# Continuous Distribution: LSAM Simulation Study

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# Disclosures

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- I have no financial relationships to disclose within the past 12 months relevant to my presentation. The ACCME defines "relevant" financial relationships as financial relationships in any amount occurring within the past 12 months that create a conflict of interest.

- My presentation does not include discussion of off-label or investigational use.

- I do not intend to reference unlabeled/unapproved uses of drugs or products in my presentation.

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# Goals

- Introduce a simple continuous distribution system.
- Use the LSAM software to illustrate differences in continuous distribution scenarios.
  - Adjust parameters
  - Assess outcomes of parameter adjustment
  - Extend to other important metrics

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# Goals

- Introduce a simple continuous distribution system.
- Use the LSAM software to illustrate differences in continuous distribution scenarios.
  - Adjust parameters
  - Direct results of parameters adjustment
  - Extend to other important metrics
- *Example of how a continuous system **could** be conceived.*
- *Any changes will be implemented through the OPTN policy-making process.*

# Continuous Distribution

- The distribution score is the sum of two components[1]:
- **Medical priority score:**
  - Can be based on both candidate and donor characteristics
  - In liver distribution: MELD
- **Geographic feasibility score:**
  - Medical and financial costs of travel
    - Ischemic time
    - Flying vs. driving
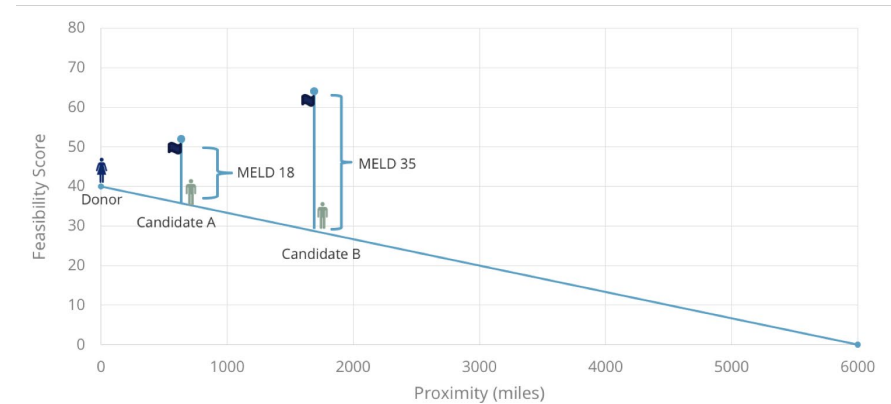
# Simulation Study Scenarios

- Evaluating a simple feasibility score function.
- Priority for transplant centers within a fixed distance (proximal zone).
  - Fly vs. drive cutoff
  - Influence determined by cliff size
- Decreasing boost with increasing distance thereafter.



**Feasibility Score Function: Basic Shape**

Geographic Feasibility Score (y-axis)

Distance (x-axis)

Proximal Zone
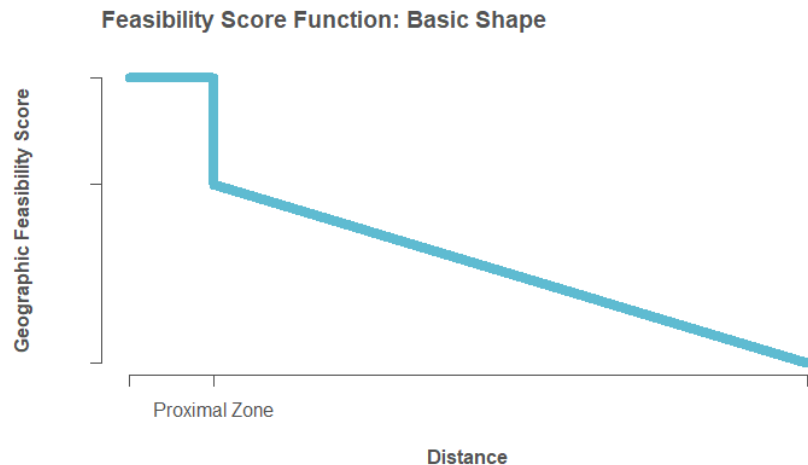
# Simulation Study Scenarios

| Sharing | PZ | Cliff |
|---------|-----|-------|
| High | 450 | 10 |
| Middle | 300 | 10 |
| Low | 150 | 15 |

