Do Disparities Play a Role in Outcome for Pediatric Liver Transplant Recipients?

John Bucuvalas MD

9/30/2021

Mount Sinai *Kravis Children's Hospital*

I HAVE NO DISCLOSURES

Disparity **usually refers to a difference that is unfair: economic *disparities* exist among ethnic groups, there is a *disparity* between what men and women earn in the same job. This noun derives from Latin *dispar* "unequal."**

Context Helps

Mount Sinai

Kravis Children's Hospital

- **Why:** We want kids who require LTX to live full and meaningful lives

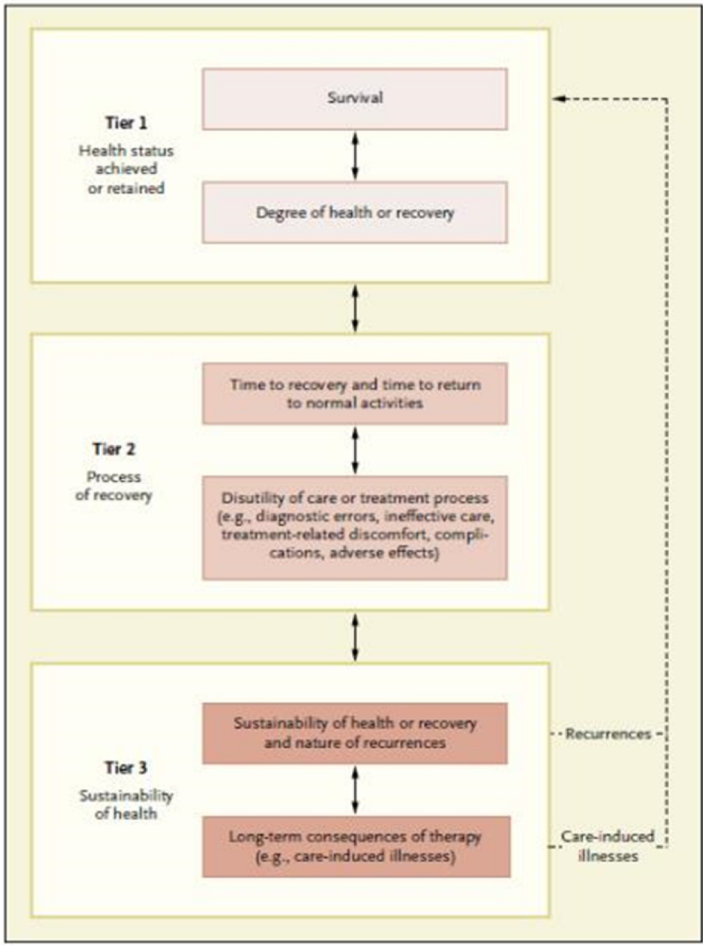
- **What:** Work to ensure the best possible outcome by addressing the challenges of wait list mortality and morbidity, peri-operative risk, adherence and by ensuring allograft health and avoiding the complications of IS

- **How:** Deliver the best care, acquire and apply new knowledge and improve the health care delivery system

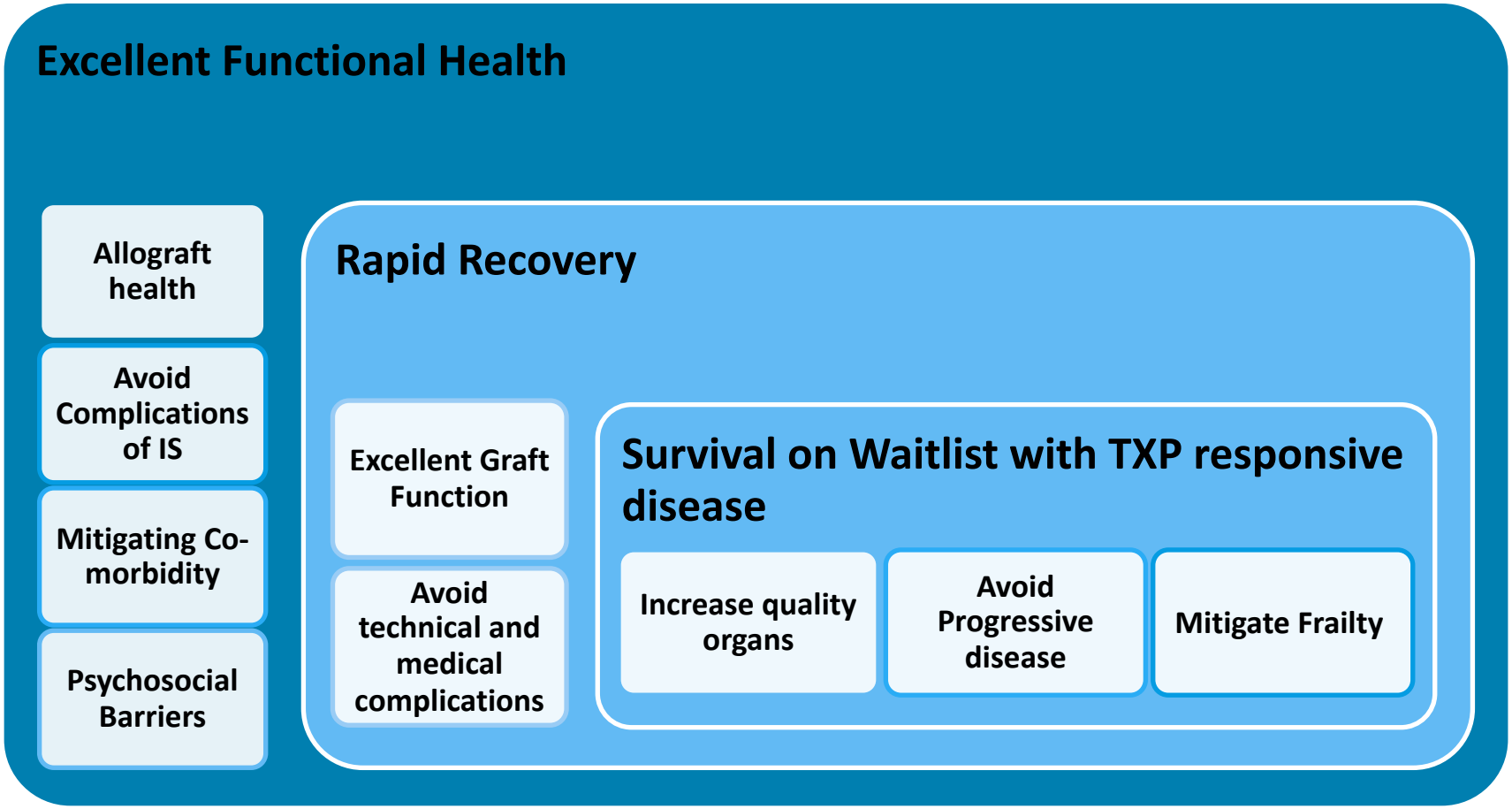
Metrics that Matter

Kids versus Adults

Should the metrics be different?

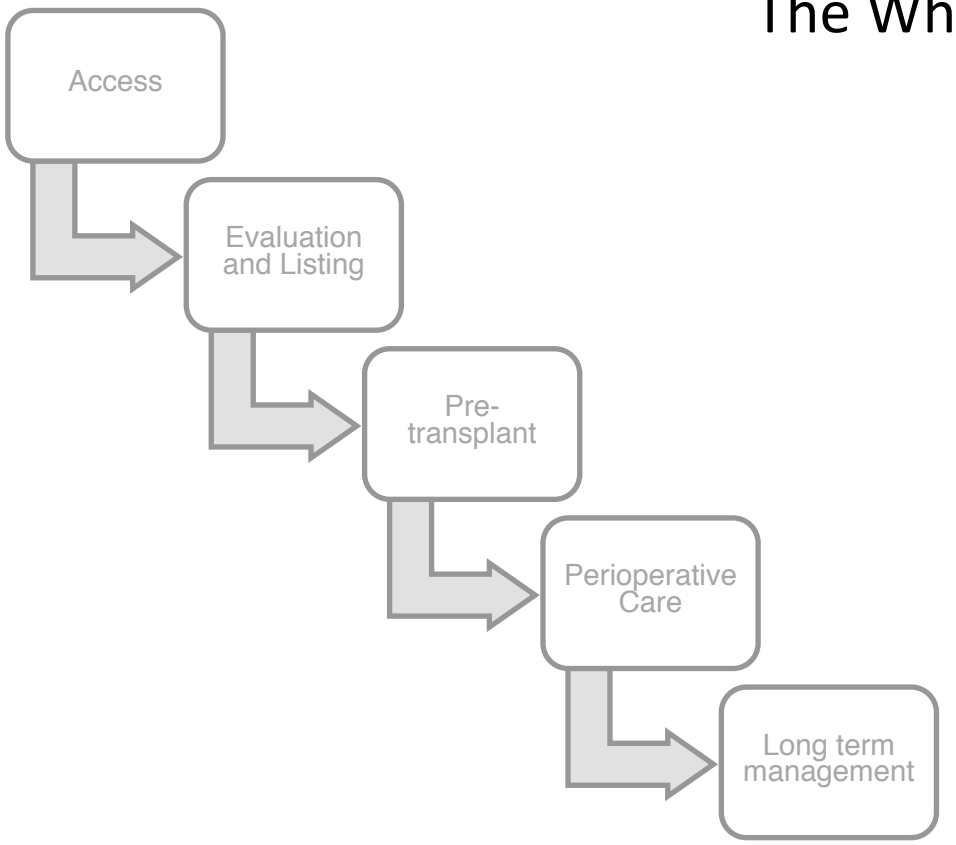


Michael Porter- NEJM 2011


Excellent Functional Health
Allograft health
Avoid Complications of IS
Mitigating Co-morbidity
Psychosocial Barriers
Rapid Recovery
Excellent Graft Function
Avoid technical and medical complications
Survival on Waitlist with TXP responsive disease
Increase quality organs
Avoid Progressive disease
Mitigate Frailty

Path of the Patient

The Whole Game



A Single Center Study of 208 Pediatric Liver Transplant Recipients Thammana 2014

- 10-year graft survival rates
  - White patients 84% [95% confidence interval (CI) = 76%-91%]
  - Black patients 60% (95% CI = 46%-74%)
  - Other race/ethnicity 49% (95% CI = 23%-77%)

- 10-year patient survival rates
  - White patients 92% (95% CI = 84%-96%)
  - Black patients 65% (95% CI = 52%-79%),
  - Other race/ethnicity 76% (95% CI = 54%-97

- Adjusted for demographic, clinical, and socioeconomic characteristics,
  - Graft failure [black: hazard ratio (HR) = **2.59, 95% CI = 1.29-5.45;**
  - Mortality (**black: HR = 4.24, 95% CI = 1.54-11.69)**

