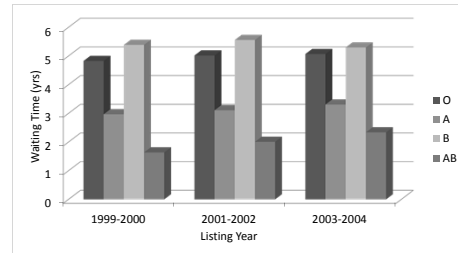


# The New Kidney Allocation System: More than Two Years Later, How's it Doing?

Linda Wright, DrNP, RN, CNN, CCTC  
Clinical Manager of Abdominal Organ Transplant  
Thomas Jefferson University Hospital

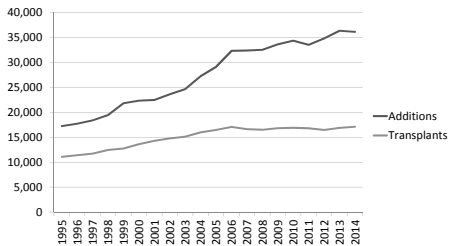


## Median Waiting Times by Blood Group



OPTN Data as of 9/4/2015

## Wait List Growth vs Transplants



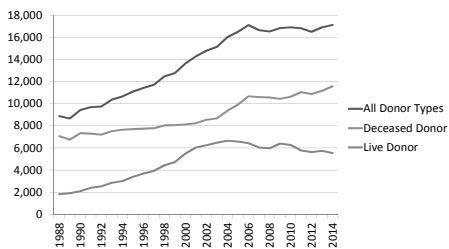
OPTN Data: Transplants 1/1/1988 – 12/31/2014

## HLA and PRA: Sensitization

- HLA: Human Leukocyte Antigen
  - Proteins on the surface of WBC and other tissues
  - Involved in immune system's defense against "invaders"
  - HLA antibodies can be formed with exposure to "non-self" HLA antigens
    - Blood transfusion
    - Pregnancy
    - Transplant
- PRA: Panel Reactive Antibody
  - Based on the presence of specific HLA antibodies
  - cPRA (Calculated PRA): Measure of sensitization
    - Estimate of likely cross-match incompatible donors

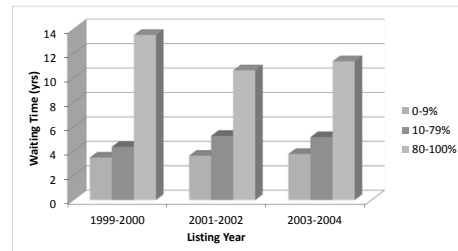
OPTN.transplant.hrsa.gov

## Kidney Transplants per Year



OPTN Data: Transplants 1/1/1988 – 12/31/2014

## Median Waiting Times by PRA



OPTN Data as of 9/4/2015

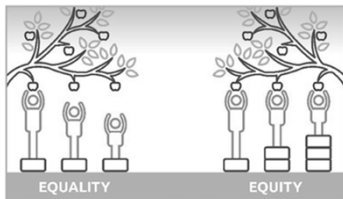
## UNOS: Vision Statement

...to promote long, healthy and productive lives for persons with organ failure by promoting maximized organ supply, effective and safe care, and equitable organ allocation and access to transplantation.

[unos.org/about/mission-values/](https://unos.org/about/mission-values/)

## Key Changes with New KAS

- Implementation of new donor and recipient scores
  - Improved longevity matching
- Credit for dialysis time
  - High dialysis mortality
  - Lack of timely referral for transplant
- Increased priority for biologically disadvantaged
  - Sensitized
  - Blood group B



[https://optn.transplant.hrsa.gov/media/2260/equity\\_in\\_access\\_report\\_201708.pdf](https://optn.transplant.hrsa.gov/media/2260/equity_in_access_report_201708.pdf)

## Key Changes with New KAS

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  - High dialysis mortality
  - Lack of timely referral for transplant
- Increased priority for biologically disadvantaged
  - Sensitized
  - Blood group B

## Key Goals of New KAS

- Increase benefit and utilization
  - Make better use of available kidneys
  - Increase transplant opportunities for hard to match patients
  - Increase fairness to patients who may have been referred late
  - Have minimal impact on most candidates

