Transplant Update

New Kidney Allocation System

Transplant Referral Strategies

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Financial Disclosures

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Number of prevalent dialysis patients, number wait-listed and number of kidney transplants, 1996-2013
Percentage of dialysis patients wait-listed and unadjusted kidney transplant rates, 1996-2013

Percentage of patients on the kidney waiting list unadjusted transplant are for all dialysis patients.
OUTLINE

- History of allocation in US
- Inequities in prior allocation systems
- KAS
- KDPI
- EPTS
- KAS thus far
- Nephrology providers and KAS
  - Transplant Process: Referral/Listing/Evaluation
Kidney Allocation Timeline

• 1999 UNOS launched UNet secure internet based database for organ allocation
• 2000 OPTN final rule “for the equitable allocation of deceased donor organs among potential recipients”
• 2004 Kidney Allocation Review Subcommittee (KARS) began review of allocation issues
• 2008 HRSA disallowed proposal matching 1:1 age of recipient and donor
• 12/2014 Initiation of new Kidney Allocation System (KAS)
History II

• Prior to 2014 allocation algorithms based on point system:
  • Time on list
  • HLA match – priority zero mismatch
  • Panel Reactive Antibody (PRA) level some points
  • Local vs. Regional vs. National sharing

• Problems with that system:
  • Older recipients receiving younger kidneys & vice versa
    • Partially addressed with expanded donor list
  • Sensitized recipients disadvantaged
  • Minority patients disadvantaged
Kidney Allocation Policy: Balancing Utility and Equity

Utility
“Best use of organs”

Equity
“Equal access to transplants”
OPTN Board requests review of kidney allocation system

Public Forum, Dallas: -LYFT

RFI released: -KDPI -LYFT

Public Forum, St. Louis: -KDPI -LYFT -Modeling

Concept document released: EPTS, age matching, KDPI

December 2014: New allocation system is implemented

KARS public hearings and meetings with other OPTN Committees

EPTS age matching concept: alternative to, simpler than LYFT

HRSA to use age in EPTS, but age matching is too arbitrary

Comments: Revised EPTS point scale for highly sensitized patients

Board approves proposal
KAS

- Start Date: 12/4/2014
- Wait list time:
  - eGFR ≥ 20 or ESRD start date from 2728
- Sensitized pts ≥ 98% cPRA highest priority (ahead of zero mismatch)
- KDPI rather than dichotomous classification of expanded donors
KAS

- Increased transplant amongst:
  - Younger candidates
  - Hispanics
  - Blacks
  - Highly sensitized patients
  - Those on dialysis ≥ 5 years
  - Slight increase in B transplants

- Decreased transplants
  - KDPI >85%
KDRI / KDPI

- Replaced dichotomous expanded donor category
- **Kidney Donor Profile Index** (KDPI), a value from 0% to 100% estimating donor quality and predicting long-term graft survival
- KDPI is a function of the Kidney Donor Risk Index (KDRI) which predicts post-transplant graft survival and integrates donor age, height, weight, race, kidney function (creatinine), medical history (hypertension, diabetes, HCV status), mechanism of death, and donation status (DCD versus DBD)
Figure 1: Estimated Graft Half Lives (years)

- Living Donor: 12.48 years
- KDPI 0-20%: 11.44 years
- KDPI 21-85%: 8.90 years
- KDPI 86-100%: 5.60 years
Kidney allocation policy: Balancing utility and Equity

- Utility: "Best use of organs"
- Equity: "Equal access to transplants"
Proportion of discards among deceased donor kidneys offered for transplantation, pre- and post-KAS, stratified by KDPI range.

Allan B. Massie et al. JASN 2016;27:2495-2501
Distribution of recipient age minus donor age, pre- and post-KAS.

Allan B. Massie et al. JASN 2016;27:2495-2501
Estimated Post Transplant Survival (EPTS)

- EPTS Based on:
  - Candidate time on dialysis
  - Current diagnosis of diabetes
  - Prior solid organ transplant
  - Candidate age
Waiting Time

• Post transplant survival & wait-list mortality both negatively associated with longer time on dialysis
• Minority patients often not referred until late in their dialysis course
• Changed from listing date to ESRD start date
Blood Group Changes

- Previously Group B recipients had longer wait times due to fewer Group B donors
- A2 antigen is expressed at low levels generally and does not pose great risk for early antibody-mediated graft loss
- A2 donor kidneys (both A2 and A2B) can be transplanted into Group B recipients
- Analysis of the first 2 years of KAS increase in A2/A2B transplants has yet to be realized
High PRA Patient

- Restructuring kidney allocation has proven effective in increasing the transplant rate of highly sensitized patients.
- Compared to the year preceding the revised KAS, kidney transplantation for candidates with a cPRA of 99-100% increased from 2.4% to 13.4% during the first year of KAS.