**Feasibility Score Function: Basic Shape**
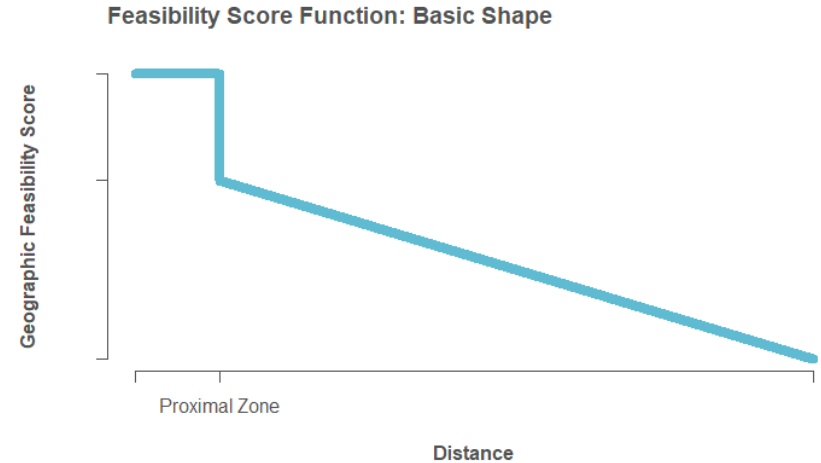
# Results: Travel Distance Distribution

- Comparisons must be made *across* scenarios.
- A baseline helps establish the range of possible outcomes.
  - Orange violin
- Sharing decreases from left to right.



Distribution of Transport Distance
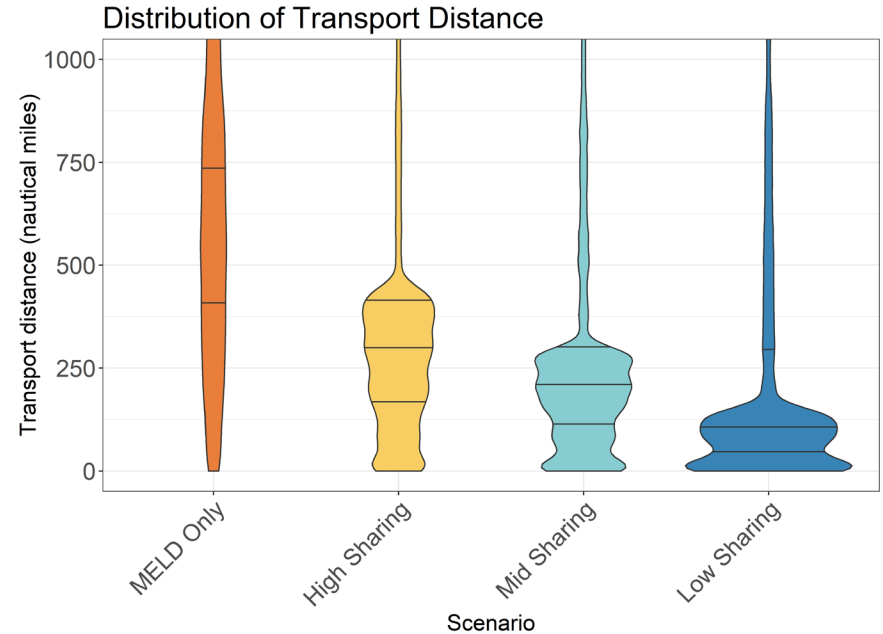
# Results: Travel Distance Distribution

- Uniform distance distribution with MELD only.
- The proximal zone decrease is clear with decreased sharing.