[OPTN.transplant.hrsa.gov](https://optn.transplant.hrsa.gov)

## Kidney Donor Profile Index

- KDPI
  - Uses clinical parameters and demographics to rate the quality of the donor kidneys relative to other donors
  - Estimates how long a deceased donor kidney is expected to function, compared to all of the kidneys recovered in the USA in the previous year
  - Lower value indicates better donor quality, and longer expected function
  - KDPI of 30% is expected to function longer than 70% of the kidneys recovered in the previous year

[OPTN.transplant.hrsa.gov](https://optn.transplant.hrsa.gov)

## Expanded Criteria Donors

Donor Condition	< 10 yrs	10-39 yrs	40-49 yrs	50-59 yrs	≥ 60 yrs
CVA + HTN + creat > 1.5mg/dL				X	X
CVA + HTN				X	X
CVA + creat > 1.5mg/dL				X	X
HTN + creat > 1.5mg/dL				X	X
CVA					X
HTN					X
Creat > 1.5mg/dL					X
None of the above					X

OPTN.transplant.hrsa.gov

## Longevity Matching

- Candidates with EPTS of  $\leq 20\%$  are given priority for donors with KDPI of  $\leq 20\%$ 
  - Higher priority for pediatric and high cPRA
- “A limited number of kidneys expected to function the very longest will be considered first for the candidates expected to need them for the longest amount of time.”

John Friedewald, MD  
Chairman, OTPN/UNOS Kidney Transplantation Committee

OPTN.transplant.hrsa.gov

## Kidney Donor Profile Index

- Benefits of KDPI over ECD/SCD Donor System
  - Uses 10 donor factors (ECD used 4)
    - Age, Height, Weight, Ethnicity, History/duration of HTN and/or DM, Cause of death, Serum creatinine, Hep C status, DCD status
  - Continuous “score” versus yes/no
  - Not all ECDs were created equal
    - Some ECD kidneys had good estimated quality
    - Some SCD kidneys had lower estimated quality

OPTN.transplant.hrsa.gov

## Key Changes with New KAS

- Implementation of new donor and recipient scores
  - Improved longevity matching
- Credit for dialysis time
  - High dialysis mortality
  - Lack of timely referral for transplant
- Increased priority for biologically disadvantaged
  - Sensitized
  - Blood group B

## Estimated Post-Transplant Survival

- EPTS
  - Clinical formula based on 4 medical factors
    - Age
    - History of diabetes
    - Previous organ transplant
    - Length of time on dialysis
  - Estimates how many years a specific waiting list candidate would be likely to benefit from a transplant
    - Lower EPTS percentage indicates likely longer survival
    - EPTS of 20% suggests that the candidate, when transplanted, will survive longer than 80% of other recipients

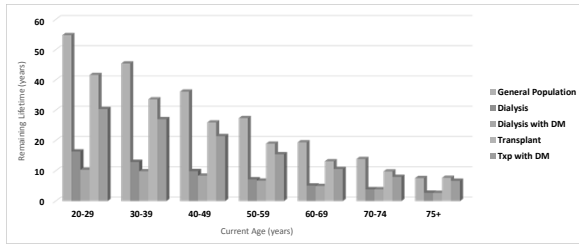
OPTN.transplant.hrsa.gov

## Credit for Dialysis Time

- Waiting Time Calculation
  - Old policy: Waiting time calculated based on:
    - Listing date, with measured/calculated CrCl/GFR of  $\leq 20$ ml/min
    - Date after listing when CrCl/GFR becomes  $\leq 20$ ml/min
    - Listing date, if candidate is on regular dialysis
  - New policy: Waiting time will be calculated based on “the earlier of the following”:
    - Listing date, with measured/calculated CrCl/GFR of  $\leq 20$ ml/min
    - Date after listing when CrCl/GFR becomes  $\leq 20$ ml/min
    - First date of “regularly administered” dialysis, even if that pre-dates the listing for transplant

