar. Members expressed concern over most urgent candidates not being weighed more since they have higher waitlist mortality. It was mentioned that it may be helpful to consider transplant rates by age group for both 1:1 and 2:1 LAS with the 5 year post-transplant model since it clearly shows the entire cohort of candidates. Members noted that with the information shown they may not have the full picture to make a decision and the Committee supported a modeling request that included both the 2:1 and the 1:1 ratios with the 5-year model with weights at 55%, 50%, and 45%. The additional information will allow the Committee to make an informed decision about the relative weights of waitlist and post-transplant mortality that includes the new 5-year post-transplant metrics approach.

Placement Efficiency Attribute Weighting

SRTR staff covered the results from the previous TSAM request for high proximity and how that differed from the weight of 6% suggested from the AHP results and the 80% used in current system. The high proximity model showed a decrease in the percent of organs expected to fly (>75 nm) and waitlist mortality compared to the current system. Overall, the results show that high proximity works if the intent is to prioritize nearby candidates. The Committee also re-reviewed the tradeoff curves provided by MIT consultants to help inform them on where the point of diminishing return for proximity weighting which seems to be at about 10%. The Committee considered that it is likely that none of the scenarios will increase the percent of organs expected to fly compared to the current system.

A member asked if there was an option to get information on how this affects metropolitan versus rural transplant hospitals and it was clarified that all transplant hospitals currently are located in metropolitan areas as defined by the U.S. Census Bureau. However, it was acknowledged that some transplant hospitals are in more isolated locations in reference to other transplant hospitals and some candidates

are located further from transplant hospitals than others. It was clarified that these types of metrics can be included in the modeling request as long as there is a clear goal for the question that is trying to be answered, and the Committee will continue to consider what metrics might capture the intended distinctions. A member noted that urgency should be weighted as most important and that the current weight of 80% and modeled weight of 40% seem extreme especially when considering that the tradeoff curves show the point of diminishing return at 10%. The Committee requested placement efficiency weights of 10%, 15%, and 20% with both 2:1 and 1:1 LAS ratios. This will allow the Committee to validate the inflection point for significant survival gains relative to efficiency and pinpoint the appropriate weight.

Candidate Biology Attribute Weighting

The Committee reviewed modeling results provided by SRTR staff and MIT consultants covering scenarios for candidate biology weighting. The SRTR candidate biology scenario showed that the number of waitlist deaths is reduced when compared to the current system and the distance an organ would travel is higher than the current system, but still lower than the 1:1 and 2:1 LAS scenarios. Transplant rates by blood type show that blood type O candidates increase while the transplant rates for all other blood types decrease compared to the current system. Overall, waitlist deaths declined for all blood types with a larger decline for blood type O candidates. The MIT consultant tradeoff curve for candidate biology showed that as the weight for candidate biology increases there is also a significant increase in disparity across ABO blood typing, so there may be a risk of creating an unintended imbalance if the weight is set too high. It was clarified that the candidate biology attribute includes candidate height, Calculated Panel Reactive Antibodies (CPRA), and blood type so the chosen weight would be equally divided across those three.

Members noted that if the candidate biology weight was set at 5% and having that split across height, CPRA, and blood type it would not really have a significant effect and that patients that are affected by all three would need it. The Committee supported candidate biology be given a weight between 15% and 17%. The Committee chose this weight in order to avoid over-prioritizing and creating a different imbalance, while protecting priority that is impacted by selection decisions that may not be fully reflected in the modeling.

Pediatric Attribute Weighting

The SRTR simulation showed that waitlist deaths decreased in each of the modeled scenarios compared to the current system for all age groups with a larger decrease in the 12-17 year old candidates. The transplant rates also increased for pediatric age groups with a larger increase in the 12-17 year old candidates. The post-transplant death rates by age showed an increase in post-transplant death for all pediatric ages, with a higher rate for the 12-17 year old candidates. However, the sample size is small for these age groups and it seems that the increase in post-transplant death rates with pediatric age groups is possibly a modeling artifact. SRTR staff noted that the reason for large differences not being seen with this simulation could be due to not using weights lower than 15% which the MIT consultant tradeoff curves showed as being the point of diminishing returns for pediatric weighting.