Distribution of Transport Distance
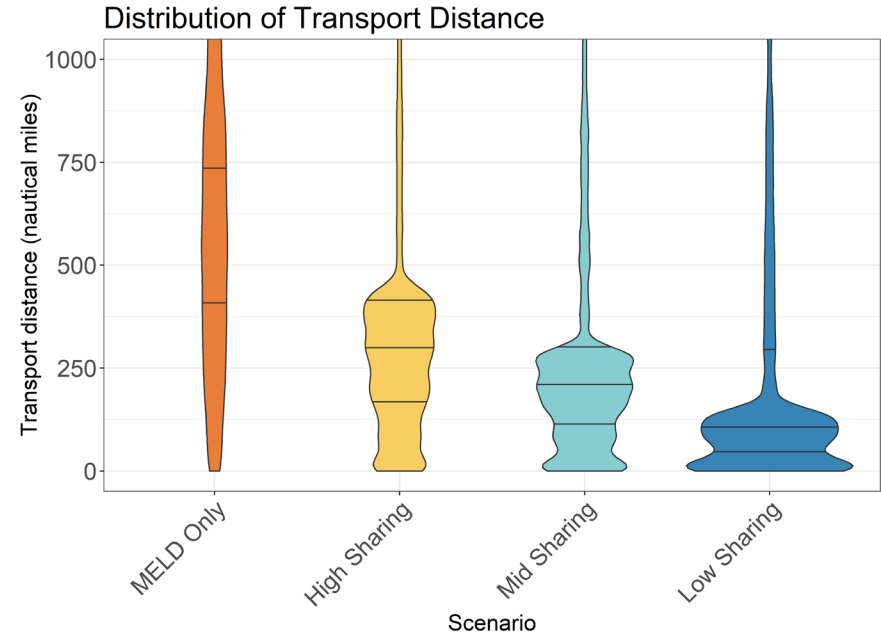
# Results: MELD Distribution

- Prioritizing less travel leads to wider distribution of MELD score at transplant.



Distribution of Allocation MELD/PELD at Transplant

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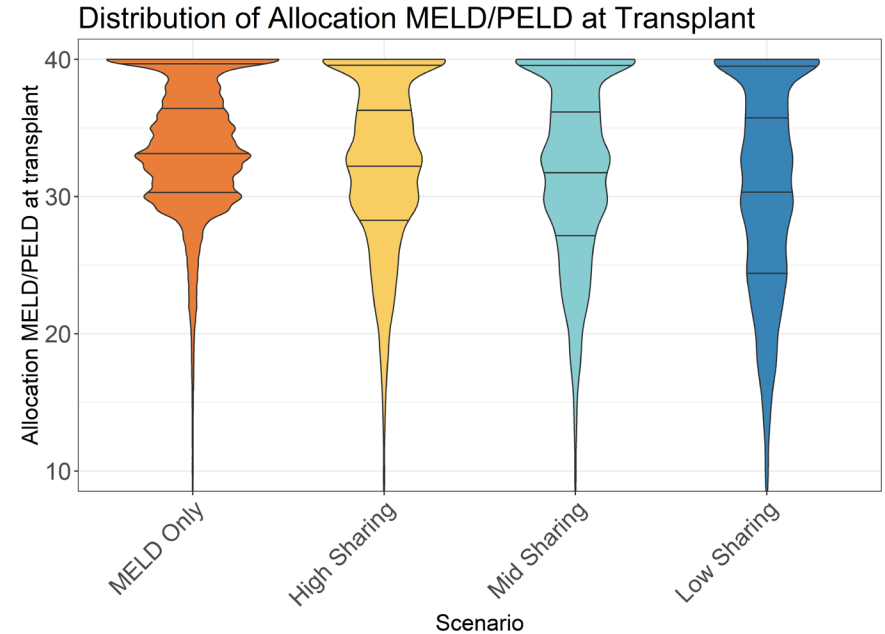
# Conclusions

- The LSAM is capable of modelling a wide range of continuous distribution systems.
    - For any system, a range of parameters should be considered
    - Care must be taken to ensure that the parameters' effects can be disentangled
- Baselines are important to establish range.
- It is possible to model and calculate many other interesting metrics with the LSAM results.

# References

- 1. Snyder JJ, et. al. Organ distribution without geographic boundaries: a possible framework for organ allocation. Am J Transplant. 2018;18(11):2635-2640