WESTERN CAPE RENAL TRANSPLANT ALLOCATION

Peter Nourse
RCWMCH

Previously

- Paper based

- No transparency

- Accountability

- No uniformity in allocation process

- Sensitization not taken into account in points or allocation

- Little benefit for children

Costs

- Approached international company

    ➡️ 80 million rand

- Leon van Niekerk Programmer from old mutual
- Peter Nourse
- Zunaid Barday (GSH)
- James Banks (Tissue typing)

View ALL Blood groups where Status = Waiting list or Suspended - Ordered by Total waiting points Ascending

Quick search 🔍   ⚙ Export ▾ | Advanced Search   Back

	Transplant Region	Hospital	State Or Private	First Name ⇕	Last Name	Listing Date	Blood Group	Age	Hiv Status	Gender	Race	Status	Date Suspended	Medical Urgency	Total Points	Pl
✎	WC	GSH	State	Zoleka	Falakhe	10/13/2005	O	42	NEG	Female	B	Waiting list		Yes	66.894	Ik
✎	WC	RCCH	State	Rijk	Vermeulen	08/31/2006	O	10	NEG	Male	W	Waiting list		Yes	62.947	No
✎	WC	GPH	State	Christel	April	10/26/2010	B	38				Waiting list		Yes	58.767	Al Ve
✎	WC	GSH	State	Juliet	Mdutyulwa	09/13/2012	A	50	NEG	Female	B	Waiting list		Yes	58.071	Ik
✎	WC	GSH	State	Mark	Joseph	03/26/2013	O	47	NEG	Male	C	Waiting list		Yes	55.328	Ni
✎	WC	GSH	State	Zikhona	Gungqwa	04/26/2012	B	24	NEG	Female	B	Waiting list		Yes	55.221	Ik
✎	WC	GSH	State	Viggo	Hebin	08/07/1984	O	45	NEG	Male	C	Waiting list		No	36.362	Ni
✎	WC	TBH	State	CARMEN	MARTIN	10/17/1992	O	42	NEG	Female	C	Suspended		No	25.975	Ra Da
✎	WC	TBH	State	ROSALINE	SWARTS	03/05/1999	B	44	NEG	Female	C	Waiting list		No	23.779	Ra Da
✎	WC	GSH	State	Michael	Batshile	12/01/1997	B	47	NEG	Male	B	Waiting list		No	22.875	Ik
✎	WC	TBH	State	ADRIAN	ROOKS	09/01/1997	B	49	NEG	Male	C	Waiting list		No	21.319	Ra Da
✎	WC	TBH	State	LEA	LANGEVELDT	02/11/1999	A	48	NEG	Female	C	Waiting list		No	20.850	Ra Da
✎	WC	TBH	State	JESSICA	PIETERSEN	10/10/2002	B	36	NEG	Female	C	Waiting list		No	20.110	Ra Da
✎	WC	TBH	State	FRANCOIS	MCKENZIE	12/07/2000	AB	42	NEG	Male	C	Waiting list		No	19.989	Ra No

Principles guiding allocation policy

Medical Need

(Access to ensure health and life)

Utility

(Optimal Use of a Limited Resource)

Justice

(Equitable Access to a Limited Resource)

Balance

Transparency
Accountability

Medical Need

Western Cape Allocation: Medical need

- Emergency :
  - Inadequate dialysis, poor access/dialysis options
  - Children severely impaired growth and development

  committee who reviews the case

- Children will be transplanted quicker
  - Extra points (2 point <18>12; 3 points <12)
  - Children's kidneys to children

UK allocation: Medical need

Tier	Patients
A	• 000 mismatched paediatric patients - highly sensitised* or HLA-DR homozygous
B	• 000 mismatched paediatric patients – others (all except those in Tier A)
C	• 000 mismatched adult patients - highly sensitised* or HLA-DR homozygous
D	• 000 mismatched adult patients – others (all except those in Tier C) • Favourably matched paediatric patients (100, 010, 110 mismatches)
E	• All other eligible patients

Waiting longer than 2 or 3 years additional points equiv to (6.5-13 yrs of points)

