Update on Lung Allocation — What Do the Numbers Tell Us About Equity?

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Disclosure

• No financial disclosures relevant to this presentation
Learning Objectives

• Understand the current state of equity in lung allocation in the United States

• Understand work currently in progress to improve lung allocation policy in the United States
Lung Allocation & Equity - Overview

What Do We Mean By Equity?

What Does The Data Say?

How Can We Do Better?
What Do We Mean By Equity?

• In this context I’d suggest:
  • Equity means that two patients with comparable utility *(i.e. urgency / benefit measure)* have an equal likelihood of receiving a transplant.
Potential Dimensions of Equity

- Location / Geography
- Disease Group
- Size / Age
- Blood Type
- Sensitization
- Socioeconomic Status
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Data Sources

• SRTR / OPTN 2018 Annual Data Report - Lung
  • Valapour et al. Am J Transplant 2020; 20(s1):427
• Other selected analyses of OPTN Dataset
• Analyses using other datasets
Location / Geography

Transplant Within 1 year

Pretransplant Mortality Rate

Using OPTN data, Kostzowski et al. calculated “incidence rate ratios” for transplant rates (LTX per active person-year) between DSAs.
Location / Geography

![Location/Geography Map and Graph]

Kostzowski et al. *Am J Transplant* 2018; 18:1491
Disease Group

Transplant Rate

Waiting List Mortality

Disease Group

Median LAS at Transplant

Waiting List Mortality by LAS

Size

• Using OPTN data (2005-11) Sell et al. calculated the impact of recipient height on rates of transplantation, death or removal from the transplant list and incidence of respiratory failure.
Size

Transplant Rate

Death or Removal from the Transplant List

Sell et al. *AJRCCM* 2016; 193:681
Blood Type

Transplant Rate

Waiting List Mortality

Blood Type

- Using OPTN data (2005-17) Barac et al. performed a propensity adjusted evaluation of transplantation rate based on blood type.
Blood Type

Barac et al. JHLT 2019; 38:73
Sensitization

- Limited data available on the impact of sensitization.
- OPTN data suggests fewer sensitized patients are transplanted but the true numbers cannot be readily determined
Socioeconomic Status

Transplant Rate

Waiting List Mortality

Socioeconomic Status

- OPTN Registry Data cannot address access to listing
- Using CF Foundation Registry data (2001-09) Quon et al. evaluated the impact of SES factors on acceptance for transplant
- Medicaid recipients were 1.56 fold more likely to not be accepted for transplant

Quon et al. *AJRCCM* 2012; 186:1008
In November 2017, the lung allocation policy was changed to replace DSA with a 250 nm circle in the allocation sequence.

This change was primarily made to address geographic variability in access to transplant.
Impact of Lung Policy Change

Figure 7. Deaths per 100 Patient Years while Waiting by LAS Group
Lung Policy Change Impact

Figure 17. Transplant Recipients by LAS and OPTN Region
Lung Policy Change Impact

Figure 16. Deceased Donor Lung Transplants by LAS Group and OPTN Region
Impact of Lung Policy Change

Figure 29. Discard Rate for non-DCD lungs with no indication of perfusion reported by OPTN Region

Figure 30. Utilization Rate by OPTN Region

Difference in the Discard Rate (Post-Pre)

Difference in the Utilization Rate (Post-Pre)
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Continuous Distribution of Lungs

Thoracic Breakout Session
Composite Allocation Score

Medical urgency score + Placement efficiency score + Outcomes score + Patient access score = Patient’s Composite Allocation Score

Medical urgency score + Placement efficiency score + Outcomes score + Patient access score = Patient’s Composite Allocation Score
## Allocation of Deceased Donor Lungs

<table>
<thead>
<tr>
<th>Goal</th>
<th>Utility</th>
<th>Equity</th>
<th>System Efficiency</th>
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</thead>
<tbody>
<tr>
<td>Medical Urgency</td>
<td>Post Transplant Survival</td>
<td>Reducing Biological Disadvantages in Transplant Access</td>
<td>Placement Efficiency</td>
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<td>1-year survival without transplant (part of LAS)</td>
<td>1-year survival post transplant (part of LAS)</td>
<td>Blood Type</td>
<td>Travel Efficiency</td>
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<td>Pediatric Priorities</td>
<td>Ischemic time</td>
<td>Highly Sensitized</td>
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<tr>
<td>Pediatric Priorities</td>
<td>Pedictric Priorities</td>
<td>Candidate Size</td>
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<td>Prior Living Donors</td>
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<td>Candidate Age</td>
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*OPTN ORGAN PROCUREMENT AND TRANSPLANTATION NETWORK*
The Path Forward

Committee activity to date

- Identify attributes
- Categorize attributes
- Prioritize attributes against each other
- Convert attributes into points
- Build framework
- SRTR modeling
- Public comment on policy proposal
- Board

Fall 2019 Concept paper

Jan. 2021

Jun. 2021
Attribute Prioritization

- Identify attributes
- Categorize attributes
- Prioritize attributes against each other
- Convert attributes into points
- Build framework
- SRTR modeling
- Public comment on policy proposal
- Board
- Committee chooses option(s)
- Gap analysis
- Community Priorities (AHP)
- Build baseline (Revealed preference)
- Public Comment
Path Forward – ATS Score

![Bar chart showing the standard deviation of access-to-transplant score (ATS) for different candidate characteristics. The chart indicates that DSA has the highest standard deviation, followed by CprA, ABO, diagnosis, education, prior kidney transplant, age, insurance type, ethnicity, community risk score, citizenship, and gender.]
Path Forward – ATS Score

Figure 2: Factors Associated with Unintended Disparities in Access to Lung Transplants

Augmented model (DSA + center effects)
2018-2019 (3Q)

DSA effect decomposed into center effect + residual DSA effect

Standard Deviation of "Discounted" (log) Transplant Rate
Summary

• Equity in Lung Transplant Can Be Assessed across multiple domains
• Evidence for inequity exists, particularly as related to geography, size and blood type
• Center effects may account for a significant percentage of geographic variability
• Balancing equity with utility in allocation remains a challenge
Thanks!