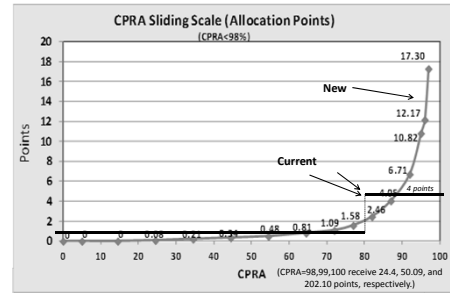
OPTN.transplant.hrsa.gov

## Expected Remaining Lifetime



USRDS 2016 Annual Report

## Sliding Scale Based on cPRA



UNOS/OPTN Kidney Transplantation Committee, Fall 2013 Update

## Key Changes with New KAS

- Implementation of new donor and recipient scores
  - Improved longevity matching
- Credit for dialysis time
  - High dialysis mortality
  - Lack of timely referral for transplant
- Increased priority for biologically disadvantaged
  - Sensitized
  - Blood group B

## Biologically Disadvantaged

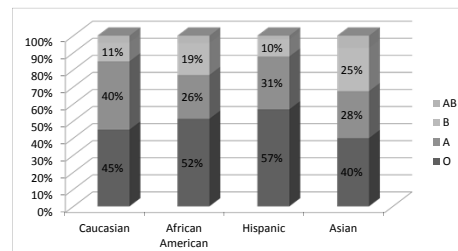
- Blood Group
  - Some B blood group candidates may be compatible with donors with certain sub-type of blood group A
  - New policy facilitates the use of these certain A donors for B recipients
  - Requires specific patient consent

OPTN.transplant.hrsa.gov

## Biologically Disadvantaged

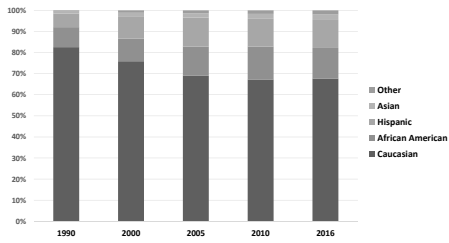
- Sensitization
  - Old policy: Gave priority to cPRA  $\geq$  80%
  - New policy: Sliding scale of additional priority based on degree of sensitization
    - Highest priority for cPRA  $\geq$  98%

## Blood Groups in the US Population



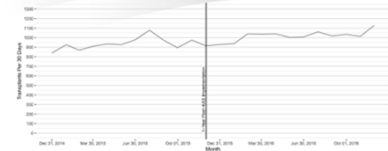
American Red Cross

## Deceased Donors by Race



Based on OPTN Data 9/28/2017

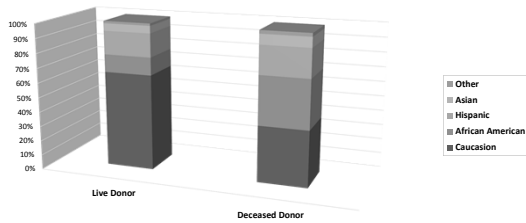
## Solitary Deceased Donor Transplants Under KAS



Transplants increased 9.1% post-KAS, from 11,302 Post-KAS Year 1 to 12,433 Post-KAS Year 2, though the rise in transplants cannot be entirely attributed to KAS.

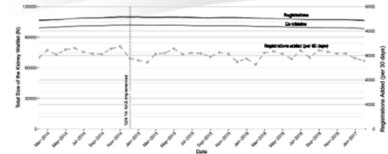
OPTN | UNOS

## Recipient Race by Donor Types: 2016



Based on OPTN Data as of 10/12/2017

## Trends in the Kidney Waiting List



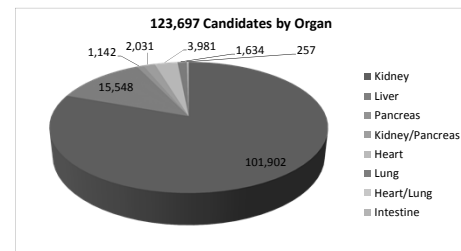
The size of the kidney waiting list is already steadily decreasing, less than 1% new kidney registrations were added post-KAS Year 2 vs. Year 1.