Priority listing in children: (Other than the normal reasons)

• special restrictions are required for a suitable kidney - (e.g. size due to anatomical difficulties in the recipient)

• Options for live related donation have been excluded

US allocation : Medical need

- Adult similar emergency recommendation

- Children

    < 10 = 4 points

    11-17 = 3 points

    Also extra point if kidney KDPI <35%

Utility
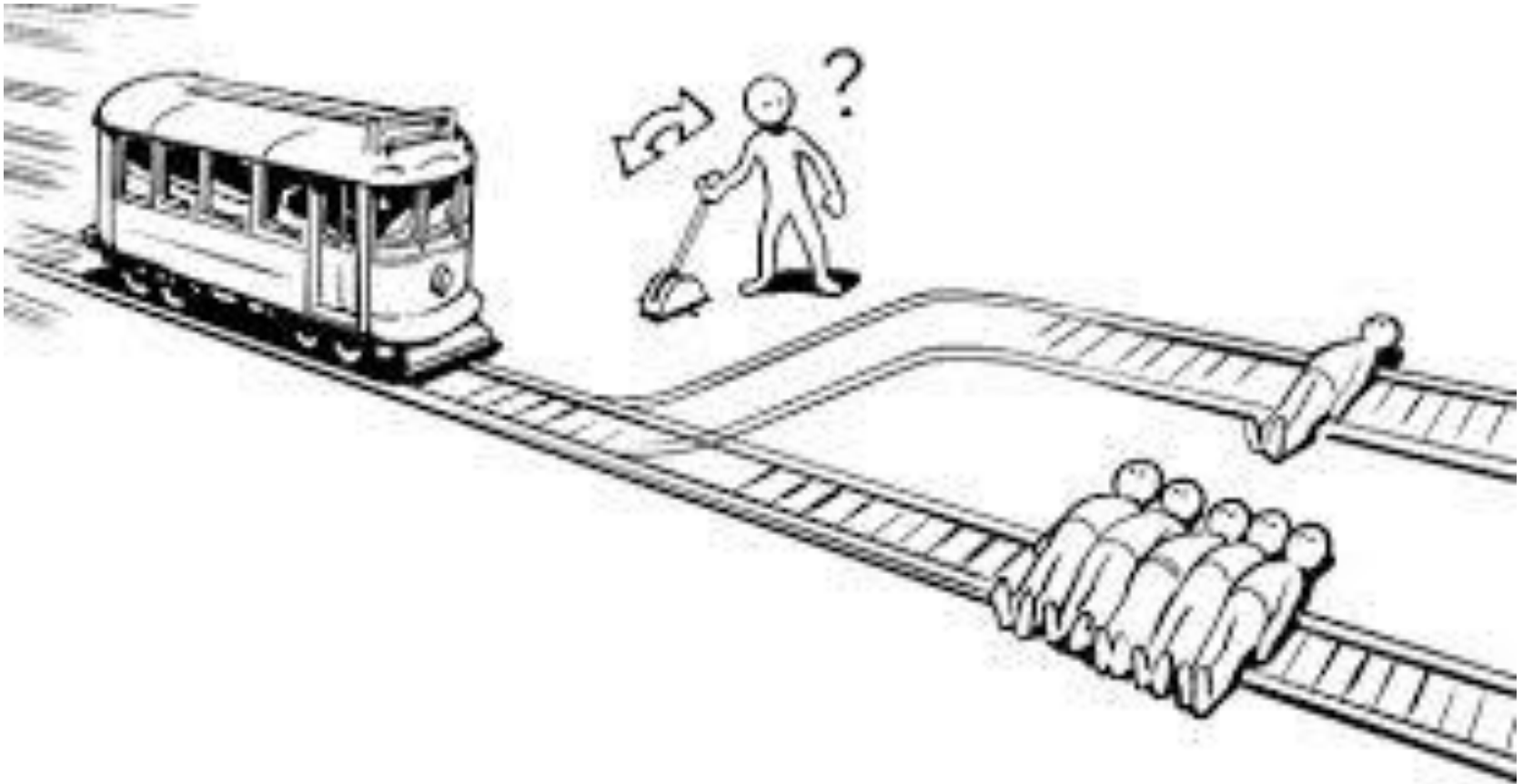
Western Cape Allocation: Utility

