SUPPLEMENTAL DIGITAL CONTENT

Worked Example

Visualizing Geographic Variation in MMaT

Suppose a resident of Wapakoneta, a small town in northeast Ohio, is in need of a liver transplant. At what transplant centers might that resident consider listing? And at what MELD might he expect to receive a transplant? To answer these questions, we used a weighted average of the median MELD/PELD at transplant (MMaT) of all transplant centers in the continental U.S. based on distance to those transplant centers. All subsequent analysis only considers transplant centers which did, on average, 10 transplants per LSAM run.

Suppose the distance from Wapakoneta to each of the n transplant centers in the continental U.S. is $d_1, d_2, \ldots, d_n$ with d_1 being the distance to the closest transplant center, d_2 being the distance to the second closest transplant center, and so on. For each transplant center we define a corresponding weight w_i:

$$w_i := \frac{\exp\left(-\frac{d_i^{5/4}}{d_1}\right)}{\sum_{j=1}^{n} \exp\left(-\frac{d_j^{5/4}}{d_1}\right)}.$$

If m_i is the MMaT for transplant center i, then we estimate that our resident living in Wapakoneta, Ohio would expect an MMaT of

$$MMaT := \sum_{i=1}^{n} w_i m_i.$$

Thus the above equation is a weighted average of the MMaT across all transplant centers, where the weight w_i can be loosely interpreted as the probability our Wapakoneta resident will list at transplant center i.

The table below shows the nine transplant centers at which our Wapakoneta resident is most likely to list based on distance (the remaining transplant centers had a combined negligible effect). It includes the distance d_i, the probability w_i he will list, and the MMaT m_i at each of those centers. Our Wapakoneta resident is most likely to list at transplant center OHOU (Ohio State University Medical Center) with a probability of 0.56 at 63 nm away, he is second most likely to list at OHCM (Children's Hospital Medical Center Cincinnati) with a probability of 0.15 at 86 nm away and so on. Thus using the above equation we can estimate the MMaT in Wapakoneta, Ohio as

$$MMat \approx \sum_{i=1}^{9} w_i m_i = 26.57.$$

	Code	$d_i(nm)$	w_i	m_i
1	OHOU	63	0.56	24
2	OHCM	86	0.15	35
3	OHUC	88	0.14	29
4	INIM	103	0.05	25
5	MIUM	106	0.05	25
6	MIHF	119	0.02	25
7	MIBH	126	0.01	26
8	OHCC	130	0.01	28
9	OHUH	130	0.01	28

Table S1: Number of liver transplants by age using acuity circles (AC) and DSA/Region-based (DSA) allocation schemes. Data represent mean (minimum, maximum).

	Number of transplants		
Age group	AC*	DSA**	*P*
Infant	707 (667, 753)	560 (524, 582)	<0.001
Child	677 (651, 703)	547 (519, 589)	<0.001
Teenager	404 (384, 428)	248 (219, 263)	<0.001
Adult	16 508 (16 316, 16 634)	16 963 (16 884, 17 151)	<0.001

Table S2: Median number of days on the liver transplant waitlist by age using acuity circles (AC) and DSA/Region-based (DSA) allocation schemes. Data represent mean (minimum, maximum).

	Days on the liver transplant waitlist		
Age group	AC*	DSA**	*P*
Infant	29 (26, 33)	42 (40, 45)	<0.001
Child	45 (39, 50)	70 (61, 79)	<0.001
Teenager	45 (41, 51)	57 (44, 75)	0.004
Adult	84 (81, 89)	89 (83, 92)	<0.001

Table S3: Median travel distance (nautical miles) for deceased-donor livers by age using acuity circles (AC) and DSA/Region-based (DSA) allocation schemes. Data represent mean (minimum, maximum).

	Travel distance for deceased-donor livers		
Age group	AC*	DSA**	*P*
Infant	403 (390, 422)	236 (230, 250)	<0.001
Child	395 (383, 411)	231 (196, 247)	<0.001
Teenager	359 (326, 374)	125 (92, 156)	<0.001
Adult	215 (208, 220)	92 (87, 94)	<0.001