OPTN | UNOS

## Trends Under the New KAS

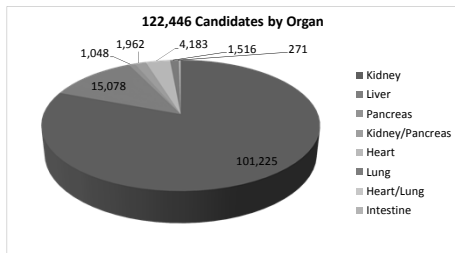
- Waitlist
- Transplants
  - Recipient age
  - A2/A2B to B
  - Highly sensitized
  - Dialysis vintage
- Organ utilization
  - Discard rates
- Outcomes
  - Patient survival
  - Graft survival

## Transplant Waiting List: 11/30/2014



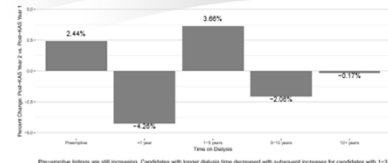
OPTN Data 10/16/2015

### Transplant Waiting List: 10/16/2015



OPTN Data 10/16/2015

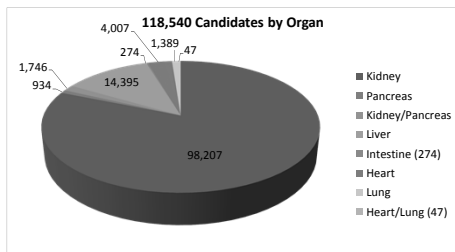
### Changes in Dialysis Listing Patterns, Post-KAS



Pre-emptive listings are still increasing. Candidates with longer dialysis time decreased with subsequent increases for candidates with 1-3 years.

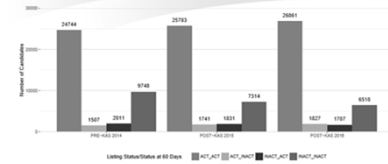
OPTN | UNOS

### Transplant Waiting List: 3/4/2017



OPTN Data 3/4/2017

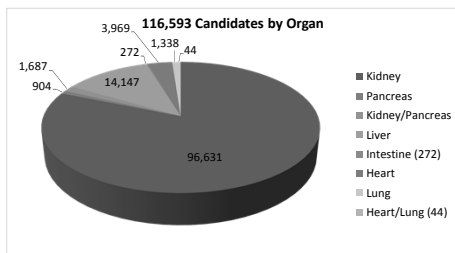
### Switching Status Within 60 Days of Listing



The number and percent of candidates listed as active and remaining active at 60 days post-listing has been increasing.

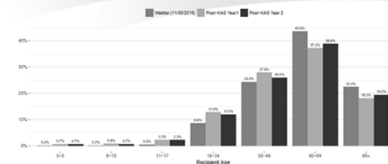
OPTN | UNOS

### Transplant Waiting List: 9/30/2017



OPTN Data as of 9/30/2017

### Deceased Donor Transplants by Recipient Age



The percent of transplants to younger candidates (15-49) decreased slightly, and transplants to 50+ candidates increased slightly.

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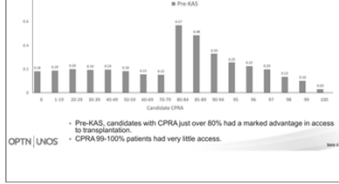
### A2/A2B Subtype to Blood Type B Recipients

KAS Year	# A2/A2B to B Transplants	% of Transplants
Pre-KAS	19	0.2%
Post-KAS Year 1	109	1.0%
Post-KAS Year 2	168	1.4%

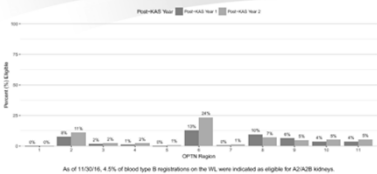
A2A2B to B transplants continue to slowly increase under KAS.