- Young kidneys to young recipient
  - A patient > 55yr will not be eligible for Paediatric donor(< 18yrs) unless there are no other suitable recipients
  - > 55 yr (35yr in JHB) old cadaver donor will be allocated to > 30 yr old recipients only


- HLA typing currently <u>not</u> currently used

UK : Utility: HLA

HLA match and age combined

Points are defined as

- 3500 points/$(1+(age/55)^5)$ for level 1 mismatch patients and paediatric patients in Tier D
- 2000 points/$(1+(age/55)^5)$ for level 2 mismatch patients excluding paediatric patients in Tier D
- 500 points/$(1+(age/55)^5)$ for level 3 mismatch patients

Points scored are illustrated in **Figure A**, and mismatch levels are shown in **Table C**

Fig A Point scores for HLA & age

* Level 1 patients + paediatric patients in Tier D
** Level 2 patients excluding paediatric patients in Tier D
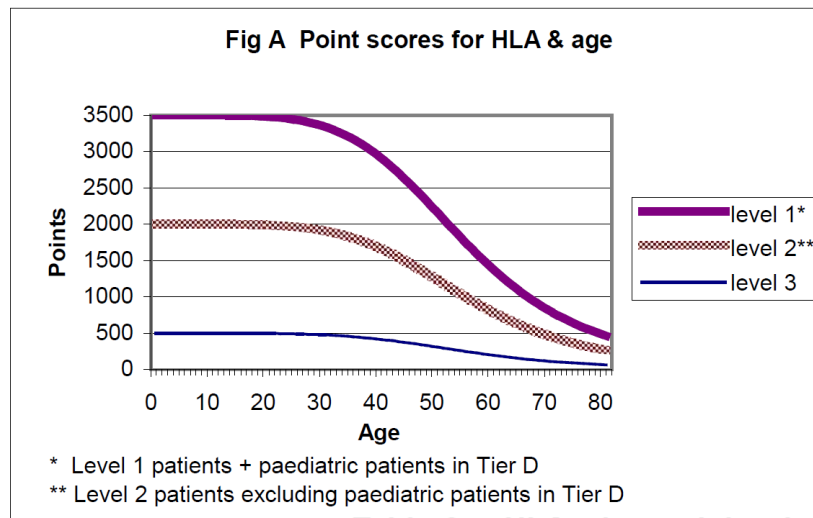
Table C   HLA mismatch levels

Level	HLA mismatch summary	HLA mismatch combinations included
1	000	000
2	[0 DR and 0/1 B]	100, 010, 110, 200, 210
3	[0 DR and 2 B] or [1 DR and 0/1 B]	020, 120, 220, 001, 101, 201, 011, 111, 211
4	[1 DR and 2 B] or [2 DR]	021, 121, 221, 002, 102, 202, 012, 112, 212, 022, 122, 222

US Utility : HLA

- Priority given to best HLA matching first (A B DR)

UK age factor

- Donor–recipient age difference

Age difference points = – ½ (donor–recipient age difference)^2

ALSO: Children not eligible for donor >50yrs

Kidney donor risk index (KDRI)

Table 8-3: KDRI Factors

This deceased donor characteristic:	Applies to:	KDRI score component:
Age (integer years)	All donors	0.0128*(age-40)
	Donors with age < 18	-0.0194*(age-18)
	Donors with age > 50	0.0107*(age-50)
Ethnicity	African American donors	0.1790
Creatinine (mg/dL)	All donors	0.2200*(creatinine - 1)
	Donors with creatinine > 1.5	-0.2090*(creatinine -1.5)
History of Hypertension	Hypertensive donors	0.1260
History of Diabetes	Diabetic donors	0.1300
Cause of Death	Donors with cerebrovascular accident as cause of death	0.0881
Height (cm)	All donors	-0.0464*(height -170) / 10
Weight (kg)	All donors with weight < 80 kg	-0.0199*(weight - 80) / 5
Donor type	DCD donors	0.1330
HCV status	HCV positive donors	0.2400