Path of the Patient

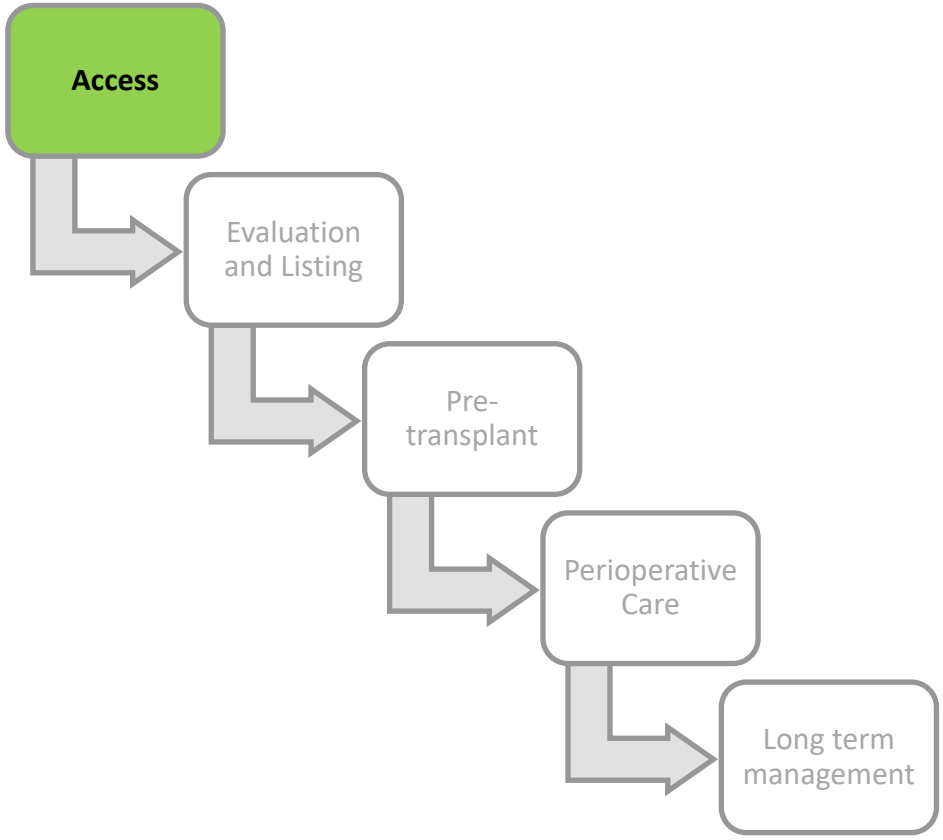


Table III

Barrier frequency and association with incomplete referral

Barrier	Number of subjects experiencing barrier (n = 341)	Percent with barrier experiencing incomplete referral	Unadjusted OR (CI) for incomplete referral for those with barrier	aOR (CI) for incomplete referral
Leaving work [#]	160	21.3	0.85 (0.44-1.66)	0.87 (0.41-1.85) [†]
Childcare	129	25.6	1.48 (0.87-2.51)	1.64 (0.91-3.00) [†]
Transportation	109	20.2	0.89 (0.51-1.57)	0.84 (0.46-1.54) [†]
Getting an appointment quickly	88	29.6	1.89 (1.07-3.34) [‡]	1.91 (1.05-3.46) [†,‡]
Understanding providers	73	19.2	0.88 (0.46-1.69)	1.01 (0.51-2.01) [†]
Communicating with office	73	28.8	1.71 (0.94-3.10)	1.73 (0.91-3.30) [†]
Locating office	72	36.1	2.71 (1.52-4.84) [‡]	2.70 (1.45-5.05) [†,‡]
Interpreters unavailable [§]	22	31.8	1.85 (0.68-5.02)	2.07 (0.73-5.91) [¶]
Inconvenient office hours	40	40.0	2.88 (1.43-5.80) [‡]	2.92 (1.38-6.21) [†,‡]
Health insurance coverage	7	28.6	1.41 (0.27-7.44)	1.49 (0.27-8.31) [¶]

[#] Asked only if parent was "working a paid job" (n = 198).

[†] Adjusted for child age, sex, race/ethnicity, survey language, insurance status (public or private), parent nativity, and parental educational level.

[‡] Statistically significant.

[§] Asked only if parent "needed help communicating with doctors in English" (n = 158).

[¶] Adjusted for child age, sex, race/ethnicity, survey language, parent nativity, and parental educational level.

[‖] Adjusted for child age, sex, insurance status (public or private), and parent educational level.

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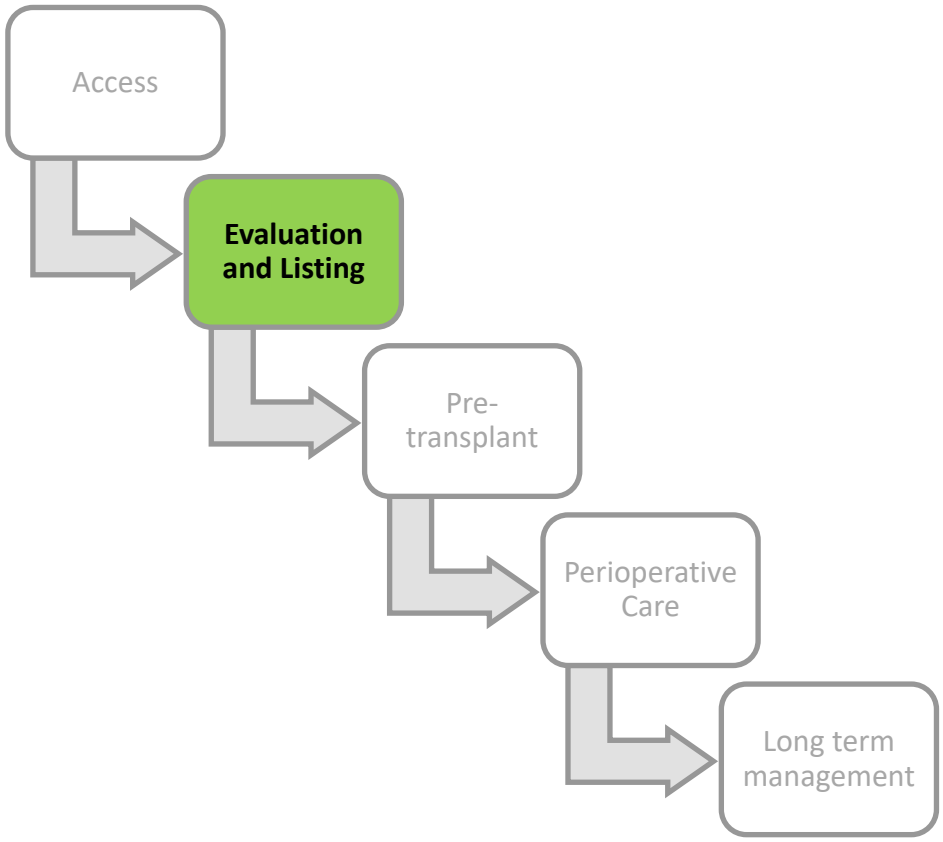
J Pediatr. 2013 February ; 162(2): 409–14.e1. doi:10.1016/j.jpeds.2012.07.022.

Barriers to Specialty Care and Specialty Referral Completion in the Community Health Center Setting

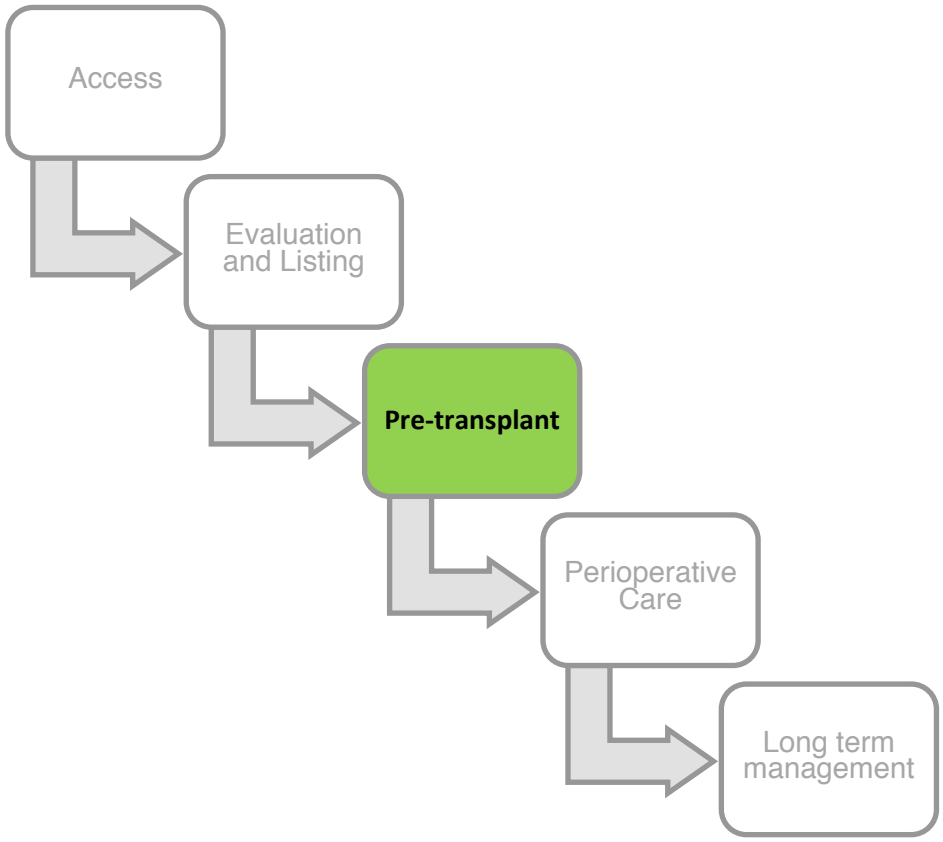
Katharine E. Zuckerman, MD, MPH[1], James M. Perrin, MD[2], Karin Hobrecker, AB[3,*], and Karen Donelan, EdM, ScD[4]

Path of the Patient



A Story about Listing as a Candidate for Liver Transplantation

Path of the Patient



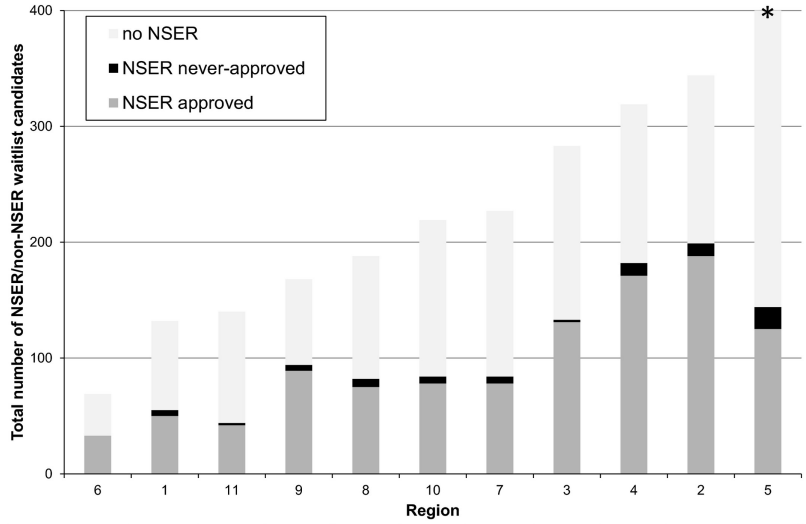
Prioritization
How does it work?

