



What's to Lose When We Choose: Decision-making in Lung Transplantation

Alexandra H. Toporek, M.D., M.H.S.¹, and Christian A. Merlo, M.D., M.P.H.^{1,2}

¹Division of Pulmonary and Critical Care Medicine, School of Medicine, and ²Department of Epidemiology, Bloomberg School of Public Health, Johns Hopkins University, Baltimore, Maryland

ORCID ID: 0000-0003-0902-0422 (A.H.T.).



Although advancements have been made in the management of progressive lung diseases, lung transplantation remains the standard of care for patients with nonmalignant, advanced lung disease. Unfortunately, the need for organs far exceeds the availability of suitable organ donors. To address the scarcity of this lifesaving therapy and adhere to the ethical tenets of equity, justice, beneficence, and use, the lung allocation score (LAS) was implemented as an objective determinant of lung allocation in 2005. The LAS considers both the medical urgency of transplantation and the likelihood of survival in the year after transplantation (1).

Although implementation of the LAS improved waitlist mortality dramatically (2), geographic, sex, racial, and other disparities in lung transplantation became apparent after its implementation (3–5). These disparities reflect a number of factors that influence listing and transplantation decisions. Significant geographic limitations in organ availability, differences in referral and screening patterns for lung transplantation, as well as center-level practices and subjective patient factors, are

not addressed in our current allocation system and are central to the decision-making process between patients and providers for listing and transplantation.

In December 2021, the Organ Procurement Transplant Network approved the use of the continuous distribution framework for all organ allocation (6). In addition to medical urgency and survival after transplant, the continuous distribution framework considers organ placement efficiency, biological disadvantages, and patient access in the calculation of a composite allocation score (CAS) (6). Development of this framework, more specifically, what attributes are included in the CAS and how those factors are weighted, has been completed with plans to implement the continuous distribution framework in early 2023. Despite the tremendous thought and effort to develop this framework, it remains uncertain whether continuous distribution will adequately address the differential selection of candidates for lung transplantation. To this end, in this issue of *AnnalsATS*, Schnellinger and colleagues (pp. 226–235) seek to define and characterize potential sources of differential selection throughout the pretransplant process using qualitative research methods (7).

Semistructured qualitative interviews were conducted among 30 lung transplant surgeons and 21 transplant pulmonologists nationally. Interviews were transcribed and coded using a modified framework analysis (8). The authors define the pre-lung transplant pathway as referral, screening, waitlist registration, waiting period, and receipt of transplant. Throughout this pathway, they identified five themes that account for potential sources of differential selection, including a transplant center's degree of risk tolerance and accountability, successfulness and fairness of the LAS, donor–organ availability and regional competition, patient health versus program

health, and access to care versus responsible stewardship of organs.

Among the study's several strengths is its focus on the entirety of the pretransplant journey, from screening to waitlist registration to transplantation. Studies have investigated sources of disparity in the referral and screening process (9), but few have characterized practice variation within the waitlist period through lung transplantation. Furthermore, purposive sampling was used to recruit lung transplant surgeons and pulmonologists from both low- and high-volume lung transplant centers, as well as from various regions in the United States (this was crucial to the identification of themes related to center-level factors).

The authors identify many important deficiencies within the current lung allocation system. Beyond the known limitations of the LAS and its exclusion of key prognostic variables (10), individual patient characteristics (frailty, psychosocial support, etc.) relevant to outcomes after transplant, and improvements in quality of life after transplant (11), the identified themes also emphasize subjectivity and flexibility within the LAS framework as an additional deficiency. This flexibility, combined with the singular emphasis placed on the LAS in the current allocation system, is an additional source of differential selection.

Importantly, three of the five identified themes (transplant center's degree of risk tolerance and accountability, donor–organ availability and regional competition, and patient health vs. program health) focus on center-level factors that influence listing and transplantation decisions. Lung transplant surgeons and pulmonologists describe accountability metrics (including average 1-year survival after transplant, mortality before transplant, waitlist time, and transplant volume) (12) as primary drivers in listing decisions. Specifically, low-volume transplant centers describe that they are

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less inclined to list and transplant patients with higher LAS and lower survival after transplant for fear of impacting survival rates after transplant. In many cases, this may be appropriate, as smaller centers may not have the necessary infrastructure to care for complex, critically ill patients before and after transplant. Conversely, high-volume centers report that they are more likely to list patients with higher LAS, as the high number of total transplants mitigates the impact of lower survival after transplant for sicker patients on posttransplant survival metrics. Importantly, lung transplant surgeons at low-volume centers also explain that many patients with lower LAS remain on the waitlist for longer periods of time until they develop other contraindications for transplant.

The impact of these center-level characteristics on listing decisions cannot be understated. The authors describe an inherent tension between the health of a patient and the health of a program. Identification of these program-level characteristics emphasizes the need to address the importance placed on program health and accountability metrics as it impacts the fairness of organ allocation and patient health. Although the

calculation of the LAS includes 1-year survival after transplant, 1-year survival without transplantation is weighted more heavily (waitlist survival is weighted two times as heavily as 1-year survival after transplant) (13). Predictably, a higher score in our current allocation system results in a shorter waiting time for lung transplantation but is also associated with lower survival after transplantation (14, 15). Prior studies using statistical modeling suggest equal weight to both waitlist and 5-year survival after transplant under a continuous distribution framework has the potential to improve long-term survival after transplant (16) and, indeed, the CAS will include and equally weight candidates' expected 5-year survival after transplant, as well as waiting-list survival in its calculation (6). This has the potential to lessen the impact of center-level characteristics on differential selection by enabling the transplantation of healthier patients at smaller centers. However, one must also be cognizant that premature transplantation may lead to an overall shorter life because transplanted organs have finite longevity. Further consideration of these center-level factors after the implementation of the continuous

distribution framework will be necessary, highlighting the importance of this study.

These findings also speak to the role of geographic distribution and regional competition for donor organs in differential selection. Geographic disparities in transplantation remain a primary focus of the continuous distribution framework. Eliminating geographic boundaries for donor organ distribution and incorporating organ placement efficiency into a weighted CAS has the potential to mitigate the influence of geography on differential selection.

Schnellinger and colleagues have conducted a timely, well-designed, and thorough qualitative evaluation of the entirety of the pretransplant pathway from screening to lung transplantation to identify sources of differential selection. Their results emphasize numerous center-level characteristics that influence listing and transplantation decisions, as well as novel inadequacies within our current system. This study offers valuable data for future consideration as we move toward a new allocation system to minimize the risk of differential selection for lung transplantation. ■

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