The Kidney Allocation System Changed in a Substantive Way on December 5, 2014

Your Patients Have Been, and Will Be, Affected by These Changes
The New Kidney Allocation System
Terms of Importance

- Pediatric
- Zero HLA Mismatch = 0 ABDR MM
- CPRA = Calculated Panel Reactive Antibody
  - 100%
  - 99%
  - 98%
- EPTS Score = Estimated Post Transplant Survival
  - Top 20
  - Bottom 80
- KDPI = Kidney Donor Profile Index
- KDRI = Kidney Donor Risk Index

**NOT in the Current System:**
- Expanded Criteria Donor (ECD)
- Standard Criteria Donor (SCD)
Overview of the New Kidney Allocation Policy

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The KDPI and KDRI
A Measure of Donor Quality Based on 10 Donor Characteristics

www.unos.org

Kidney Donor Risk Index (KDRI) and Profile Index (KDPI) Calculator
Version 1.2 (5/06/2011)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Input Fields</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Donor Age</td>
<td>years</td>
<td>PLEASE SELECT VALUE</td>
</tr>
<tr>
<td>Donor Height</td>
<td>ft in</td>
<td>PLEASE SELECT VALUE</td>
</tr>
<tr>
<td>Donor Weight</td>
<td>lbs kg</td>
<td>PLEASE SELECT VALUE</td>
</tr>
<tr>
<td>Donor Ethnicity/Race</td>
<td></td>
<td>PLEASE SELECT VALUE</td>
</tr>
<tr>
<td>Donor History of Hypertension</td>
<td></td>
<td>PLEASE SELECT VALUE</td>
</tr>
<tr>
<td>Donor History of Diabetes</td>
<td></td>
<td>PLEASE SELECT VALUE</td>
</tr>
<tr>
<td>Donor cause of death</td>
<td></td>
<td>PLEASE SELECT VALUE</td>
</tr>
<tr>
<td>Donor Serum Creatinine</td>
<td>mg/dl</td>
<td>PLEASE SELECT VALUE</td>
</tr>
<tr>
<td>Anti-HCV</td>
<td></td>
<td>PLEASE SELECT VALUE</td>
</tr>
<tr>
<td>Donor Meets DCD Criteria?</td>
<td></td>
<td>PLEASE SELECT VALUE</td>
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**The KDPI**
- Continuous variable 0-100%
- Lower number is better score, longer projected survival
- Factors not included:
  - Biopsy results
  - High risk behavior, substance abuse
  - Cold ischemia time
  - Donor management issues

**The KDRI**
- Relative risk of graft failure (Hazard Ratio)
- Values above 1 higher risk vs. Defined Median Donor

This donor’s risk is greater than [ ]% of all procured kidney donors*. 
Estimated risk of graft failure** is [ ] times that of an average (median) donor***.
Projected Kidney Allograft Survival vs. KDPI

Acceptable KDPI Range is Defined for Each Recipient Candidate by the Transplant Center

Acceptance of KDPI >85% Kidneys Requires Patient Informed Consent (Prior ECD Consents Accepted)
KDRI vs. ECD Designation

Figure 1: Distribution of Kidney Donors by ECD/non-ECD and KDRI


<table>
<thead>
<tr>
<th>KDRI</th>
<th>ECD</th>
<th>Non-ECD</th>
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<tbody>
<tr>
<td>0-0.75</td>
<td>100%</td>
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<tr>
<td>0.75-1.25</td>
<td>94%</td>
<td></td>
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<tr>
<td>1.25-1.50</td>
<td>48%</td>
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<tr>
<td>1.50-1.75</td>
<td>21%</td>
<td></td>
</tr>
<tr>
<td>1.75-2.0</td>
<td>6%</td>
<td></td>
</tr>
<tr>
<td>2.0-2.5</td>
<td>2%</td>
<td></td>
</tr>
<tr>
<td>2.5-3.0</td>
<td>0%</td>
<td></td>
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(ref. = median donor)

www.unos.org
Estimated Post-Transplant Survival (EPTS)
A Relative Measure of Expected Recipient Life Span

Attention: The EPTS % may change on a daily basis due to age and time on dialysis.