Heterogeneity and disparities in the use of exception scores in pediatric liver allocation

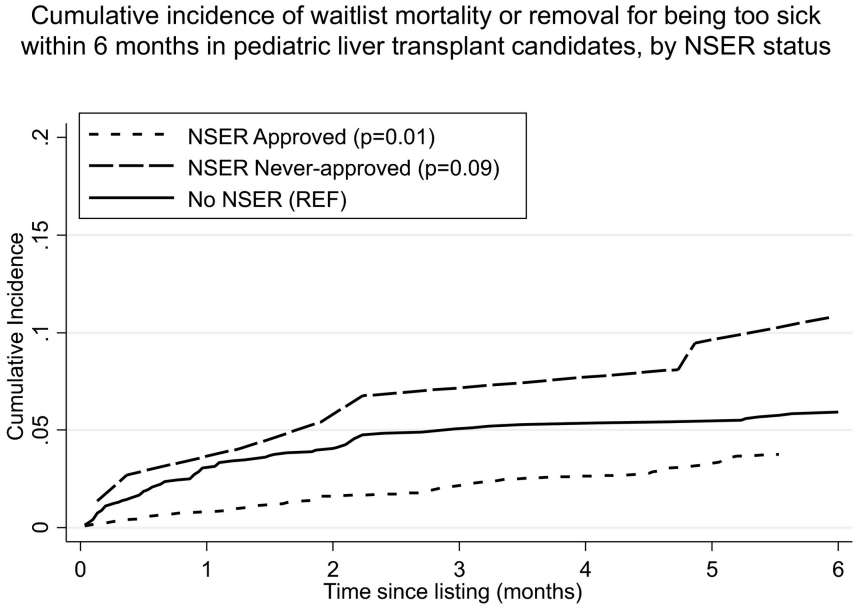
E K Hsu [1], M Shaffer, M Bradford, N Mayer-Hamblett, S Horslen

Patients of non-White race had exception score request rates 13% lower than patients of White race (IRR 0.87, 95% CI 0.77-0.98, p = 0.02).

Nonstandard Exception Requests Impact Outcomes for Pediatric Liver Transplant Candidates



# centers	2	3	10	5	6	5	8	7	11	6	9
Adult transplant MELD	L	H	L	H	M	L	M	L	M	M	H



American Journal of Transplantation, Volume: 16, Issue: 11, Pages: 3181-3191, First published: 23 May 2016, DOI: (10.1111/ajt.13879)

Children receiving a living-donor liver transplant (LDLT) have superior post-transplant outcomes but this procedure is only used for 10% of transplant recipients.

Living donor liver transplant varies by race/ethnicity
Mogul 2018 JPGN

Table 3

1-year unadjusted cumulative incidence by race/ethnic group

	Mortality (%)	*P*	DDLT (%)	*P*	LDLT (%)	*P*
Caucasian non-Hispanic	8.3	–	63.8	–	8.8	–
African American	8.5	>0.05	65.3	0.04	4.9	<0.001
Hispanic	10.1	0.02	64.1	>0.05	7	0.047
Asian	7	>0.05	68	>0.05	10.1	>0.05
mixed/other	14.3	0.001	64.9	>0.05	5.7	>0.05

P value from coefficient in competing risk regression

- LDLT varied by race/ethnicity, with only 6.7% African Americans and 10.3% Hispanic children receiving LDLT compared with 12.4% Caucasian, 13.3% Asian, and 9.4% mix/other children.
- In an adjusted Cox proportional hazards model, ***African Americans were half as likely as Caucasians to use LDLT (hazard ratio (HR): $_{0.41}0.55_{0.73}$)***

Understanding of living donor liver transplantation varies according to insurance
Mogul 2019

Individuals with public insurance were less likely than those with private insurance

- To know the steps for LDLT evaluation (44% vs 82%; P<0.001).
- To feel well-informed (67% vs 87%; P=0.03)
- To understand how donor surgery might impact donor work/time-off (44% vs 81%; P=0.001)

Aim: Evaluate the impact of race/ethnicity on waitlist mortality.

Aim: Evaluate the impact of race/ethnicity on waitlist mortality and **investigate how neighborhood deprivation modifies this effect.**

Francis S. Collins
@NIHDirector

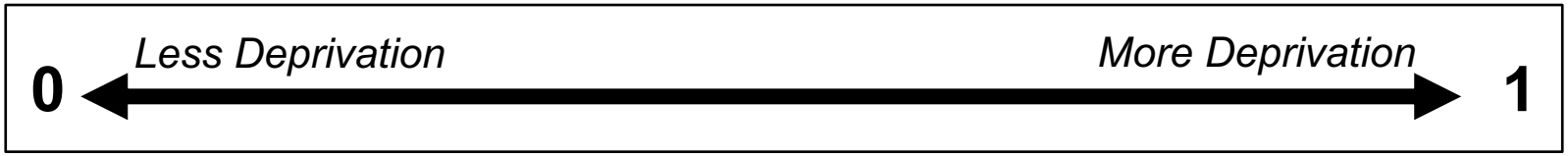
Follow

T. Glass: If DNA is our biological blueprint, ZNA (zipcode at birth) is the blueprint for behavioral&psycho-social makeup. #PMINetwork

8:10 AM - 29 May 2015

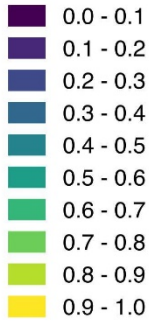
Deprivation Index

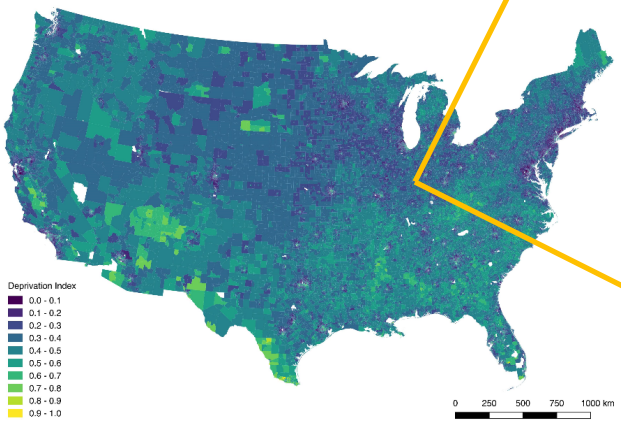
- % of households < Federal Poverty Line
- Median household income
- Fraction of population with high school education
- Fraction of population with no health insurance
- Fraction of the population receiving public assistance
- Fraction of houses that are vacated