Proportion of all DDKT recipients with CPRA=100% by month.

Allan B. Massie et al. JASN 2016;27:2495-2501
HLA mismatch before and after KAS

Downside

• Increase in cold ischemic time
• Increase in delayed graft function
• Increase in organ discard rate
KAS 3 years in...
Kidney sharing at local, regional and national levels
Pre & Post KAS

Pre-KAS (1 year)
- Local: 78.6%
- Regional: 12.6%
- National: 8.8%

Post-KAS (1 year)
- Local: 68.5%
- Regional: 18.8%
- National: 12.7%

Trends in kidney transplants in recipients with cPRA ≥ 99%
Increased CIT

- Increased distant sharing of high KDPI kidneys (>85%)
  - Distance increased 194 to 264 miles (37.6 % increase)
  - CIT increased by 6.7%

- Kidneys for high cPRA recipients (≥98%)
  - Distance increased 441 to 706 miles
  - CIT increased by 14.4%

- (+) Xmatch in high PRA txp --> prolong CIT
Distribution of waitlisting and kidney transplants before and after the new KAS by recipient race/ethnicity

BUT
KAS claims equity: time to reevaluate

• Fairness:
  – Priority to high PRA pts disadvantages 1st transplants
  – Living donors who develop ESRD should be 1st not 5th

• Utility:
  – High PRA recipients have decreased graft survival
  – Should include matching in algorithm for young recipients increase
Kidney allocation policy: Balancing utility and Equity

Utility
“Best use of organs”

Equity
“Equal access to transplants”
TRANSPLANT
REFERRAL
QUESTION

IS DECREASED RATE OF TRANSPLANT AMONGST MINORITIES DUE TO

? LACK OF REFERRAL ?

OR

? FAILURE TO COMPLETE WORKUP ?

OR

?DECREASED TRANSPLANT OF REFERRED PATIENTS?
Steps to Transplant

Discussion of Options

Referral for Transplant Evaluation

Completion of Transplant Evaluation

Wait-listing and/or Identification of Living Donor

Maintenance of Active Status on Waitlist

Transplantation
KAS and you

• KAS is expected to reduce racial disparities in kidney txp amongst waitlisted patients

• However, this depends on patients being listed

• Primary nephrology providers, dialysis unit medical directors and dialysis staff need to be aware of the listing and allocation changes
Transplantation Measures Included in Dialysis Facility Reports

- Waitlisting for Transplantation
- Transplantation Rate
- Standardized Transplantation Ratio
What Are Appropriate Referral Rates?

• Nationally about 23% of patients younger than 70 years of age in a dialysis facility are waitlisted

• 3.7% receive transplants annually

• Wide variation in wait-listing and transplantation

• Lower TXP rates in dialysis facilities with
  – For-profit status
  – Higher proportions of black patients & other minorities
  – Patients with limited access to health care
  – Fewer staff
State Level Variation in Wait-listing

Percent of Patients on the Kidney Transplant Waiting List* by State (2013)

*Lighter shades indicate more patients on the waitlist.

State specific values are reported in the Table of Key Statistics along with p-values indicating the level of statistical significance of the value compared to the 2013 national average of 24.5%.

2014 State Profile of ESRD Facilities
Produced by The University of Michigan Kidney Epidemiology and Cost Center
Referral Rates in Georgia

- Lowest transplantation rates in US
- Statewide collaboration among 308 Georgia dialysis facilities and three Georgia TXP centers
- Collected data on Dialysis Clinic TXP referral rates between 2005 and 2011
- Linked USRDS data on transplantation with data from dialysis and TXP facilities
- Limitations: did not capture referrals and TXP out of state

- Median within-facility % of incident ESRD patients referred to TXP center within 1 year 24% (IQ range 16-33%) ranged from 0-75%
- Facilities in the lowest tertile (<19.2%) more likely to:
  - Treat patients in high poverty neighborhoods
  - Have higher patient social work ratios
  - Be not for profit facilities
- 28% of incident ESRD pts referred to TXP center within 1 year
- 80% neither listed nor received a LD within 1 year

Patzer: JAMA 2015
Allocation System Changes for Equity in Kidney Transplantation Study: ASCENT

