Estimating latent demand for organ transplantation

Presentation before the Maryland Health Care Commission working group

May 27, 2015
How can we quantify latent demand for organ transplantation?
The current formula

The current formula is complicated, but ultimately carries several flawed assumptions:

• The rate of ESLD/ESRD in a DSA is fully captured by the current number of transplants to residents
• If the current number of transplants to residents of a DSA is declining, then need is declining
• A new center won't change the proportion of patients in a DSA who go elsewhere for a transplant (ex-migrants)
• A new center won't change the proportion of patients who come from outside a DSA for a transplant (in-migrants)
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These assumptions are probably more reasonable for (say) stroke, where supply isn't constrained
Proposed framework: estimating demand

- Base demand on number of cases of ESRD/ESLD

- Ex-migrants (in excess of some baseline) represent unmet local demand

- Formula must be easy to calculate

- Estimate demand independent of case mixture (currently, white/high-SES patients have better access to transplant, but we don't wish to perpetuate this disparity)
Estimating latent demand: methods

• Data: KT in 2013; incident ESRD in 2011 (most recent years available)

• Define "exmigrant" KT as KT outside of DSA of residence

• Regress # exmigrant KT as a function of # incident ESRD cases with no constant term (i.e. model ratio of KT to ESRD cases)

• If observed exmigrant KT is dramatically larger than predicted exmigrant KT, this indicates latent demand for a new transplant center
Estimating latent kidney demand

Wide variation among DSAs
Estimating latent kidney demand

WRTC rate of travel is 3x national average (40.3 expected, 123 observed)
Liver transplantation

• We have no registry of ESLD

• Model exmigrations as a proportion of all transplants, by DSA of *residence*
Estimating latent demand: liver

• We have no registry of ESLD; use transplants by DSA of *residence* for denominator

• Regress # exmigrant LT as a function of transplants to residents, with no constant term

• If observed exmigrant LT is dramatically larger than predicted exmigrant LT, this indicates latent demand for a new transplant center
Estimating latent liver demand

LT and DSA exmigration by DSA of residence
$R^2 = 0.66$

Even more variation among DSAs
Estimating latent liver demand

WRTC rate of exmigration is 2.3x average (21.6 expected, 49 observed)
Conclusion

Based on national averages, WRTC has latent demand for an estimated 83 additional KT and 27 additional LT per year
Estimates are conservative

• Does not account for population growth

• Does not account for potential immigration

• A center that was more aggressive than the national average with regards to outreach or live donation might capture additional demand