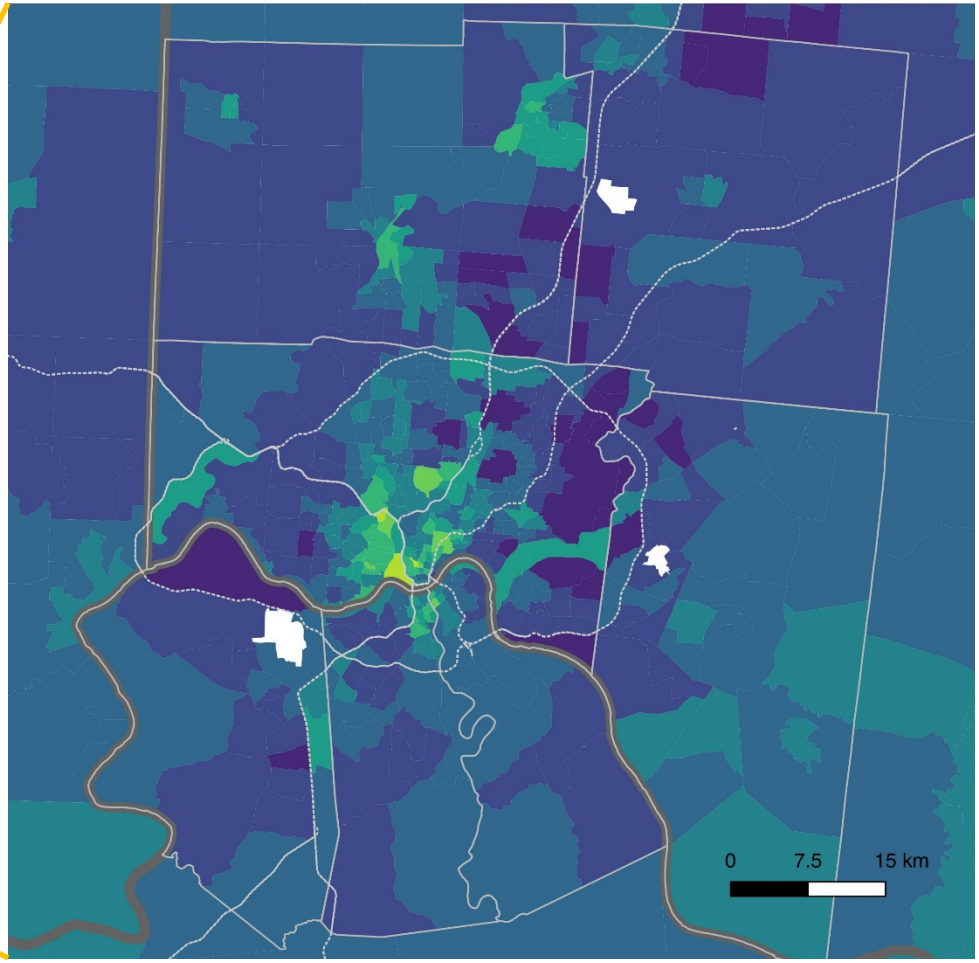


Brokamp C, *Annals of Epidemiology,* 2018

Deprivation Index

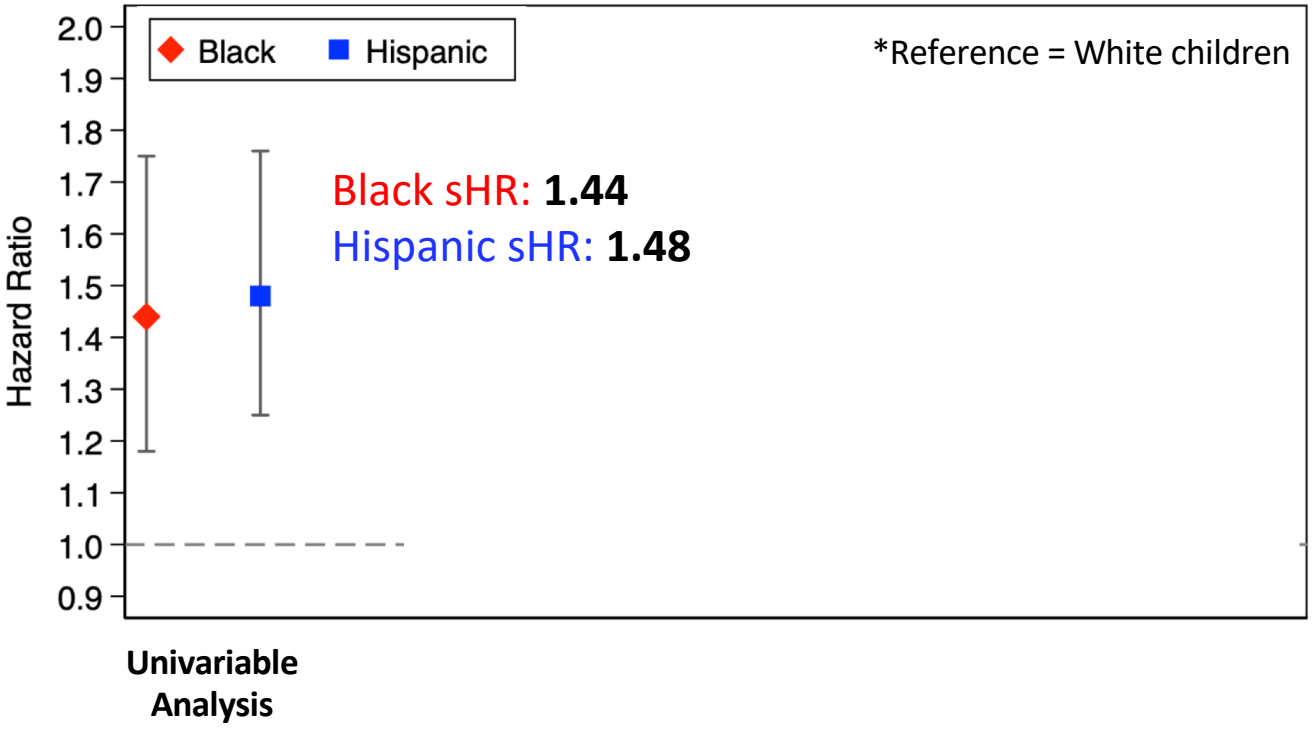




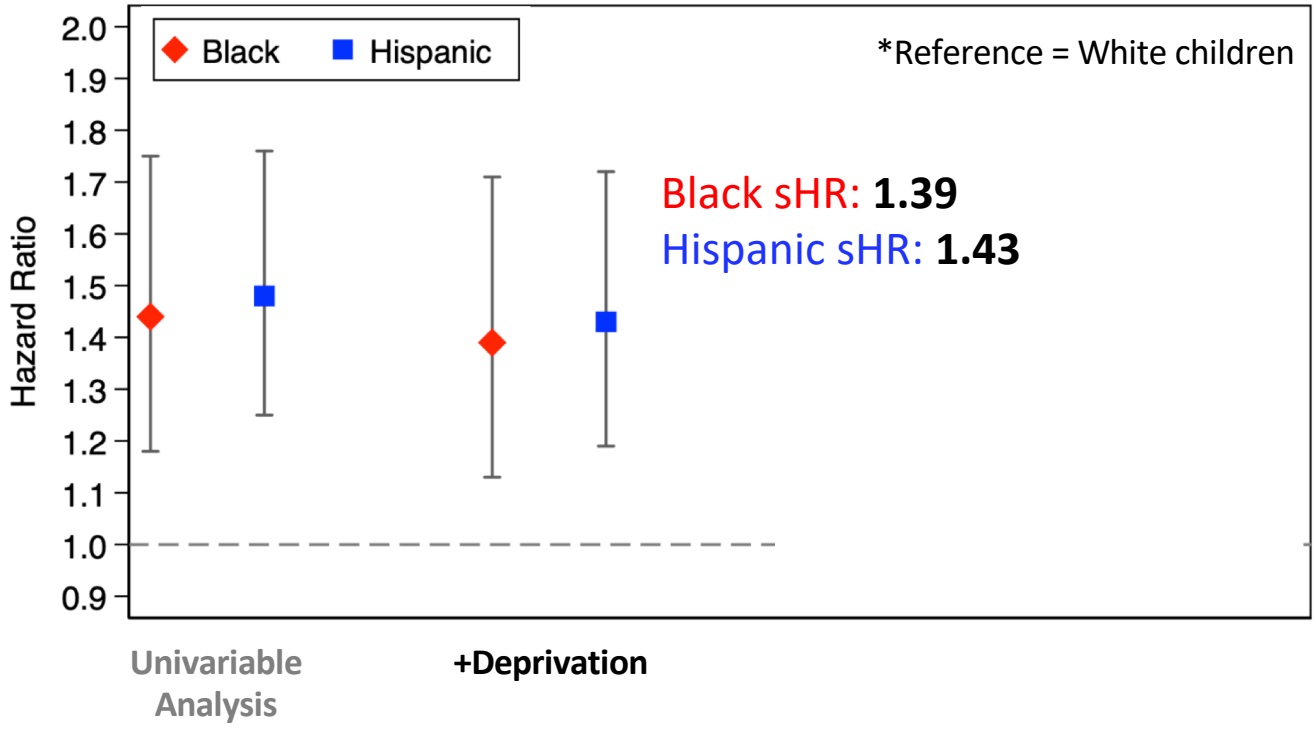


https://github.com/cole-brokamp/dep_index

Waitlist Mortality Models



Waitlist Mortality Models



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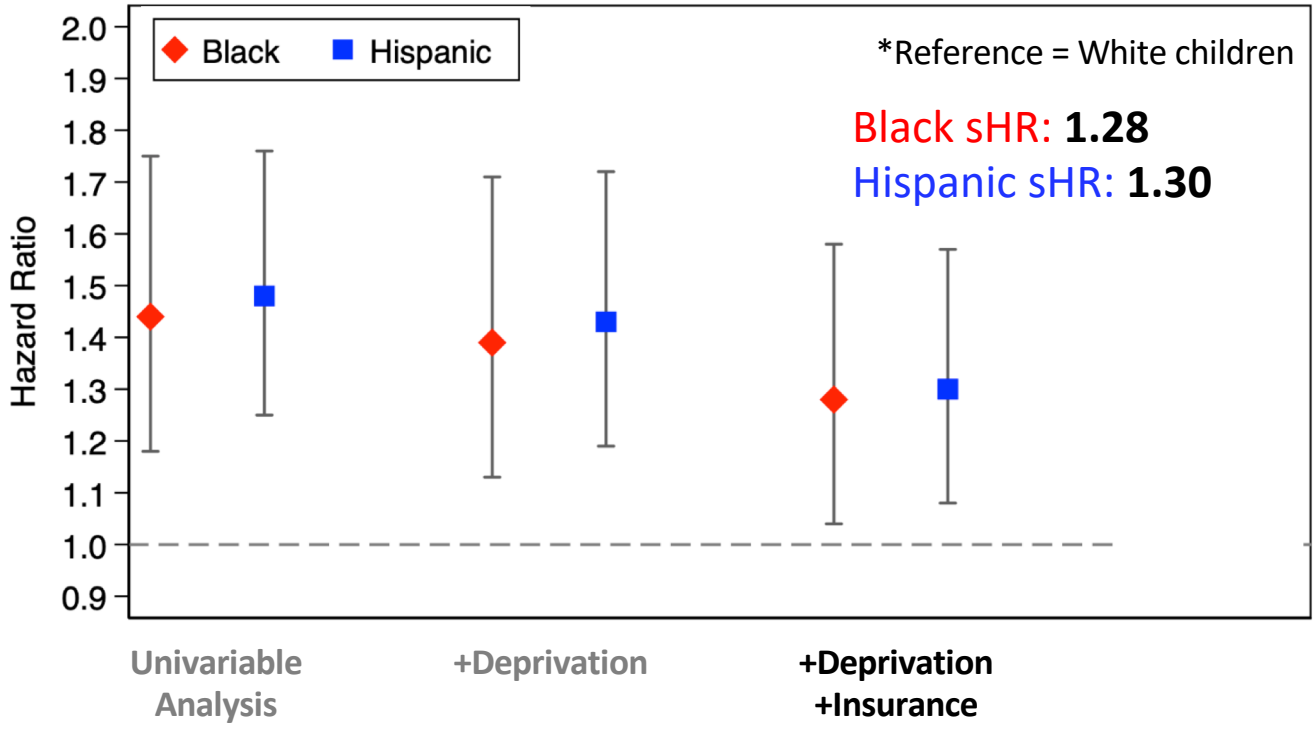