Estimated graft survival rates by Kidney Donor Profile Index
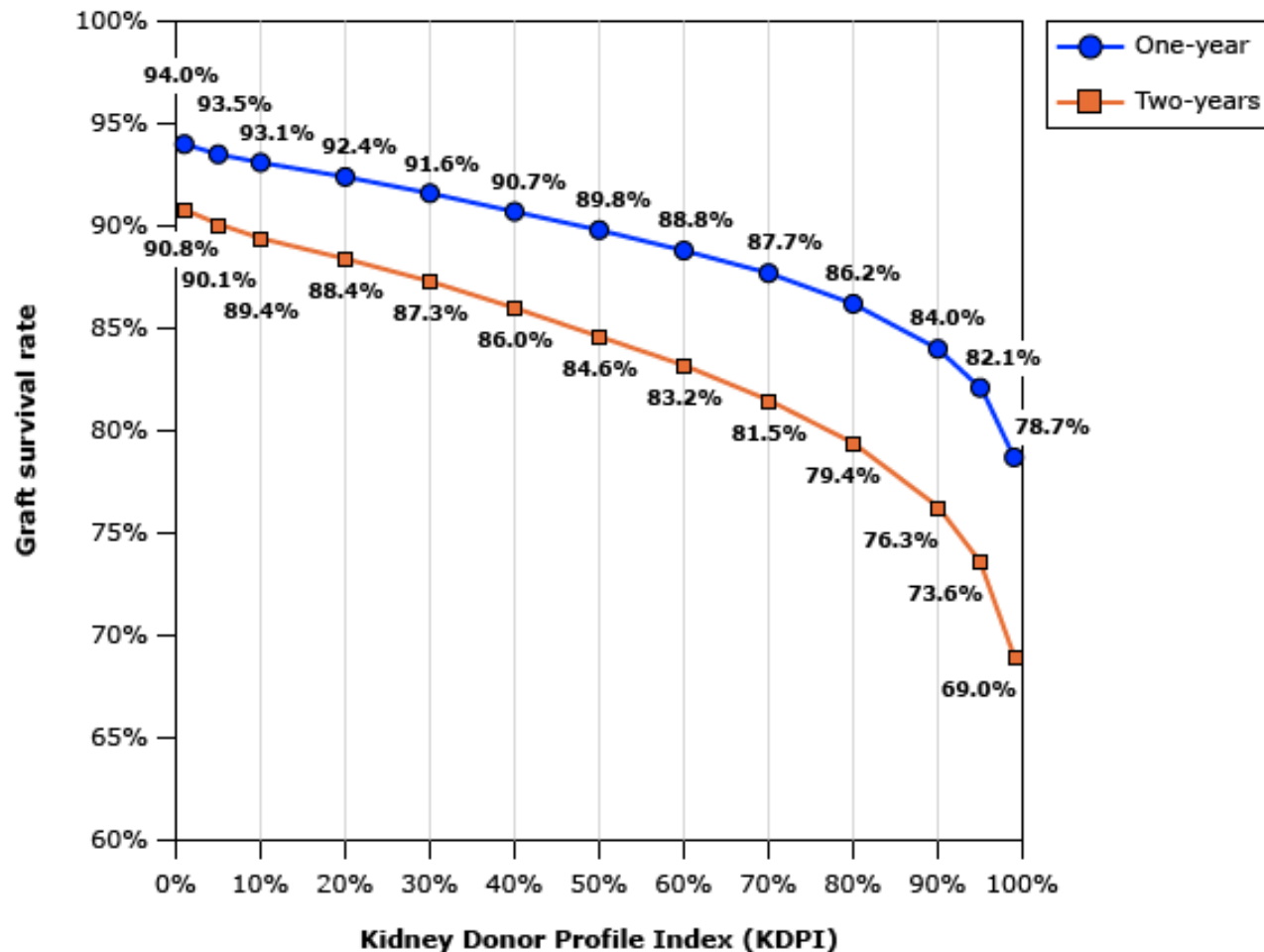
KDPI: Kidney Donor Profile Index.