The EPTS Score

- Continuous Variable (0-100%)
- 1% score = anticipated life span longer than 99% of recipient candidates
- Pediatric patients (<18 yo) excluded from calculation
- Factors not included innumerable
- **Top 20 vs. Bottom 80 crucially important to patients**
  - Still binary with regard to allocation
  - e.g. 21% vs. 91% not important in allocation algorithm

Based on a reference population as of 09/30/2013, this candidate’s EPTS of 20% is in the national Top 20%, making them eligible for increased priority for kidneys from donors with KDPI in the Top 20%.
Figure 1: Kaplan-Meier Patient Survival Curves by EPTS Score
Deceased Donor, Adult, Solitary Kidney Transplants from 2003-2010
Based on OPTN data as of Feb 7, 2014
Bead Technology Has Improved Sensitivity and Specificity of HLA Antigen Testing

- Highly sensitive
- Limited false reactions due to non-HLA Ab
- Available as a qualitative screen or panel
- To determine PRA and specificity
- Can have interference from high dose IVIg
Pre-Transplant Antibody Testing

• Detect sensitization
• Identify target antigens
• cPRA – points (Unacceptable Ag)

Screen/ID

Final Crossmatch

Assess risk

Transplant ?

Courtesy of John Schmitz, PhD
Unacceptable Antigen Designation and Impact on CPRA
Number of Positive Crossmatches Reported as a Reason for Organ Refusal
Deceased Donor Kidney Match Runs Only

Allocation PRA/CPRA:
- Not Reported/0
- 1-20
- 79 - 21
- +80

UNOS Histocompatibility Committee Region 11 Update
OPO and Regional Sharing
Overview of the New Kidney Allocation Policy

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Time Waiting Remains Very Important
(Though Somewhat Less Than With the Previous KAS)

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Wait Time Accrual Starting Point

- **Adults** - Earlier of the following:
  - WL registration date and GFR or calculated Cr Cl < 20 ml/min
  - Date after WL registration when GFR or Cr Cl first reaches < 20 ml/min
  - Date of initiation of maintenance dialysis
- **Children (<18)** – Earlier of the following:
  - WL registration date (no clinical criteria)
  - Date of initiation of dialysis

Israni, et al. JASN 2014. 25:1842-1848
High CPRA Candidates Receive Huge Points

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Scale based inversely on the probability of receiving an organ offer

CPRA Sliding Scale (Allocation Points)

Scale based inversely on the probability of receiving an organ offer

New System

Old System

Organ Allocation and Blood Type

- A2 blood type less immunogenic
- B blood type waiting times are the longest
- Allocation as follows:
  - B to B, unless zero Ag MM
  - O to O, unless zero Ag MM
  - A1 to A
  - A1B to AB
  - A2 and A2B to B
    - Requires patient consent
    - Center must designate acceptable titer of antibody to A2
    - Must update every 90 days
    - Plasmapheresis must be available as needed after transplant
Exceptions Due to Medical Urgency

• Must be medically necessary
  » Dialysis not possible
  » No living donor option
• Requires agreement of all centers within OPO
• Single center OPO may be best option for this patient
### Impact of the New KAS on Specific Patient Groups

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<th>Positively Impacted</th>
<th>Negatively Impacted</th>
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<td>• Highly sensitized</td>
<td>• Unsensitized</td>
</tr>
<tr>
<td>• EPTS &lt;20%</td>
<td>• EPTS 21-100</td>
</tr>
<tr>
<td>» Younger adults</td>
<td>» Older but not old</td>
</tr>
<tr>
<td>» Non-diabetics</td>
<td>» Diabetics</td>
</tr>
<tr>
<td>• Patients with pre-listing dialysis time</td>
<td>• Patients listed prior to dialysis initiation</td>
</tr>
<tr>
<td>» Especially for those on dialysis many years</td>
<td>» Advantage still there vs. late listing</td>
</tr>
<tr>
<td>• B blood type</td>
<td>• Non-B blood type</td>
</tr>
<tr>
<td>» If patient consents and center accepts A2</td>
<td>» Advantage persists</td>
</tr>
<tr>
<td>• Adults</td>
<td>• Children</td>
</tr>
<tr>
<td></td>
<td>» Still have huge advantage</td>
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<td>» List before 18 if possible</td>
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Anticipated National Consequences of the New KAS

- **Longevity matching for top 20% of kidneys**
  - Reduced re-transplantation
  - Improved utility, reduced equity (age, diabetes)
- **Lower deceased donor discard rates**
  - No proof yet
  - >85% KDPI impact unknown
- **Anticipated gain in total years of graft function and patient survival for a given number of organs**
- **More transplants in sensitized patients**
  - Increased regional and national sharing of kidneys
  - Increase in average cold ischemia time
Anticipated National Consequences of the New KAS