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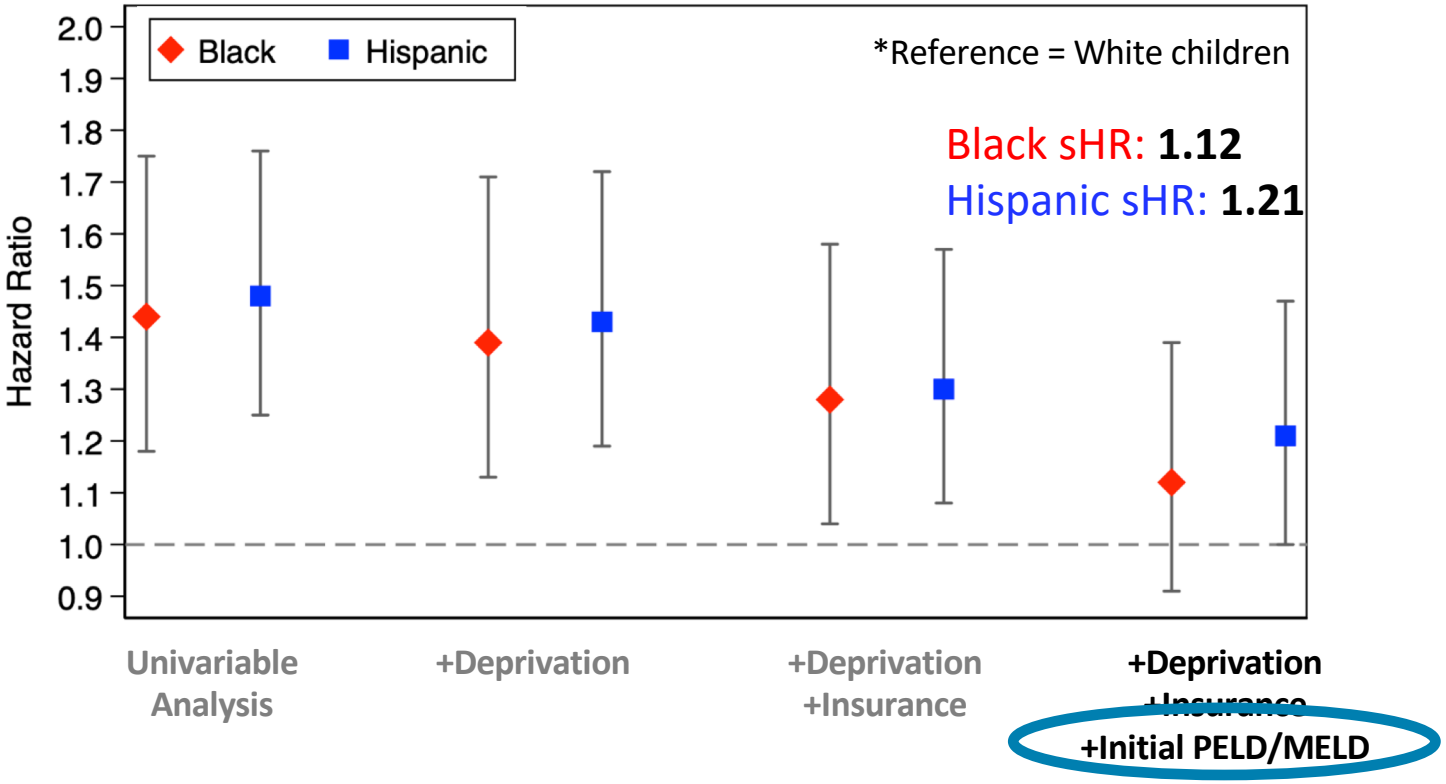
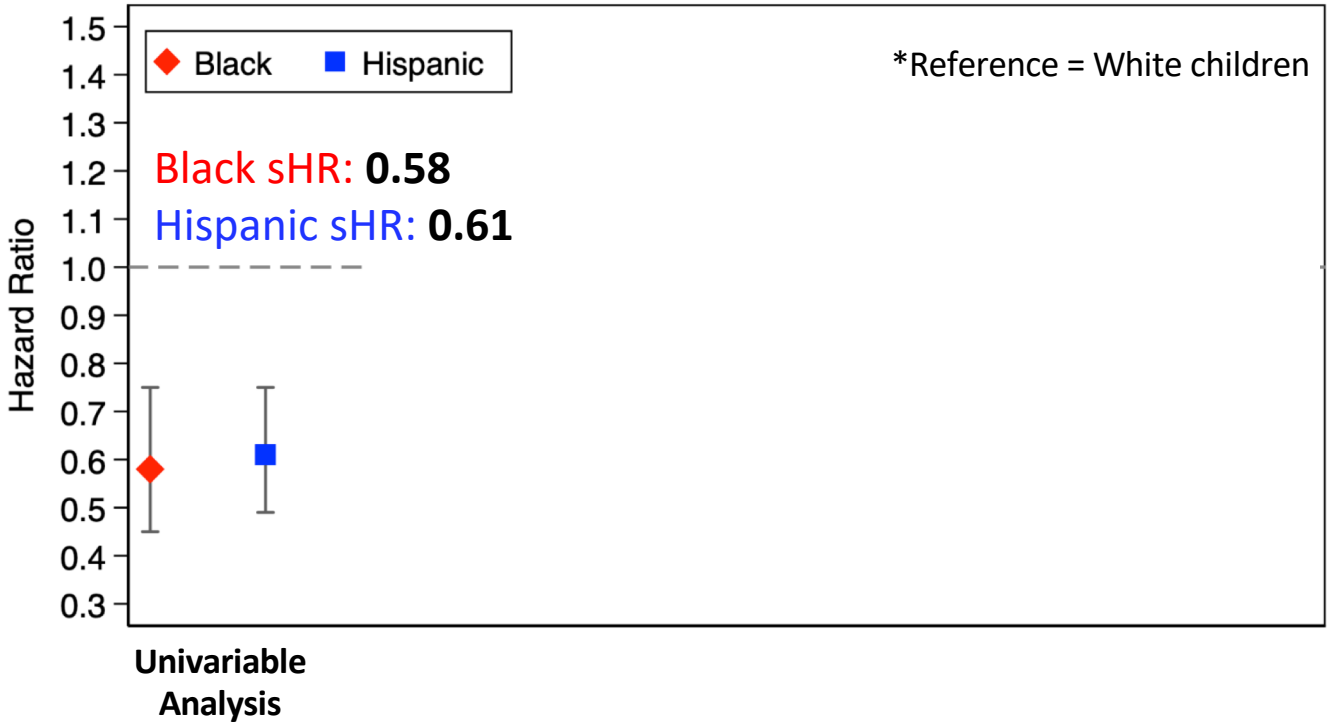


Living Donor Models



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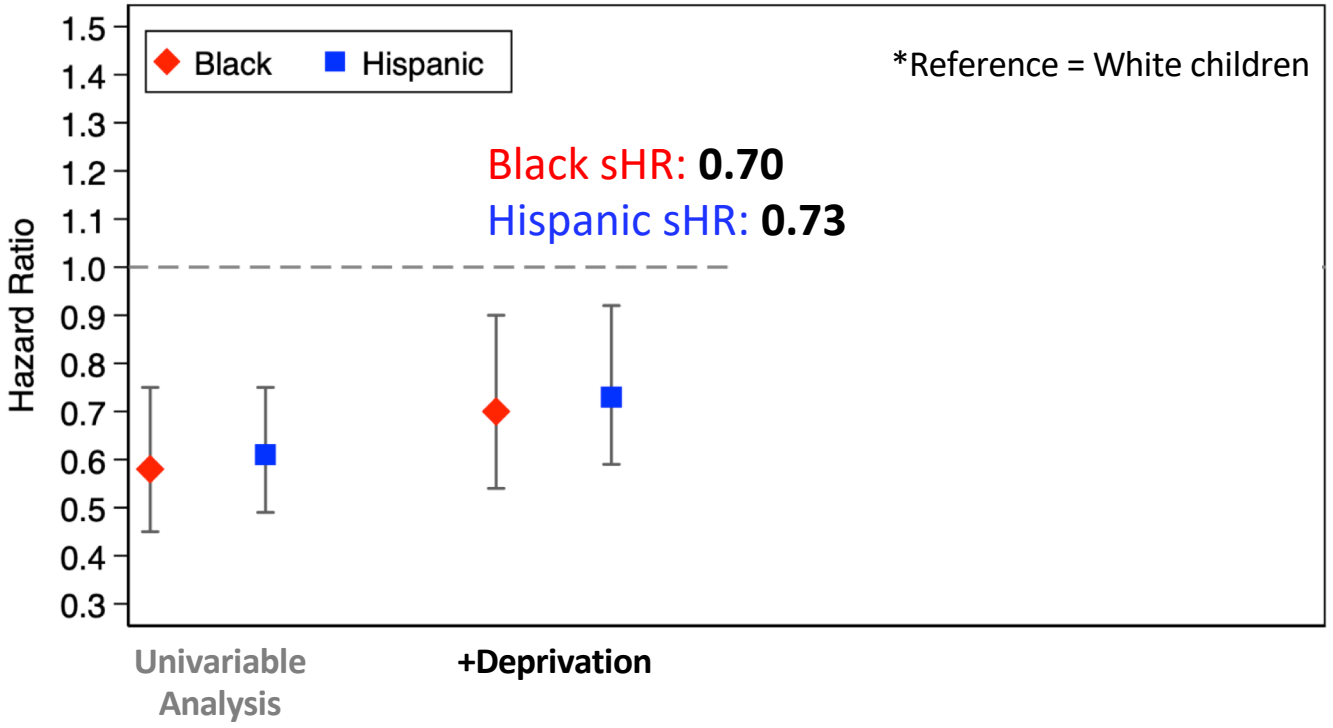

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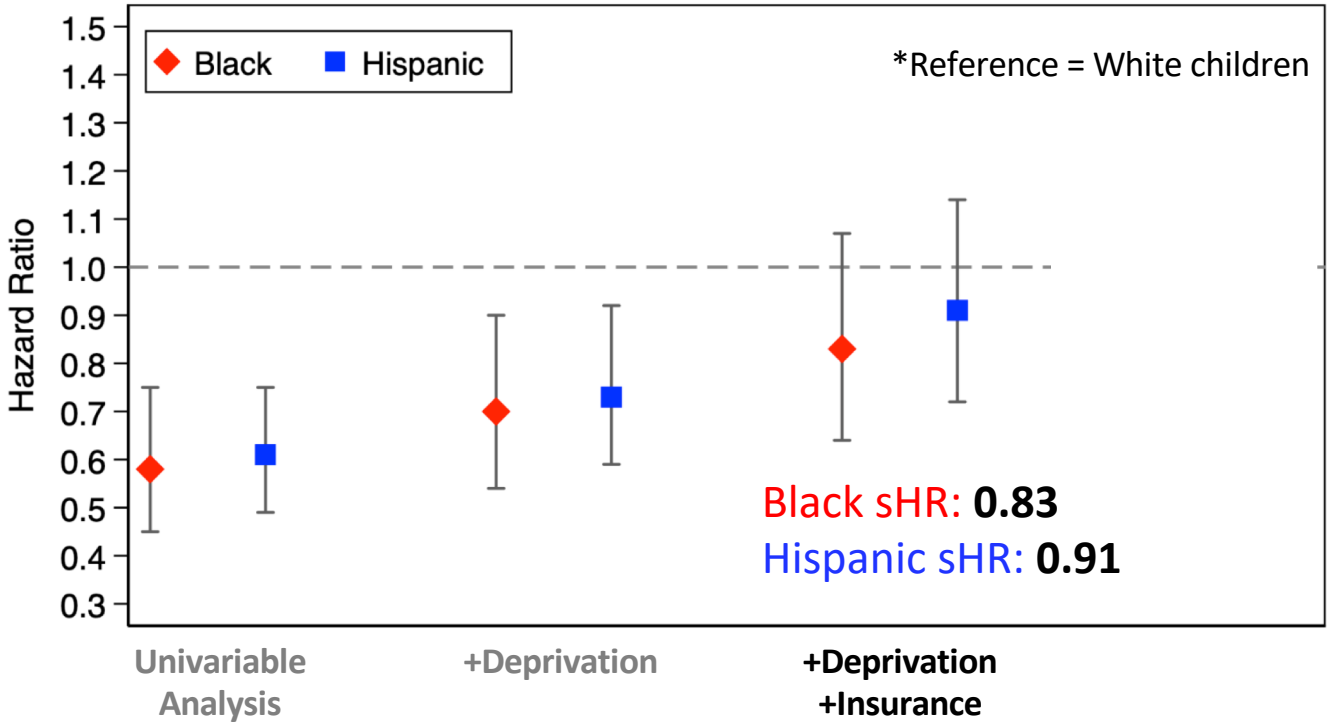