Reproduced from: United Network for Organ Sharing (UNOS). Available at:
http://optn.transplant.hrsa.gov/ (Accessed on July 21, 2014).

UpToDate®

Estimated post transplant survival(EPTS) is based on all of the following:

1. Candidate time on dialysis

2. Diabetes

3. prior solid organ transplant

4. Candidate age

A candidate's raw EPTS score is equal to:
0.047 * MAX(Age - 25, 0) +
-0.015 * Diabetes * MAX(Age - 25, 0) +
0.398 * Prior Solid Organ Transplant +t
-0.237 * Diabetes * Prior Solid Organ Transplant +
0.315 * log (Years on Dialysis + 1) +
-0.099 * Diabetes * log(Years on Dialysis + 1) +
0.130 * (Years on Dialysis = 0) +
-0.348 * Diabetes * (Years on Dialysis = 0) +
1.262 * Diabetes

Top 20% based on reference population

# How KDPI and EPTS affect allocation

Donor kidneys with lowest KDPI (<20%)

Given preferentially

to recipients with lowest EPTS(<20%)

Location from donor(Cold ischaemic time)

- UK: takes location of donor into account

- US: allocates locally regionally and then Nationally

"The beneficial effect of HLA matching appears to generally outweigh the detrimental effect of prolonging the cold ischemia time "
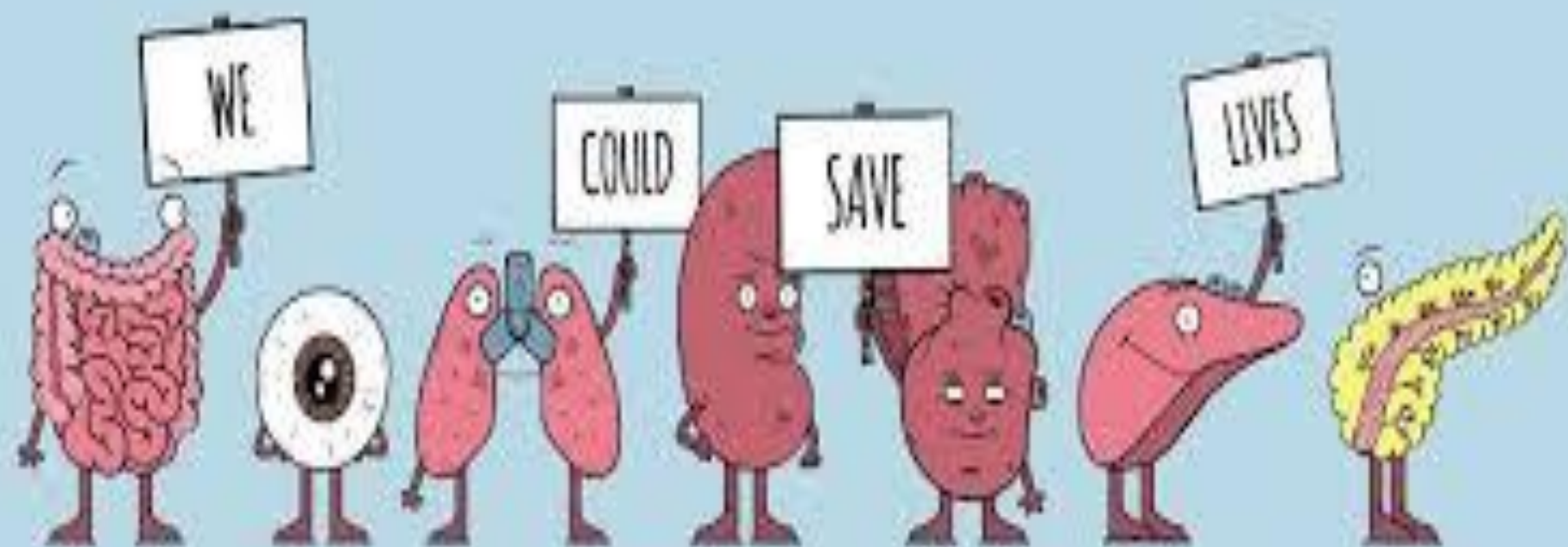
Justice