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### Transplant rates (per active patient-year) by candidate cPRA

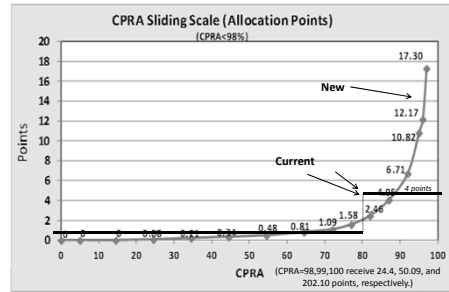


### A2/A2B Waiting List Eligibility by OPTN Region



OPTN | UNOS

### Sliding Scale Based on cPRA



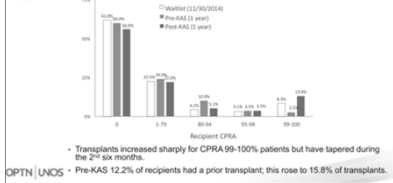
OPTN | UNOS

### Public Comment Proposal Guidance for Transplant Program Participation in the Transplantation non-A1/non-A1B (A2/A2B) Donor Kidneys into Blood Group B Candidates

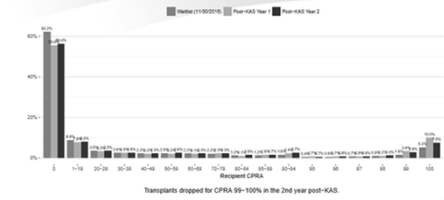
Contents

- 1. Background
- 2. Rationale
- 3. Objectives
- 4. Key Messages
- 5. Summary of Key Messages
- 6. Key Messages
- 7. Summary of Key Messages
- 8. Summary of Key Messages
- 9. Summary of Key Messages
- 10. Summary of Key Messages
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### Who's getting transplanted under KAS?

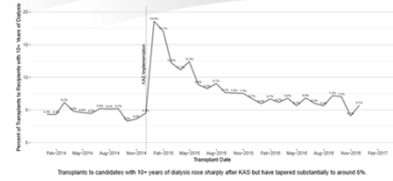


### Deceased Donor Transplants by Recipient CPRA



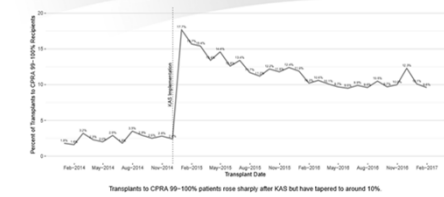
OPTN | UNOS

### High Dialysis Time Recipient "Bolus Effect"



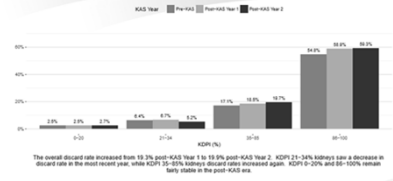
OPTN | UNOS

### CPRA 99-100% Recipient "Bolus Effect"



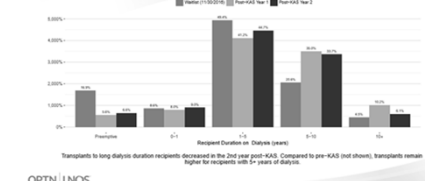
OPTN | UNOS

### Kidney Discard Rate by KDPI



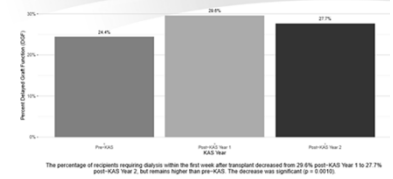
OPTN | UNOS

### Deceased Donor Transplants by Recipient Duration on Dialysis



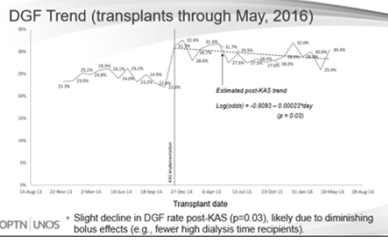
OPTN | UNOS

### Delayed Graft Function (DGF) Rates



OPTN | UNOS





## Access to Transplant

- Access to Transplant Score
  - A numerical measure that quantifies the variability in expected waiting times for deceased donor transplant for candidates on the transplant list

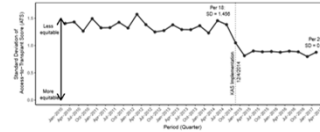
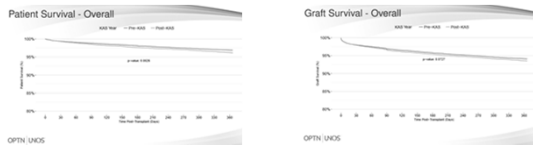