• Randomized controlled effectiveness-implementation study
• 600 U.S. dialysis facilities with low waitlisting in all 18 ESRD Networks
• Primary outcomes:
  – include change in waitlisting and waitlist disparity at 1 year
• Secondary outcomes:
  – changes in facility medical director knowledge about KAS
  – staff training regarding KAS
  – patient education regarding transplant
  – medical director's intent to refer patients for transplant evaluation

The Kidney Allocation System changed in December 2014, giving priority to patients with longer time on dialysis in efforts to improve equity and reduce racial disparities in kidney transplantation. Your dialysis facility had among the lowest percentage of patients on the kidney transplant waitlist (Fig. 1). In 2014, your facility had a lower percent of African American patients compared to white patients on the kidney transplant waitlist (Fig. 2). Your facility has a high number of patients, including African Americans, who have been on dialysis for ≥ 4 years (Fig. 3). Patients will now receive credit on the deceased donor kidney waitlist for time spent on dialysis. As a result, their wait time to receive a deceased donor kidney may be reduced.

How Is Your Facility Performing When Compared To Other Dialysis Facilities?

Your facility's waitlisting percentage is:

Your facility's waitlisting percentage is: **12.7%**

National Average = 23%

U.S. Dialysis Facilities, n= 6,498

Figure 1. Distribution of the Percent of Dialysis Patients Waitlisted for Kidney Transplantation at U.S. Dialysis Facilities, 2014

Figure 2. Percent of Dialysis Patients on the Waitlist by Race Across Geographic Areas, 2014

<table>
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<th>Facility</th>
<th>State</th>
<th>Network</th>
<th>National</th>
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<tbody>
<tr>
<td>% Overall</td>
<td>12.7</td>
<td>22.8</td>
<td>24.1</td>
<td>23</td>
</tr>
<tr>
<td>% White</td>
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<tr>
<td>% AA</td>
<td>11.1</td>
<td>28.1</td>
<td>25.5</td>
<td>25.1</td>
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</table>

Figure 3. Percent of Patients with ≥4 Years on Dialysis Across Geographic Areas by Race, 2014

<table>
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<th></th>
<th>Facility</th>
<th>State</th>
<th>Network</th>
<th>National</th>
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<tr>
<td>% Overall</td>
<td>38.9</td>
<td>42.4</td>
<td>39.1</td>
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<tr>
<td>% AA</td>
<td>61.1</td>
<td>42.7</td>
<td>41.2</td>
<td>43.1</td>
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Next Steps

- Continue educating all patients about the benefits of kidney transplant at least annually.
- Regularly review your dialysis population to determine their interest in kidney transplantation.
- Identify and refer patients who have been on dialysis for several years, as their years on dialysis will now count toward their transplant waiting time.
- Refer all appropriate patients for transplantation as early as possible.
- Follow all patients from transplant evaluation to waitlisting, and remember to notify the transplant center with any changes in patients' status that may affect their transplant candidacy.

For more information about transplant, contact the ASCENT (Allocation System Changes for Equity in Kidney Transplantation) Study staff at info@ascenttotransplant.org

Data source for figures was United States Renal Data System (USRDS), 2014.
Standardized Transplantation Referral Ratio (STReR) to Assess Clinical Performance of Transplant Referral among Dialysis Facilities

8,308 dialysis patients from 249 Georgia dialysis facilities

Referred to 3 Georgia kidney transplant centers, 2008-2012

STReR = \frac{\text{Actual Referral}}{\text{Expected Referral}}

<table>
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<tr>
<th>STReR</th>
<th>Description</th>
<th>Percentage</th>
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<tr>
<td>&gt; 1</td>
<td>Better than expected</td>
<td>12%</td>
</tr>
<tr>
<td>= 1</td>
<td>As expected</td>
<td>77%</td>
</tr>
<tr>
<td>&lt; 1</td>
<td>Worse than expected</td>
<td>11%</td>
</tr>
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Range: 0 - 4.87  Mean: 1.16  SD: 0.76

\( p < 0.01 \)

\( r = 0.46 \)
\( r = 0.35 \)
\( r = 0.20 \)

CONCLUSION The STReR is a dialysis-level quality metric to measure transplant referral.
Conclusion

• KAS has resulted in
  • Increased transplants amongst certain subgroups
    – Highly sensitized patients
    – Patients on dialysis for many years
  • Somewhat better age matching of donor and recipients
  • More shipped kidneys w/ long CIT, more discards
• Long term impact on graft survival yet to be determined
• Primary nephrology providers:
  – advocate for patient referral, completion of evaluation & listing!
QUESTIONS

???????