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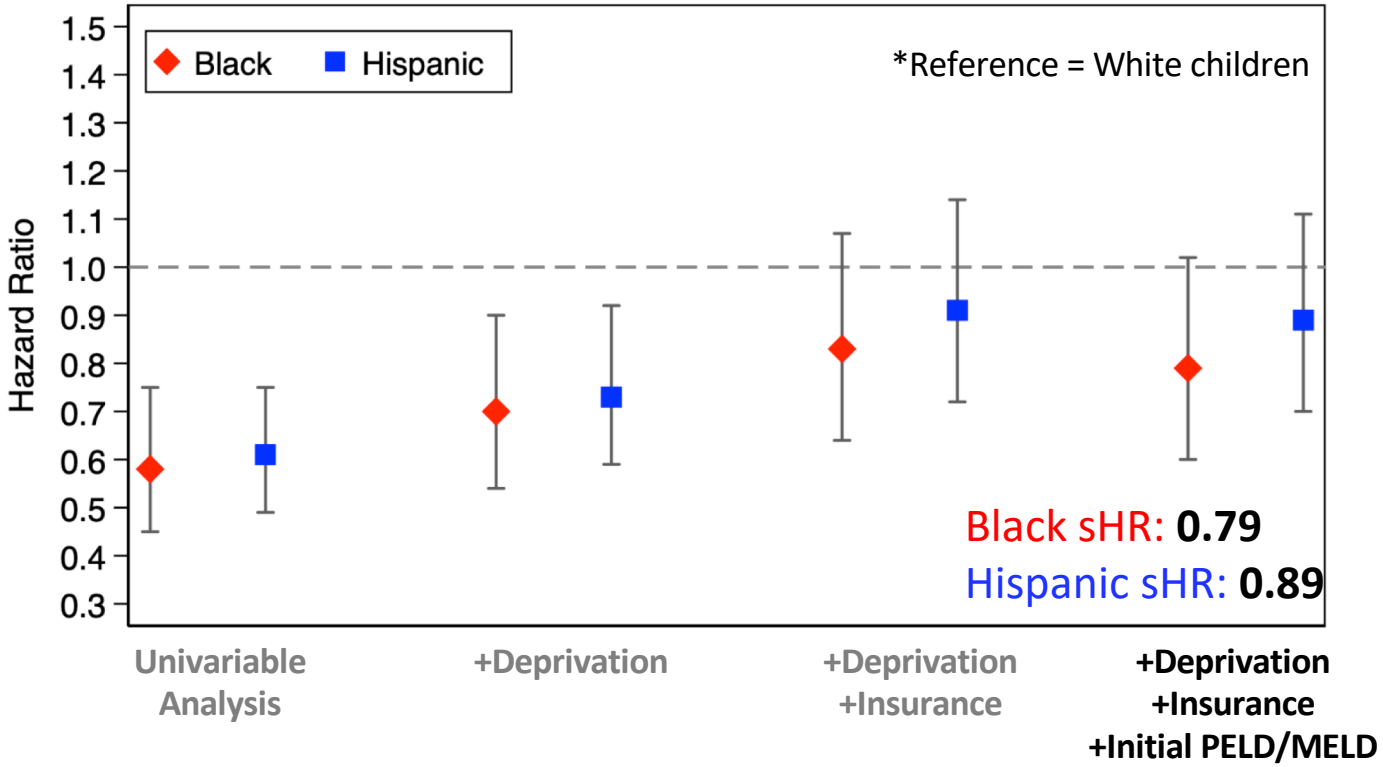
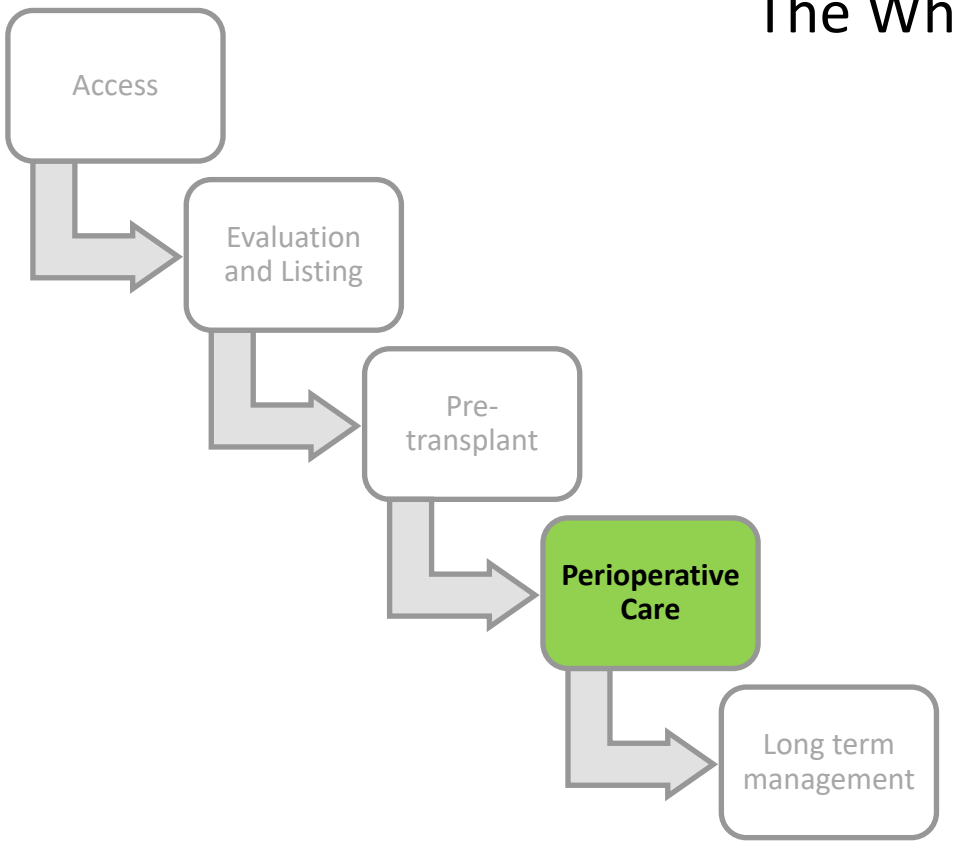