Lady Justice, in front of the Supreme Court of Brazil

Justice : Western Cape

- Patients receive a transplant based on how long they have been on the list. (1 point per year)

- Sensitization Level:

    > 80   4 points
    40-79   2pts
    20-39   1pt
    <20   0pts

- Blood group to blood group

- Previous transplants 2 or greater (-3)

Time on waiting list

- UK: Points for time on transplant list

- US : Also time on waiting list

Sensitization

- UK : Highly sensitized patients (PRA >85%) are prioritized

- US :

If the candidate's CPRA score is:	Then the candidate receives this many points:
0	0.00
1-9	0.00
10-19	0.00
20-29	0.08
30-39	0.21
40-49	0.34
50-59	0.48
60-69	0.81
70-74	1.09
75-79	1.58
80-84	2.46
85-89	4.05
If the candidate's CPRA score is:	Then the candidate receives this many points:
90-94	6.71
95	10.82
96	12.17
97	17.30
98	24.40
99	50.09
100	202.10

Blood group

- UK:

Table A Donor–recipient blood group matching policy

Donor	Recipient			
	O	A	B	AB
O	✓	✓*	✓	✓*
A	-	✓	-	✓
B	-	-	✓	✓*
AB	-	-	-	✓

* 000 mismatched very highly sensitised (cRF≥95%) adult patients & 000 mismatched paediatric patients only

- blood group incompatible

Allocation by blood type: US

Donor	recipient			
	0	A	B	AB
O	X*			
A		X		X
B			X*	
AB				X
Non A[1]			X	
Non A[1]B			X	

Transparency

Transparency

- Physicians who have patients on list can see where their patient is on the list

- Allow viewing of all previous CM and allocation

- Allow storage of data for audit and analyses

Scoring

Priority score (= wait-time score + sensitization score + Children score + Previous transplant score)
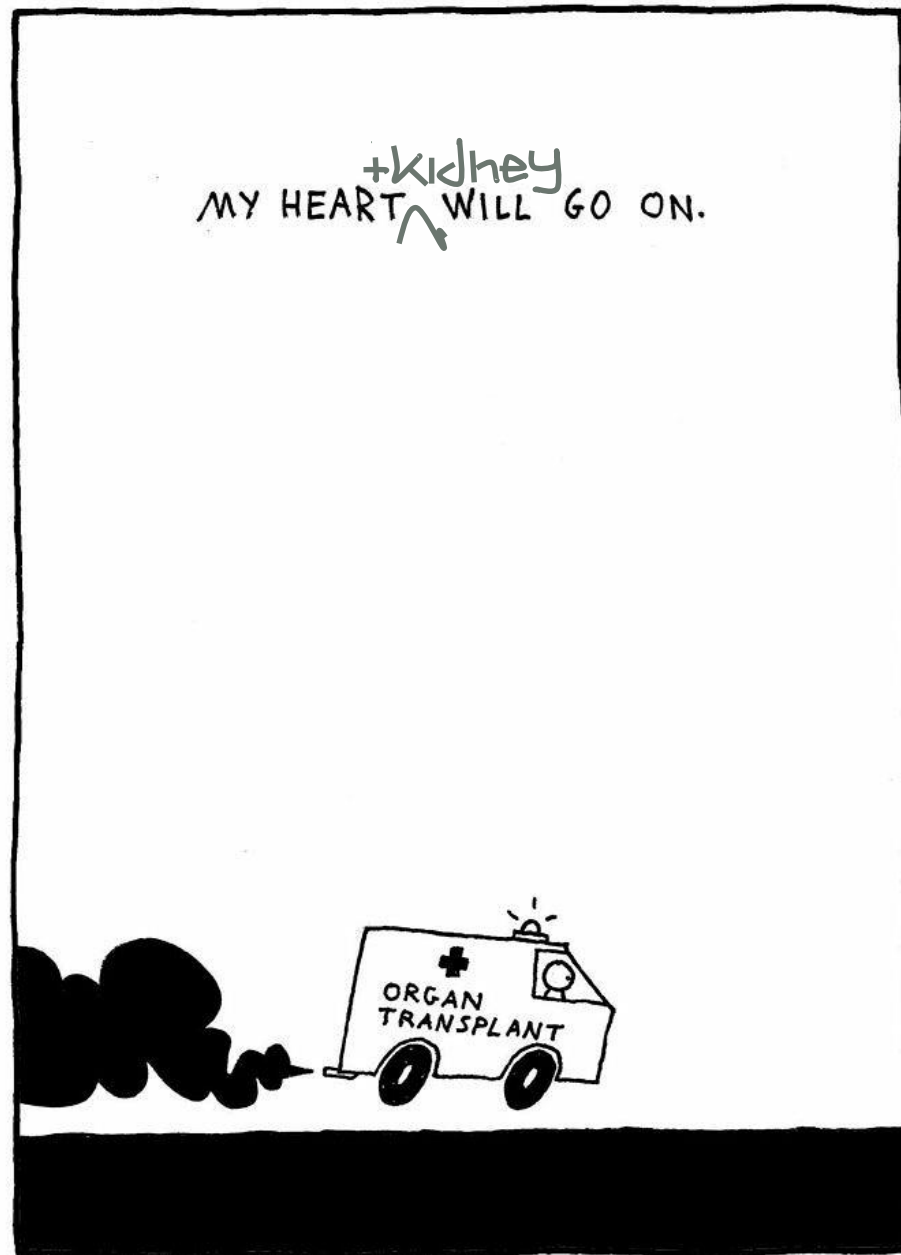