Figure 1: Tracking Variability in Access-to-Transplant Score (ATS) Among Waitlisted Kidney Candidates by Quarter (Jan 2010 - Mar 2017)

OPTN: Report on Equity in Access



OPTN | UNOS

OPTN | UNOS

## Characteristics Most Associated with Disparity in Access to Transplantation

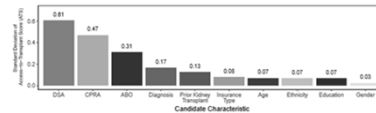


Figure 5: Variability in Access-to-Transplant Score (ATS) by Candidate Characteristics, "All Else Equal" Post-KAS, 2017 Q1

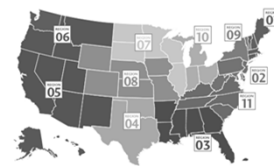
OPTN: Report on Equity in Access

## Survival

- Decreased slightly but remain high
- Affected by multiple factors
  - Recipient age
  - Organ preservation time (cold ischemia time)
  - Recipient sensitivity
  - Recipient dialysis vintage
- Highly sensitized and longer-term dialysis patients were transplanted with the implementation of the KAS
  - Bolus effects may affect patient and graft survival

OPTN.transplant.hrsa.gov

## UNOS REGIONAL MAP



unos.org/transplantation/matching-organs/regions

**Region 2 Profile**

Donors versus Organs Donated in 2016		
Programs	Donors	Organs
All Donors	2,099	5,298
Kidney	1,880	3,023
Liver	1,172	1,172
Heart	369	369
Pancreas	148	148
Lung	302	373
Intestine	13	13

Based on OPTN data as of 10/15/2017

Organ registrations on waitlist as of 10/15/2017	
Programs	Counts
All Organs	17,061
Kidney	13,830
Liver	2,054
Pancreas	139
Kidney / Pancreas	201
Heart	409
Lung	284
Heart / Lung	4
Intestine	140

Based on OPTN data as of 10/15/2017

## References

- Organ Procurement and Transplantation Network (OPTN)  
<https://optn.transplant.hrsa.gov>
- United Network for Organ Sharing (UNOS)  
<https://www.unos.org>
- United States Renal Data System (USRDS)  
<https://www.usrds.org>

Region 2 Profile			Region 9 Profile		
Donors versus Organs Donated in 2016			Donors versus Organs Donated in 2016		
Programs	Donors	Organs	Programs	Donors	Organs
All Donors	2,099	5,298	All Donors	965	1,908
Kidney	1,880	3,023	Kidney	879	1,238
Liver	1,172	1,172	Liver	372	372
Heart	369	369	Heart	122	122
Pancreas	148	148	Pancreas	49	49
Lung	302	373	Lung	58	104
Intestine	13	13	Intestine	3	3

Based on OPTN data as of 10/15/2017

Organ registrations on waitlist as of 10/15/2017		Organ registrations on waitlist as of 10/15/2017	
Programs	Counts	Programs	Counts
All Organs	17,061	All Organs	9,239
Kidney	13,830	Kidney	7,997
Liver	2,054	Liver	1,308
Pancreas	139	Pancreas	173
Kidney / Pancreas	201	Kidney / Pancreas	145
Heart	409	Heart	339
Lung	284	Lung	63
Heart / Lung	4	Heart / Lung	14
Intestine	140	Intestine	14

Based on OPTN data as of 10/15/2017

- ## KAS 2 Years Later:
- Deceased donor kidney transplants increased 9.1%
  - Longevity matching performing as expected
    - More than half of adult recipients with EPTS <20% received kidneys from a donor with KDPI <20%
  - Significant bolus effects occurred for candidates who received priority under the new KAS
    - Transplant rates have declined as fewer candidates are left on the list
    - Transplant rates remain higher than pre-KAS
  - Discard rates are slightly higher, but are largely linked to KDPI scores
    - <3% of kidneys with <20% KDPI are discarded
    - 60% of kidneys with >85% KDPI are discarded
  - Survival rates have decreased slightly, but remain high
- optn.transplant.hrsa.gov/news/two-year-analysis-shows-effects-of-kidney-allocation-system