The New Kidney Allocation in Ontario,

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Why change?

- Expert Panel Report - access issues
- Auditor General report - access issues
- Ontario was only OPO region in: Canada, USA, Euro-txp, UK, with multiple kidney and pancreas lists
- In Ontario all other organs: lungs, heart, livers were on a single list
- The previous system was out-dated, and difficult to manage
and for over 40% of the cases we reviewed, the highest-priority patient did not receive the organ and no reason was documented.

90% of kidney recipients received a kidney within four years in one Ontario region, compared to about nine years in two other Ontario regions.
Average wait-time for kidney by Donor region and age (includes on Hold) 2010-11

<table>
<thead>
<tr>
<th>Region</th>
<th>19-55</th>
<th>&gt;55</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ottawa</td>
<td>1636</td>
<td>1526</td>
</tr>
<tr>
<td>Hamilton</td>
<td>1522</td>
<td>1557</td>
</tr>
<tr>
<td>Kingston</td>
<td>1499</td>
<td>1073</td>
</tr>
<tr>
<td>London</td>
<td>910</td>
<td>805</td>
</tr>
<tr>
<td>Toronto</td>
<td>2179</td>
<td>1948</td>
</tr>
<tr>
<td>Regional Average</td>
<td>1781</td>
<td>1626</td>
</tr>
</tbody>
</table>
**Why change?: Better outcomes**

- New technology with regard to matching. Can allocate based on acceptable mismatch, known patient antibodies against donors (DSAs)
  - Better short and long-term outcomes
  - Obviate need to cross DSA barriers

- Be consistent with what we were doing with National Kidney Paired Donation and with Highly Sensitized Program

- Some improvement in access to kidneys
  - Waiting times
  - Sensitized
Why was this the right time?

- HLA technology
- Ontario’s organ donor #s are now best in the country
- The growth in organ donation has occurred in the regions where it had to grow! : GTA and HAMILTON
- Easy to accommodate CBS National Highly Sensitized Registry for recipients with cPRA >95%
Ontario deceased organ donation
2016: record year; 351 DD and 108(31%DCD)

Population 13,500,000
DRM= 26
TGLN 2001-2016: Which donor regions saw the most growth?

- TGLN 2001-2005 - 141 donors per year
- TGLN 2006-2008 - 182 donors per year
- TGLN 2009-2012 - 223 donors per year
- TGLN 2013-2014 - 245 donors per year
- TGLN 2015-2016 - 310 donors per year
TGLN 2001-2014: Which donor regions saw the most growth (last 12 years)?

London, Hamilton, GTA, Kingston, Ottawa?

- London - 5%
- Hamilton - 120%
- GTA - 65%
- Kingston - 15%
- Ottawa - 10%
Problems with old allocation system

1. Based on priorities, but no weighting applied
2. Multiple lists, difficult to administer and allocate
3. Required negative cross-match for allocation
4. HLA labs for each of the 5 regions, but no access between regions. Thus kidneys moved between regions to recipients without knowing “matching”
5. Transplanted across DSA barriers
6. Belief that donors belonged to the transplant program
7. Unequal access in terms of wait-times and sensitized recipients
<table>
<thead>
<tr>
<th>Old Allocation</th>
<th>New Allocation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Don’t Share Kidneys</td>
<td>share 1 kidney Nationally and/or provincially</td>
</tr>
<tr>
<td>Sensitized patients in GTA have access to 5 million potential donors</td>
<td>Sensitized patients in GTA have access to <del>13 million (highly sensitized</del>35 million)</td>
</tr>
<tr>
<td>Allocation based on cross-match</td>
<td>Allocation done virtually</td>
</tr>
<tr>
<td>Allocation based on dichotomous variables (PRA&gt;80% or 20-79%)</td>
<td>Allocation will be continuous (point system based on cPRA and wait-time)</td>
</tr>
<tr>
<td>Transplant with donor antibody present (DSA)</td>
<td>Eliminate transplant against DSA</td>
</tr>
</tbody>
</table>

**February 12, 2014**
What are allo-antibodies?

- Allo-antibodies are proteins made by our immune system that react to other human cells and organs and can destroy organs.
- We get these by exposure to Humans via blood transfusions, pregnancies and previous organ transplant.
- These are measured and we call this cPRA.
- cPRA can range from 0-100%.
- The higher the number, the harder it is to find a matching kidney.
- When we match a kidney, we try not to use a kidney that the recipient has antibodies against—Donor specific antibodies (DSA).
What is virtual cross match?