PLUS

Crossmatch Score (on the night of TP)

=>Patients ordered for allocation

Improvements

- Role out to other organs and to rest of country

- Automated screening for previous donor specific antibodies

- HLA matching

- Better functionality with re-auditing

- Cross blood group allocation

- Automate age rules

Barrier: COSTS

Thank you

According to this policy, the following parameters are considered whenever a kidney donor is entered into the matching system:

●The estimated posttransplant survival (EPTS) score estimates for each waitlisted candidate >18 years of age the number of years of potential benefit from a kidney transplant.

●The kidney donor profile index (KDPI) incorporates more information about the quality of the donor and classifies kidneys on the basis of a clinical formula that estimates how long the kidney is likely to function once transplanted. A KDPI calculator is provided by OPTN (figure 1) [2].

●Additional priority is given to candidates with less common blood types (that is, type B and type O) and high immune system sensitivity (estimated by the calculated panel reactive antibody [CPRA] score) since such candidates have fewer opportunities for transplantation.

• As previously, candidates are prioritized based upon

- Estimated posttransplant survival (EPTS) score — The EPTS score estimates for each waitlisted candidate >18 years of age the number of years of benefit from a kidney transplant. The EPTS score is based upon candidate age, time on dialysis, absence or presence of diabetes, and history of prior solid organ transplant. The score is calculated for each candidate upon registration on the waiting list. The score is updated daily and any time the transplant hospital reports a change in any EPTS factor.
- Twenty percent of kidneys that are estimated to function the longest are allocated to candidates that are expected to need the allograft for the longest time

UNOS

- Blood type — Kidneys are allocated based upon blood type as follows:

- ●Type O kidneys may be given to type O candidates unless there is zero-human leukocyte antigen (HLA) mismatch, in which case kidneys may go to any type blood.

- ●Type A kidneys may be given to type A or AB candidates.

- ●Type B kidneys may be given to type B candidates, unless there is zero-HLA mismatch, in which case kidneys may be given to other blood type candidates.

- ●Type AB kidneys may be given to type AB candidates.

- ●Type non-A1 and non-A1B kidneys may be given to type B candidates, provided that the type B candidate provides written, informed consent and the transplant center has an established written policy regarding acceptance of non-A1 and non-A1B kidneys by type B candidates. Specific candidate eligibility must be confirmed every 90 days.