An attendee stated that from a pediatric perspective, there may be times pediatric candidates are disadvantaged if the weighting is set too low and the goal should be to avoid that scenario. A member agreed since the assumption with the modeling scenarios is that the offers will be accepted and that is not always accurate. Another member suggested the pediatric weight be set somewhere between 15-20% to avoid instances where an adult candidate may outweigh a pediatric candidate. The Committee supported that pediatric candidates be given a weight of between 15% and 20%. This would protect the

prioritization of pediatric candidates where it makes the most impact while preserving the ability to prioritize other attributes where it does not significantly impact the access of pediatric candidates.

Calculation of Distance

The Committee reviewed several different methods for calculating the distance between a donor and recipient since in certain scenarios this would have a practical impact on allocation order. The proximity efficiency curve gives no advantage to candidates at the donor hospital compared to another across the street, but the travel efficiency curve does provide a slight advantage to candidates at the donor hospital since it is assumed there would be no cost for travel. The options for the Committee to choose from include assuming that a candidate within 1 mile of the donor hospital is at the donor hospital which may not always be true (especially in major metropolitan areas) or remove the assumption that there is a slight efficiency gain for candidates already at the donor hospital. However, the impact of the options on allocation is limited to a small point difference for a small number of patients.

The Committee supported smoothing out the travel efficiency curve so that the slight advantage for candidates at the donor hospital is removed.

3. SRTR Thoracic Simulation Allocation Modeling (TSAM) Data Request

The Committee reviewed the previous metrics and stratification variables used for the previous TSAM request as a reference for what could be requested for the next TSAM. The Committee was asked for feedback on possible additional or updated metrics and ways to stratify the results for the new TSAM request. The Committee also reviewed the supported attribute weights for the next TSAM data request.

Summary of discussion:

TSAM Metrics and Stratification Variables

Since the Committee supported moving to a 5 year post-transplant survival model and the previous TSAM request included 2 year post-transplant mortality, several individuals requested longer term outcomes however, that 5 years of data would not be available yet since the latest cohort started in 2018.

The Vice Chair wanted to clarify the previous topic of rural versus metropolitan transplant hospitals/patient access. A member clarified that they would be interested in seeing if there is a change in transplant viability depending on location as well as the patient access of a more rural location. The Chair asked if transplant hospital specific impact could be modeled due to any changes. SRTR staff explained that a TSAM works on averages over an entire cohort while knowing that some transplant hospitals have different behaviors and as the model gets more granular, it is harder to predict. SRTR staff asked the Committee if seeing this information by region would be helpful, and the Committee decided it would not. A possibility for the next model could show how the patient's distance from a transplant hospital affects access due to the changes, however, it should be considered that many factors contribute to candidate access such as socioeconomic status. The Committee was asked if it would make sense to separate out the candidate information versus the transplant hospital's information (such as transplant volume). It was noted that all the candidates seen in these examples are already on the waitlist which means that the people who did not have access due to their circumstances were already missed. Overall, the concern seemed to be that if placement efficiency is weighted too high, isolated programs may run into viability issues. UNOS staff also clarified that in Continuous Distribution system, scenarios where offers are made to the 5 closest transplant hospitals before candidates with high LAS scores, CPRA, etc. would be avoided and that the Continuous Distribution point system is easier to refine as adjustments are shown to be needed.

The Committee supported using the same metrics and stratification variables from the previous TSAM data request.

Attributes for the next SRTR TSAM Data Request

The Committee reviewed scenarios with the supported weights through the Match Run Visualization Tool.³ All scenarios used a 1:1 ratio for waitlist and post-transplant mortality as well as 1 year post-transplant mortality values.