1) Know all HLA antibodies of recipients on wait-list at the molecular level

2) Donor antigens known at time

Potential donor, if the recipient does not have any Donor Specific Antibodies (DSA)

ie: if recipient has antibodies against HLA: Dr11*0401, then donor who expresses this antigen will not be a match.
New kidney allocation for Ontario

- Use same priorities as in past, but assign weighting
- All recipients have know DSAs in system
- Allocate based on acceptable mismatching
- Goal: improve access to sensitized patients and improve transplant outcomes, **improve, but not eradicate wait-time discrepancies between programs**
- Also able to apply changes to deal with blood group wait-time discrepancies ie: A2 to B recip.
Principles of kidney Allocation

Keep 1, Share 1

1) “Old” donor regions remain

2) First kidney stays in local donor region

3) Second kidney offered first to National system*, then to next highest priority patient in Ontario

*patients with a high cPRA 95% or greater, have access to kidneys from all of Canada
KIDNEY ALLOCATION IN ONATRIO

Principles:

All Ontario recipients have high quality cPRA, HLA and acceptable antigen mm entered into TGLN data base

Organ offers will made after negative virtual cross match with donor

2 separate allocations SCD and ECD (regardless of NDD or DCD)

First kidney stays in traditional transplant region, and second allocated to provincial or National HSP wait-list. However allocation rules remain the same for both. If only one kidney, than its allocated to transplant/donor region.

All SCDs (<35) will be considered for pediatric recipients, for adults will use age matching criteria as currently applied.

ALL ECD allocated to ECD recips (criteria set)
Wait-list Point system

- Waiting time is based on First day of dialysis

POINT system for each wait-list patient

0.1 points for every 30 days on dialysis + 4 x (PRA/100)
PRIORITIES of Kidney ALLOCATION

Starting point is virtual negative cross-match with donor:

1) OVERRIDING PRIORITY=Medical high priority

2) Very HIGH PRIORITY:
   - cPRA >95%

3) High Priority
   - Pediatric
   - Multiorgan
   kidney pancreas

3) MEDIUM PRIORITY: Age matching;<35 year old donor to <55 year old recipient
Ontario Blood group donors/Recipients

DONORS
RECIPIENTS
SMH RECIPIENTS

%
Some help for blood group B recipients

• 10% of blood group A donors are A2 (lower antigen expression)
• Can Use A2 donors safely for B recipients when anti-A titres are 1:8 or less
• Programs will identify B recipients with Anti-A Ab of 1:8 or less
• These B recipients now prioritized to receive A2 donor kidneys
# Kidney Transplant Wait Time for ABO B Patients by A2/A2B Acceptability

February 12th, 2014 – February 11th, 2015

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>Total</th>
</tr>
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<tbody>
<tr>
<td>Count</td>
<td>11</td>
<td>45</td>
<td>56</td>
</tr>
<tr>
<td>Mean</td>
<td>1146.5</td>
<td>2690.6</td>
<td>2387.3</td>
</tr>
<tr>
<td>SD</td>
<td>586.5</td>
<td>1492.1</td>
<td>1494.3</td>
</tr>
<tr>
<td>Median</td>
<td>880</td>
<td>2733</td>
<td>2295</td>
</tr>
<tr>
<td>Min-Max</td>
<td>609 - 2295</td>
<td>58 - 6372</td>
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Why are wait-times different?

LOCATION
Differences still exist amongst regions in Ontario. May take 5 years to equalize.

BLOOD GROUP
Blood type A very short, blood type B, the longest.

AGE
We allocate older donor kidneys to those over 60. Why? Because less waiting for those less who can least afford to wait. Trade off, these kidneys are not going to last as long as younger donor kidneys.

cPRA
Patients who are very sensitized (cPRA 99-100%) are difficult to match (For these patients we have the NATIONAL SYSTEM).

BEING ON HOLD
For patients

• Ideally if you have a living donor we will give you priority.

• Why? Because you could avoid dialysis

• If no living donor, then usually not very important to be referred urgently.

• Why? Because no matter long it takes to complete the transplant evaluation, you’re wait-time is backdated to the first day of dialysis

• Important to have your blood sent for antibody testing every 3 months while on waiting-list

• Why? So we always have recent blood to look for kidney matches

• If you are on hold, find out when you can be reactivated
Summary

1) Virtual Cross match system is working well
2) Beginning to see improvements in access equity
3) More sensitized recipients getting transplanted
4) Equal access across regions may take 5 years to achieve
5) Access based on blood type is still an issue
Acknowledgements

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