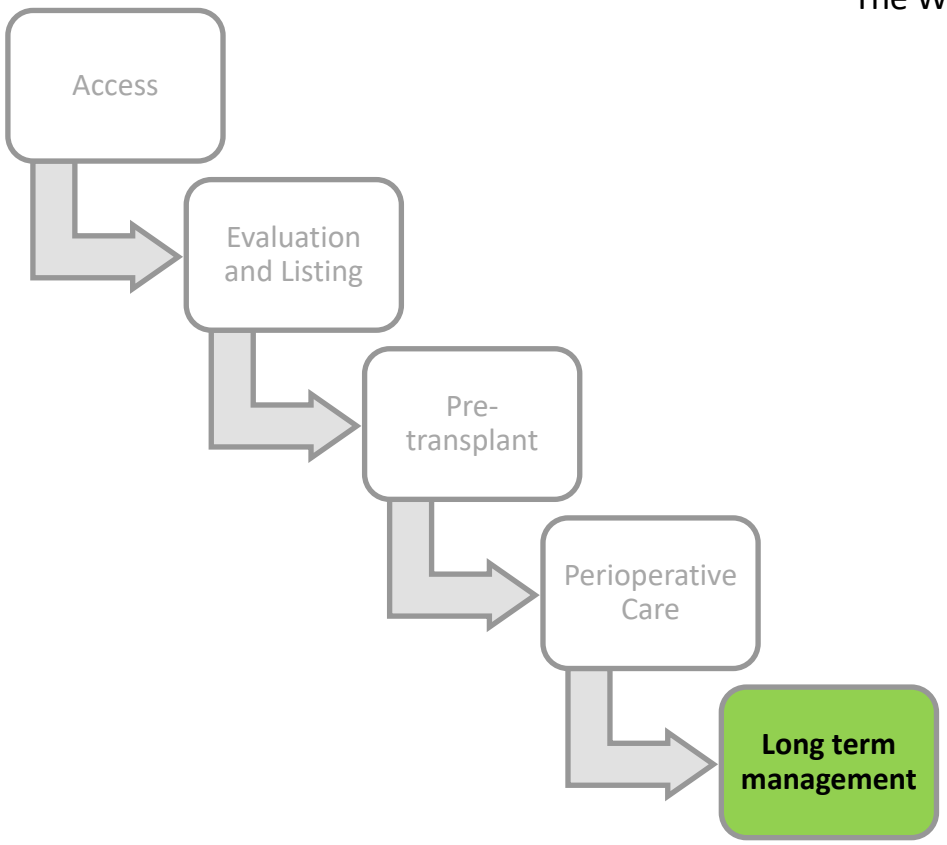
Path of the Patient

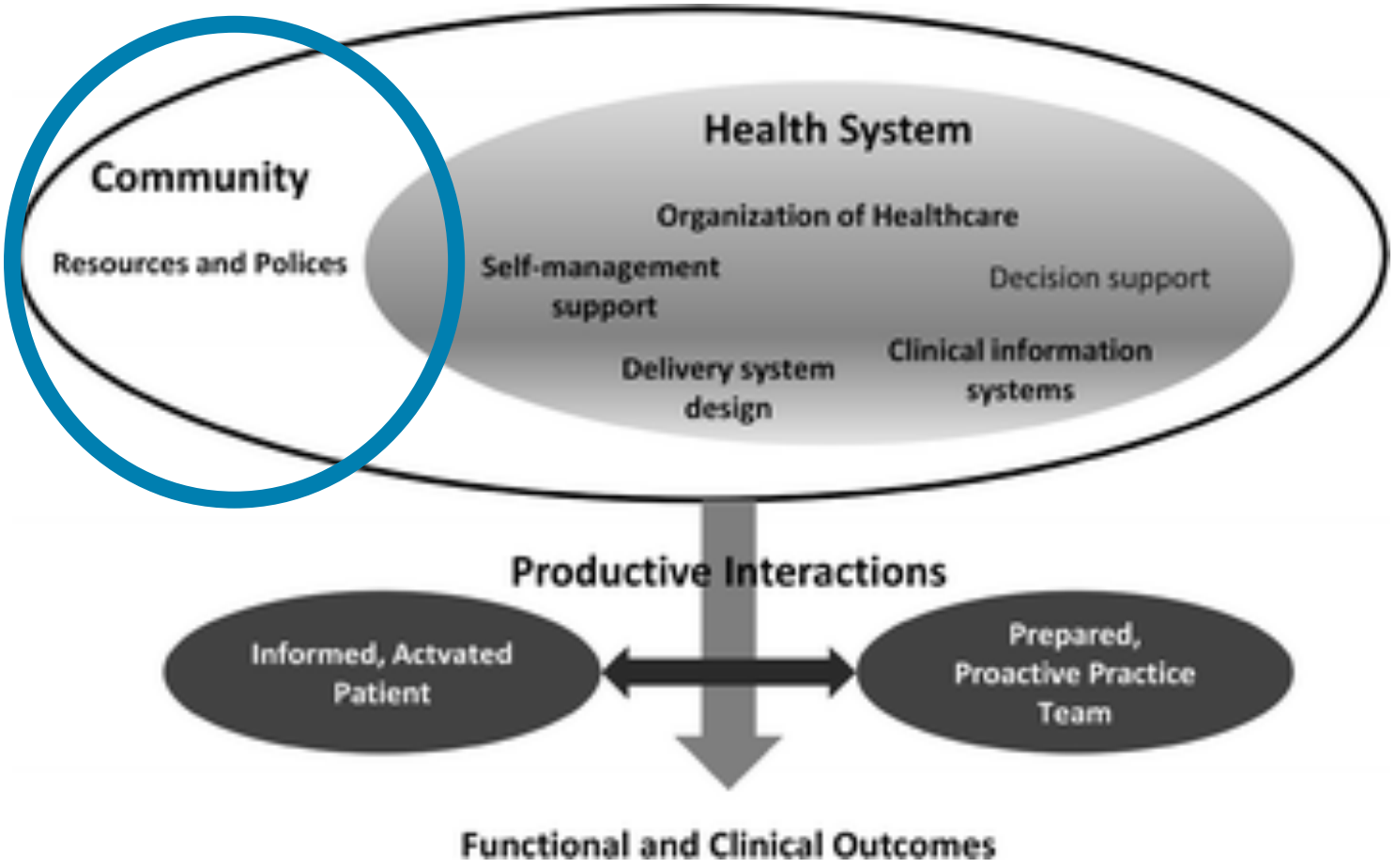
The Whole Game



Path of the Patient

The Whole Game




Community
Resources and Polices
Health System
Organization of Healthcare
Self-management support
Decision support
Delivery system design
Clinical information systems
Productive Interactions
Informed, Actvated Patient
Prepared, Proactive Practice Team
Functional and Clinical Outcomes

The association between neighborhood socioeconomic measures and a novel biomarker of nonadherence: Results from a multi-center cohort

Sharad Wadhwani, MD MPH[1]; John Bucuvalas, MD[2,3]; Cole Brokamp, PhD[1,4]; Ravinder Anand, PhD[5]; Ashutosh Gupta, PhD[5]; Stuart Taylor, MA[1]; Eyal Shemesh, MD[2,3]; Andrew Beck, MD MPH[1,4]

Aims and Methods

To determine if there is an association between an index of neighborhood deprivation and a validated biomarker of non-adherence

- Secondary analysis of MALT (NCT 01154075)
- Matched addresses to measures of neighborhood SES

Children's Hospital of Pittsburgh of UPMC
Mattel Children's Hospital UCLA
Ann & Robert H. Lurie Children's Hospital of Chicago
Icahn School of Medicine at Mount Sinai

Primary Outcome: Medication Level Variability Index (MLVI)

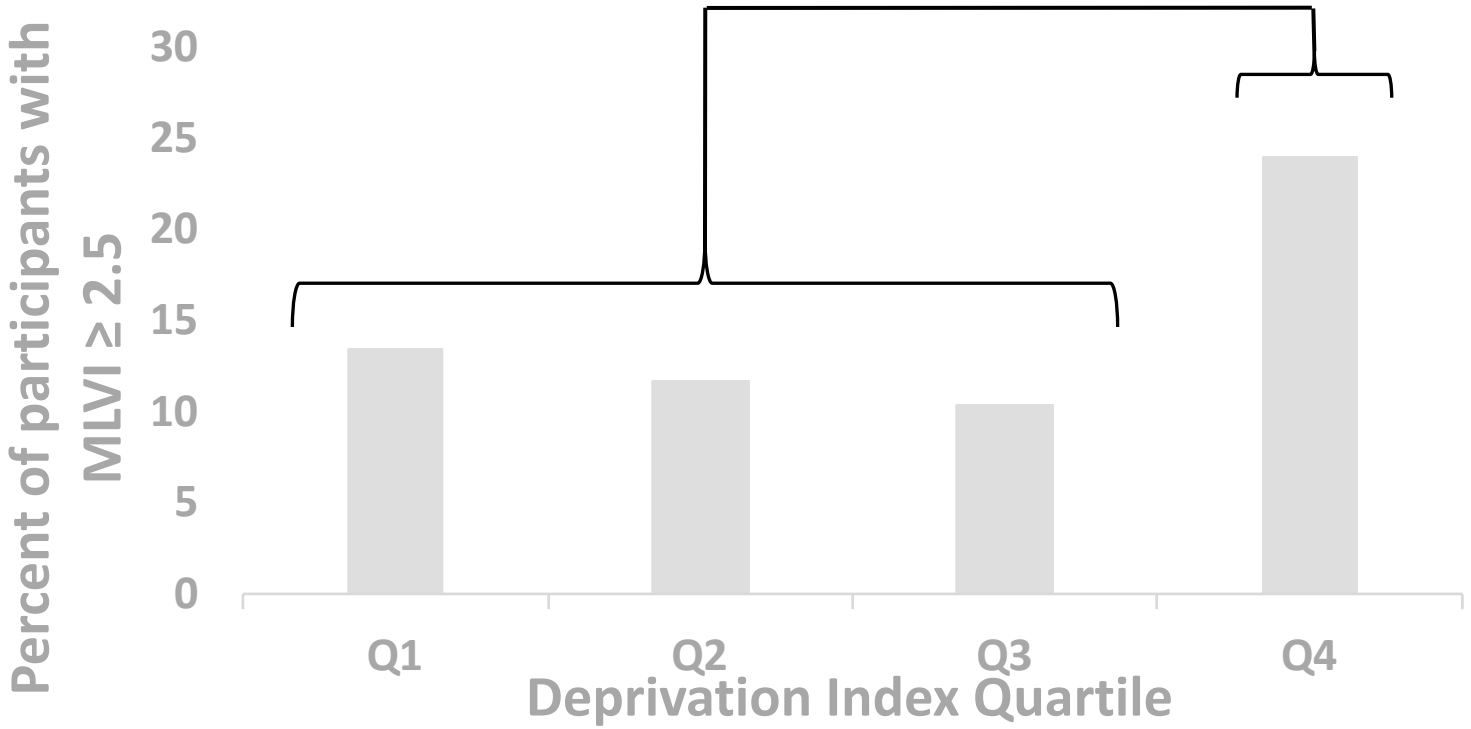
- Calculated as the standard deviation of at least 3 sequential tacrolimus trough levels
- Higher variability = worse adherence
- MLVI ≥ 2.5 can reliably predict late allograft rejection

Shemesh E, Bucuvalas JC, Anand R, et al. *Am J Transplant.* 2017.

The 271 participants were well distributed across demographic characteristics

Variable	N (%)	Variable	N (%)
Female	147 (52.0%)	Caregiver's Highest Educational Attainment	
Race		Some high school or less	29 (10.3%)
Asian	14 (5.0%)	High school degree/GED	61 (21.6%)
Black/African American	31 (11.0%)	Vocational school/some college	57 (20.1%)
White/Caucasian	203 (71.7%)	College degree	83 (29.3%)
Other	35 (12.4%)	Professional school	36 (12.7%)
Primary Insurance		Missing	17 (6.0%)
State funded	116 (41.0%)		
HMO/managed care	83 (29.3%)		
Private Insurance	68 (24.0%)		
Other	16 (5.7%)		

24% of participants from the highest quartile deprivation index were non-adherent compared to 12% in the remaining cohort (p = 0.018).



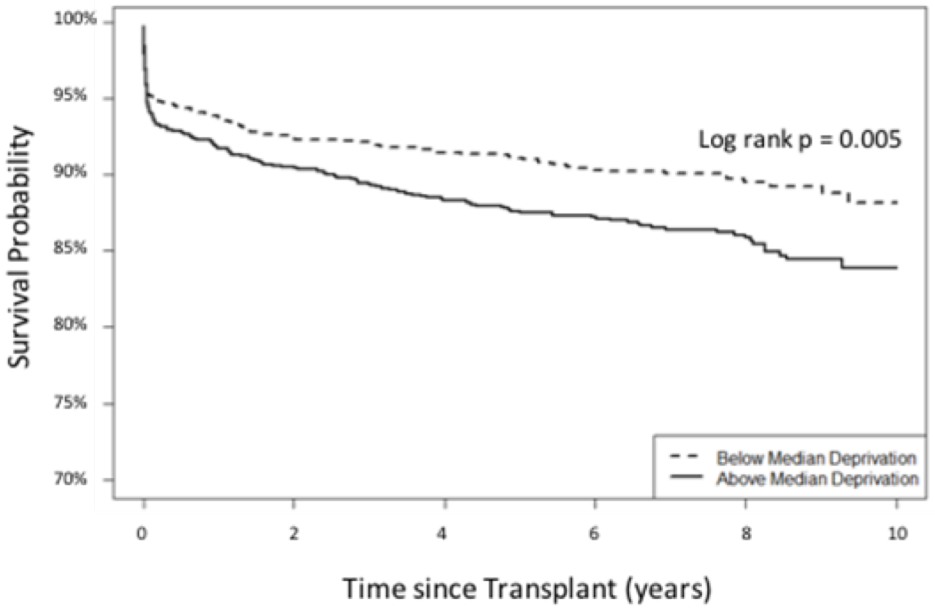
Black participants were 4.0 times more likely to be non-adherent after controlling for the effect of neighborhood deprivation