When pediatric weight is set at 20%, most of the pediatric candidates are at the top of the list, but there is some overlap showing the least sick pediatric candidates placed lower than adult candidates that are harder to match or have high LAS scores for example. A member stated that from a pediatric standpoint, it needs to be shown that pediatric candidates are not being disadvantaged given the small number of offers available, but that there is a need to be pragmatic and a small amount of overlap is acceptable. A member asked if the Match Run Visualization Tool takes the quality of the organ into account and it was clarified that the tool does not include much information on donor characteristics aside from aspects such as the age of donor. SRTR asked if donor characteristics change the match run and UNOS staff clarified that ranking does not change but it will show a change in comparison to current policy as well as show different rankings due to donor age. A member mentioned that female candidates that have shorter heights can be disadvantaged if pediatrics are weighted too highly. The Committee revisited pediatric attribute weighting and requested a pediatric weight of 20%.

Setting the candidate biology weight at 15% with blood type (ABO), CPRA, and height all weighted at 5% allowed for the Committee to visualize what a match run would look like for highly sensitized candidates, candidates with heights at the extreme ends of the spectrum, and blood type O candidates. It was discussed that there should be a small boost for blood type O candidates, but the Committee still needed to be cautious of causing any disparity related to candidate ABO. Members asked if ABO, CPRA, and height could be weighted differently and it was clarified that the rating scales account for the differences in the categories of candidate biology and that overall they are measuring the same category. Members expressed concern for candidates with high LAS scores and CPRA of 90+% since they will only be able to accept a very small number of organs. It was noted that the rating scales also use a steep non-linear curve which makes up for the disadvantage of a candidate being highly sensitized for example. For further clarification, the Committee reviewed match run rankings with candidate biology rating scales set at a linear curve and supported continuing to use a steep non-linear curve. The Committee revisited candidate attribute weighting and requested a candidate biology weight of 15%.

Overall, the Committee found the Match Run Visualization Tool to be a very useful resource for informing decisions for the next TSAM data request.

The Committee voted on the next SRTR TSAM data request with:

- Both priority 1 & 2 candidates less than 12 years old to be assigned .75 post-transplant survival to give a weight of 55%
- LAS 2:1 and 1:1 ratios with the 5-year post-transplant mortality model at weights of 55%, 50%, and 45%
- Placement efficiency weighting at 10%, 15%, and 20% with both 2:1 and 1:1 LAS

³ "Match Run Visualization Tool, Continuous Distribution of Lungs," Tableau Public, accessed April 23, 2021, <https://public.tableau.com/profile/optn.committees#!/vizhome/ContinuousDistributionofLungs/Home>

- Candidate biology weighting at 15%
- Pediatric weighting at 20%
- Prior living donor weighting at 5%⁴

The Committee supported the request with 12 members voting yes, 0 voting no, and 0 abstaining.

Upcoming Meetings

- April 1, 2021 (Committee)
- April 15, 2021 (Committee)

⁴ The totals recorded during the meeting summed to 105% and this was clarified on a future Lung Committee Leadership call.

Attendance

- **Committee Members**
 - Erika Lease, Chair
 - Marie Budev, Vice Chair
 - Alan Betensley
 - Denny Lyu
 - Cynthia Gries
 - Marc Schechter
 - John Reynolds
 - Ryan Davies
 - Dan McCarthy
 - Julia Klesney-Tait
 - June Delisle
 - Kenneth McCurry
 - Michael Mulligan
 - Nirmal Sharma
 - Staci Carter
 - Whitney Brown
- **HRSA Representatives**
 - Jim Bowman
 - Adriana Martinez
- **SRTR Staff**
 - Katie Audette
 - Melissa Skeans
 - Andrew Wey
 - Maryam Valapour
- **UNOS Staff**
 - James Alcorn
 - Julia Chipko
 - Rebecca Goff
 - Elizabeth Miller
 - Janis Rosenberg
 - Susan Tlusty
 - Sara Rose Wells
 - Krissy Laurie
 - Leah Slife
 - Darren Stewart
 - Courtney Jett
 - Kaitlin Swanner
 - Lindsay Larkin
 - Tatenda Mupfudze
 - Nicole Benjamin
- **Other Attendees**
 - Ted Papalexopoulos
 - Nikos Trichakis