- **Reduced penalty for late listing**
  - May increase referral of long-term dialysis patients

- **Reduced blood type disparity in time to transplant**
  - Less racial inequity

- **Possible impact on living donor transplant rate**
  - EPTS <20% patients may choose to wait for KDPI <20%
  - Older patients may be more likely to seek or accept a living donor

- **% of Inactive (Status 7) patients likely to decline**
A Rule Change in 2002 Led to A High Percentage of Inactive Patients in the Old Kidney Allocation System

- 3 status options established
  - Actively listed
  - Status 7 (inactive but listed) – time still accrues
  - Not listed (delisted or never listed)
- Delisting a listed patient = Loss of all waiting time prior to December 5, 2015
- Transplant centers acting as patient advocates left patients on the list even if:
  - Low (but not zero) likelihood of future transplant
  - Medically indicated observation periods (e.g. cancer diagnosis)
- Patient Impact
  - The Good: Accumulated waiting time
  - The Bad: Testing often continued to maintain listing status
    - Cost
    - Inconvenience
    - Procedural risks
Impact of a High Inactive % On Transplant Center Statistics and Behavior

• Inactive patients included in analyses of
  » Waiting time
  » Death on the wait list
  » Transplant rate
• True waiting time, transplant rates obscured
• Center comparison difficult
• Centers experienced negative impact
  » Regulatory concerns
  » Reimbursement and contracts impacted
The New KAS Offers Another Option for Some Patients
Proposal: The LIFT List

- Current KAS still has 3 status options – Active, Inactive, Not Listed
- The important change as of December 4, 2014
  » Delisting leads to loss of waiting time only if patients were listed prior to dialysis
- Proposal – A Fourth Listing Option for UNC = List at a Future Time (LIFT)
  » Applied to patients without pre-dialysis waiting time who would previously have been listed as inactive:
    • Includes currently listed and ready to be listed patients who are future potential candidates
  » Examples
    • Weight loss requirements to get BMI <40
    • Cancer waiting period
    • Active foot ulcers, infection
    • Establishing a post-transplant care plan, social support system
    • Drug abuse counseling
- The Risk
  • Cannot forget these patients
  • How will patients react to being delisted vs. being inactive?
Recommendations for Individual Patients

- Refer at eGFR 20 to 25 ml/min
- List CKD children prior to age 18 if they have a chance of future ESRD
- EPTS calculation for each patient
  - Counsel those <20% when they will cross the 20% line
  - Active status important when nearing EPTS 20%
- Counsel B blood type patients about A2, A2B donor option
- Counsel carefully anyone we delist that their waiting time since starting dialysis will not be lost
- High risk (diabetic, obese) and elderly patients (>65) must strongly consider living donor transplants
Age Distribution of Recipients

SRTR Data

U.S. Kidney Transplant, 1997-2004 Graft Survival Data (%)

U.S. Kidney Transplant, 1997-2004 Patient Survival Data (%)

1 Year Survival
3 Year Survival
5 Year Survival

< 1 Year | 1-5 Years | 6-10 Years | 11-17 Years | 18-34 Years | 35-49 Years | 50-64 Years | 65 +

< 1 Year | 1-5 Years | 6-10 Years | 11-17 Years | 18-34 Years | 35-49 Years | 50-64 Years | 65 +

1 Year Survival | 3 Year Survival | 5 Year Survival
Transplantation, Especially From a Living Donor, Offers Mortality Advantage for Patients >65 Years of Age

- USRDS 1995-2007
- >65 years of age
- Categorized by CV risk and donor type
- CHF, Ischemic Heart Disease, CVA, PAD used to define CV risk
- DM defined as high risk

Is It Possible to Risk Stratify the Older Kidney Recipient Candidate?

Measures of Frailty in the Elderly and the Likelihood of Post-Transplant Success
Cycle of Frailty

Measuring Frailty
The Fried Frailty Scale

- **Shrinking**
  - Unintentional weight loss of > 10 lbs. in last year
  - At f/u – loss of > 5% previous year’s body weight
- **Exhaustion**
  - Subjective interview scale
- **Strength**
  - Grip Strength
- **Low Activity**
  - Kcals per week expended
  - Men: < 383 Kcals per week frail
  - Women: < 270 Kcals per week frail
- **Low walking speed**
  - 15 feet in 6 or 7 seconds
Frailty Distribution and Outcomes Associations
The Johns Hopkins Experience (2008-2013)

Frailty Distribution at Time of Transplant

Patient Survival by Frailty Status