UNOS

- IMPACT OF REVISED POLICY — A few months after the revised policy was implemented, the following trends in kidney allocation were observed [11]:
- ●There was a sixfold increase in the number of transplants for highly sensitized candidates (defined as calculated panel reactive antibody [CPRA] >99 percent).
- ●There was an increase in nonlocal transplants from 20 to 30 percent.
- ●There was a decrease in the number of age-mismatched kidneys (defined as donor/recipient age difference >15 years) from 50 to 44 percent.
- ●There was an increase in transplants for candidates ages 18 to 49 years and a decrease in transplants for candidates >50 years.
- ●There was a decrease in pediatric transplants from 5 to 3.6 percent.
- ●There was a decrease in transplantation of zero-mismatched kidneys from 8 to 5 percent.
- Subsequent studies have further assessed the impact of the revised kidney allocation system (KAS) on organ distribution. As examples:
- ●One study that compared Organ Procurement and Transplantation Network (OPTN) data one year before and after implementation of the revised KAS found a 23 percent reduction in transplants in which the donor and recipient age differed by more than 30 years [12]. There was an initial sharp increase in transplants for recipients with a CPRA of 99 to 100 percent and those with at least 10 years on dialysis, followed by a tapering of transplants to these groups suggesting a bolus effect. Kidneys were more frequently shipped long distance, with a consequent increase in cold ischemia times. Although higher delayed graft function rates were noted, six-month graft survival rates were unchanged.
- ●A second study compared Scientific Registry of Transplant Recipients (SRTR) data for the two years pre-KAS with data for the first nine months post-KAS [13]. Key findings included an increase in both regional (12.5 percent post-KAS versus 8.8 percent pre-KAS) and national (19.1 percent post-KAS versus 12.7 percent pre-KAS) imports. The proportion of recipients >30 years older than their donor decreased from 19 to 15 percent, while the proportion of recipients with a CPRA of 100 percent increased from 1 to 10 percent. Although the overall rate of deceased-donor kidney transplants (DDKTs) did not change, DDKT rates increased for black and Hispanic transplant candidates and for candidates aged 18 to 40 years; DDKT rates decreased for candidates aged >50 years. Rates of delayed graft function increased from 25 percent pre-KAS to 30 percent post-KAS.

- The beneficial effect of HLA matching appears to generally outweigh the detrimental effect of prolonging the cold ischemia time in transported kidneys [42]. The current registry data indicate that the five-year graft survival of six-antigen-matched cadaver kidneys is the same regardless of whether the kidneys undergo 3 or 36 hours of cold ischemia

Two Parts

- Establish allocation rules

- Change paper based system into electronic

Table 8-1: Kidney Points

If the candidate is:	And the following allocation sequence is used:	Then the candidate receives this many points:
Registered for transplant and meets the qualifying criteria described in *Policy 8.4: Waiting Time*	8.5.H, 8.5.I, 8.5.J, or 8.5.K	1/365 points for each day since the qualifying criteria in *Policy 8.4: Waiting Time*
Aged 0-10 at time of match and a 0-ABDR mismatch with the donor	8.5.H, 8.5.I, or 8.5.J	4 points
Aged 11-17 at time of match and a 0-ABDR mismatch with the donor	8.5.H, 8.5.I, or 8.5.J	3 points
Aged 0-10 at time of match and donor has a KDPI score <35%	8.5.H, 8.5.I	1 point
A prior living donor	8.5.H, 8.5.I, or 8.5.J	4 points
Sensitized (CPRA at least 20%)	8.5.H, 8.5.I, or 8.5.J	*See Table 8-2: Points for CPRA*
A single HLA-DR mismatch with the donor*	8.5.H, 8.5.I, or 8.5.J	1 point
A zero HLA-DR mismatch with the donor*	8.5.H, 8.5.I, or 8.5.J	2 points

*Donors with only one antigen identified at an HLA locus (A, B, and DR) are presumed "homozygous" at