Logistic regression models			
	Variable	**Odds Ratio**	**95% CI**
Model 1	Deprivation Index	1.2	0.9 – 1.5
Model 2	Race		
	Black	4.2	1.8 - 10.6
	All other races		
Model 3	Deprivation index	1.1	0.8 - 1.4
	Race		
	Black race	4.0	1.7 - 9.6

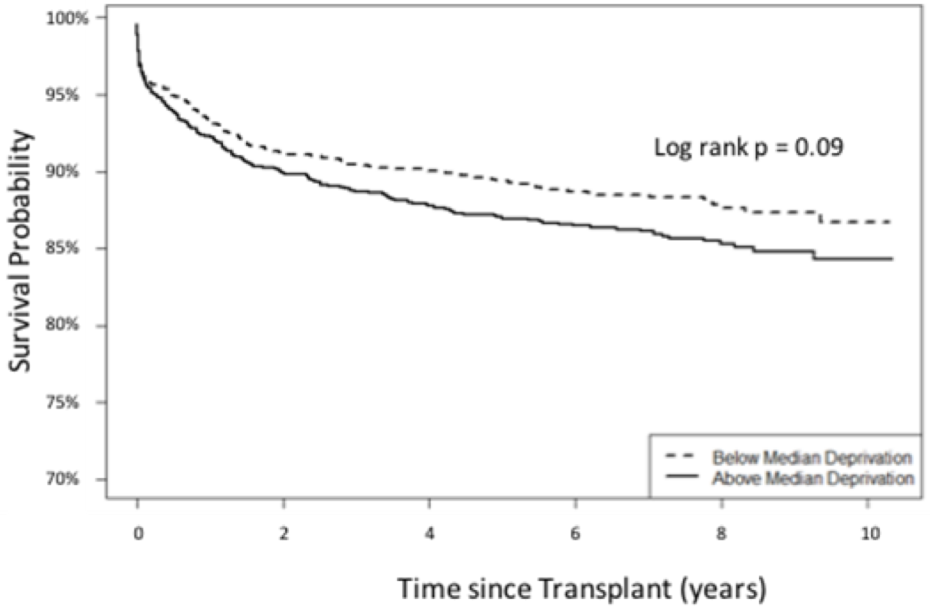
Participants classified as adherent or nonadherent based on MLVI cut-off of 2.5

Its not just adherence

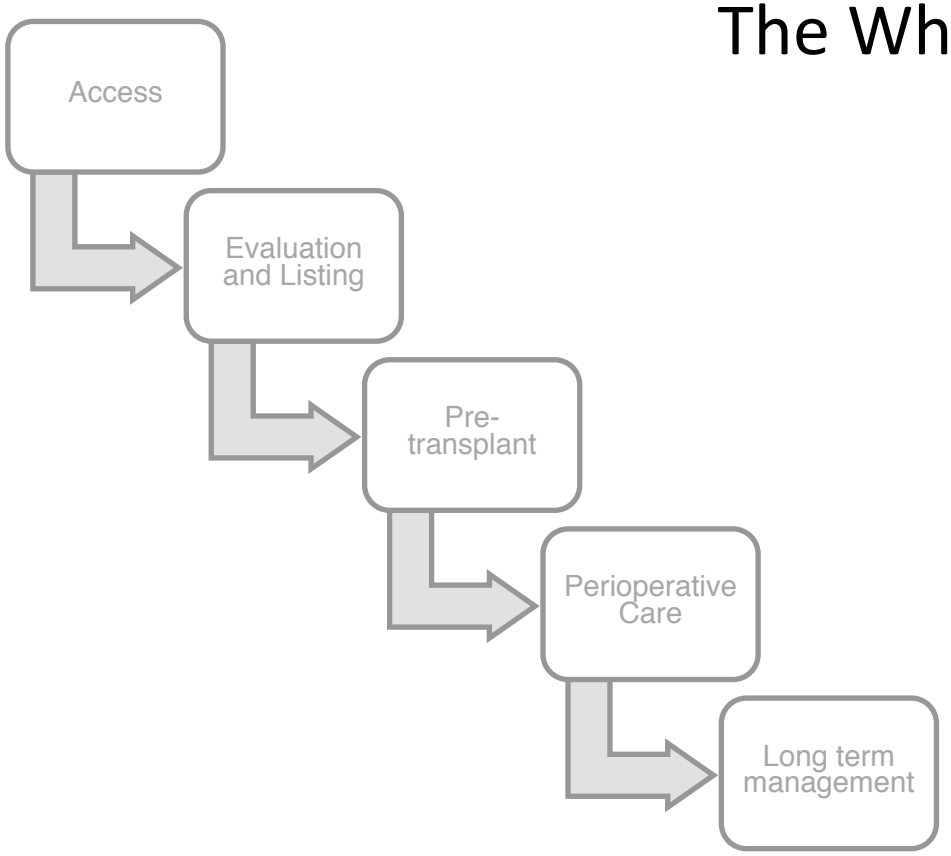
a. Graft survival for children above and below the median deprivation index



b. Patient survival for children above and below the median deprivation index



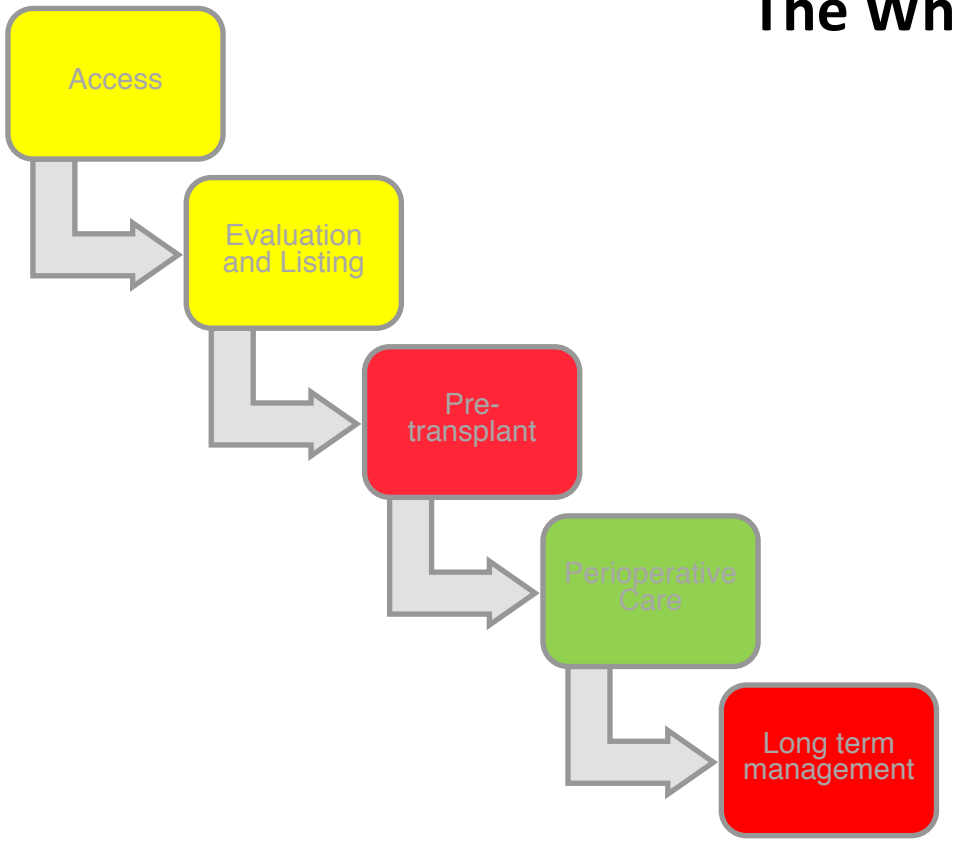
Path of the Patient



The Whole Game

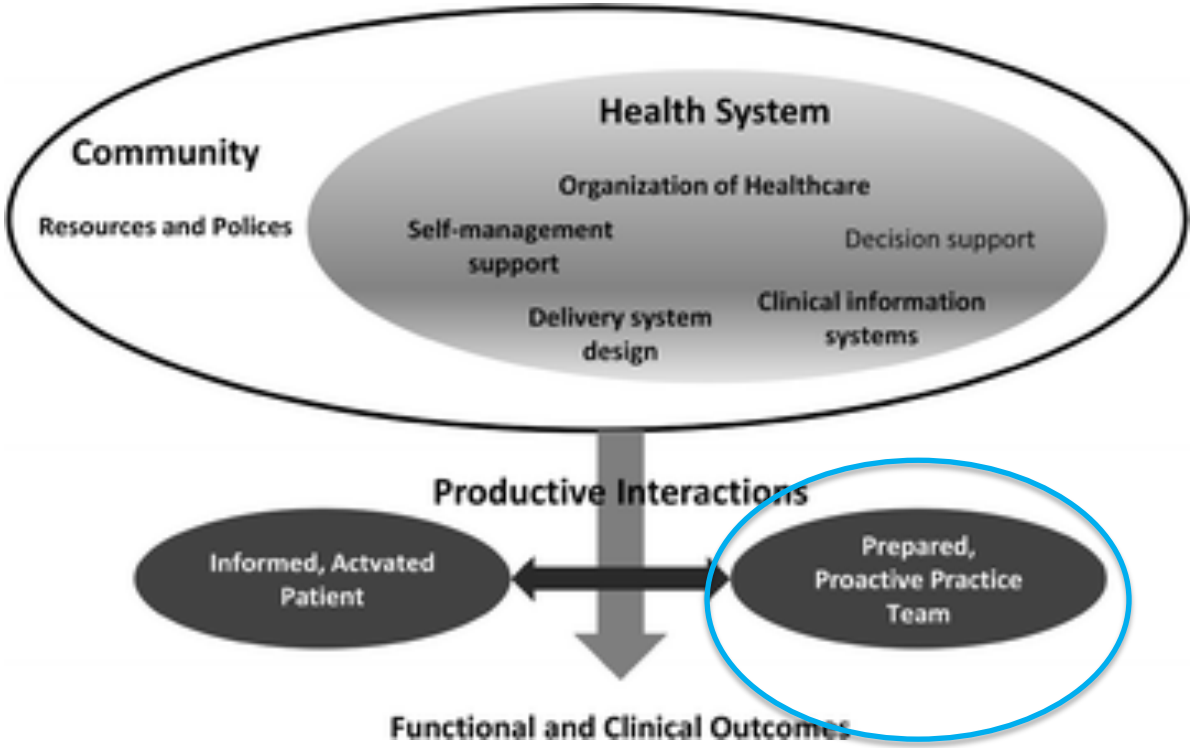
Path of the Patient

The Whole Game



Strategy

- Evidence-based interventions are sparse
- Future research
- Short-term interventions center around awareness



ATTENDANCE

TEXT “7517”

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