Australian Paired Kidney Exchange (AKX) Program

Biannual Report #2

As of 31 December 2013
### Table of Contents

Foreword ................................................................................................................................................. 3

1. Transplants facilitated by year ........................................................................................................ 4

2. Number of pairs in quarterly match runs ..................................................................................... 4

3. Matching efficiency ......................................................................................................................... 5

4. Match conversion rates .................................................................................................................... 5

5. Pool composition and transplanted patients by cPRA ................................................................. 6

6. cPRA of registered recipients over time ....................................................................................... 6

7. Access to transplantation by cPRA ............................................................................................... 7

8. Donor and recipient blood group .................................................................................................. 7

9. Pool composition and transplanted patients by blood group ...................................................... 8

10. Transplant rates using ABO incompatible matching ................................................................... 8

11. Transplanted patients wait time to match and match to surgery by blood group .................. 9

12. Transplanted patients wait time to match and match to surgery by cPRA ................................. 9

13. Time from match to transplant surgery ...................................................................................... 10

14. Wait times >1 year by cPRA ......................................................................................................... 10

15. Non-proceeding crossmatch negative matches ........................................................................ 11

16. Registered and transplanted patients by centre ........................................................................ 11

17. Participating transplant centres .................................................................................................. 12
Foreword

Welcome to the second Biannual Report of the Australian paired Kidney eXchange (AKX) Program. The AKX program has become an integral part of the live donor kidney transplant activity in Australia, it continues to grow and each month there is a steady number of new pairs being added to the registry.

This report provides an overview of the activity of the AKX program up-to-date as of 31 December 2013. The last allocation round was performed on 14th October 2013 and identified 14 pairs in 6 loops suitable for exchange surgeries after crossmatching. It was possible to organise transplant surgeries for 5 cases, for the remainder, transplant surgeries have been scheduled early in the New Year.

As of 31st December 2013, 175 individual pairs were included in any of the 13 allocation match runs. To date the AKX program has facilitated 71 live donor kidney transplants, with a further 9 pairs awaiting surgery. The yearly match rate ranges from 21 to 30 pairs annually, although this is not reflected in the annual transplant rates because the time from proposal of a match to surgery (median 86 days, 95% CI 32-129 days) often means that pairs identified in the last allocation round of the year are transplanted in the early months of the following year. The virtual crossmatch approach used for allocation in AKX continues to be highly predictive of the actual crossmatch results, with 97% of CDC crossmatches being negative in computer-matched pairs.

In this report we have maintained some of the core figures graphically unaltered, so that they can easily be compared to those in previous and future reports. We have attempted to present some of the results with new graphics in order to deliver some data in a way that can deliver some novel and hopefully useful information.

The success of the AKX was made possible by the effort and dedication of the health professionals of all participating referring and transplanting units around Australia. Thank you and keep up the great work.

Paolo Ferrari                                                  Claudia Woodroffe
National Coordinating Centre
Australian Kidney paired eXchange Program
1. Transplants facilitated by year
As of 31st December 2013 there have been 94 kidney paired donation transplants facilitated, or scheduled for surgery, in Australia. Of these, 80 have been facilitated through the AKX program, 71 recipients have already been transplanted and 9 are due to have their transplant surgery in early 2014.

Figure 1. Kidney paired donation transplants in Australia

KPD facilitated kidney transplant in Australia

![Graph showing transplanted and awaiting surgery kidney paired donation transplant in Australia over years 2007 to 2014.]

2. Number of pairs in quarterly match runs
The AKX program looks for suitable matches among registered pairs every 3 months using a specific NOMS computer program, a procedure that is called a ‘match run’. In 2013, on average 44 pairs were included in each of these allocation rounds.

Figure 2. Number of patients in quarterly match runs

Number of patients in quarterly AKX matching runs
Cumulative number of individual candidates = 175
Oct 2010 – Dec 2013

![Bar graph showing number of patients in each match run from Oct 2010 to Oct 2013.]

31/12/2013
3. Matching efficiency

The match efficiency of the AKX program remains very good, with 71% of registered pairs finding a match and 41% receiving a kidney transplant. This is quite remarkable considering that there have only been 2 altruistic non-directed donors to date who donated a kidney in AKX, and that therefore, most of the pairs have to be matched in closed 2-way and 3-way loops.

Figure 3. AKX match and transplant efficiency

4. Match conversion rates

Before donors are recalled for crossmatching, the tissue typing laboratory and the recipient’s team evaluate a possible match with regard to immunological suitability. In rare instances a review of a matched recipient’s antibody record after a match reveals an unacceptable antibody to the matched donor that was not considered by the NOMS computer module. This leads to a computer-matched pair not being offered for crossmatching. In the first 3 years, this has only been the case in 4 instances. Of the pairs accepted for crossmatching the crossmatch result was reported as negative in 97% of cases, i.e. the virtual crossmatch is highly predictive of the actual crossmatch.

Figure 4. AKX match conversion rates
5. Pool composition and transplanted patients by cPRA
One of the key measures of KPD performance is the ability to match and transplant highly sensitized patients. The majority of transplant candidates enrolled in the AKX program are highly sensitised; 59% of them have a cPRA of >75% and 34% have a cPRA >95%. Despite the high level of sensitisation of transplant candidates enrolled in the AKX program, 45% of transplanted patients whose kidney transplant was facilitated by the AKX program had a cPRA >75%.

Figure 5. cPRA of registered versus transplanted patients

6. cPRA of registered recipients over time
From the initial match run through to match run 7 (April 2012) we witnessed a steady accumulation of highly sensitised patients (cPRA >95%) in the pool of registered recipients. This trend appears to be gradually reversing in the past 18 months.

Figure 6. cPRA of registered recipients through time
7. Access to transplantation by cPRA
Although 45% of patients whose kidney transplant was facilitated by the AKX program had a cPRA >75%, access for highly sensitised recipients remains lower compared to transplant candidates who are less sensitised (cPRA <75%). When cPRA is >95% less than 1 in 3 patients will find a suitable match that results in a kidney transplant.

Figure 7. Match and transplant probability by cPRA

<table>
<thead>
<tr>
<th>cPRA</th>
<th>Tx</th>
<th>Not Tx</th>
<th>Total Registered</th>
<th>% of group Tx</th>
<th>% of Registered population</th>
<th>% of the total Tx</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-74%</td>
<td>39</td>
<td>33</td>
<td>72</td>
<td>54%</td>
<td>41%</td>
<td>55%</td>
</tr>
<tr>
<td>75-94%</td>
<td>15</td>
<td>30</td>
<td>45</td>
<td>33%</td>
<td>26%</td>
<td>21%</td>
</tr>
<tr>
<td>95-100%</td>
<td>17</td>
<td>41</td>
<td>58</td>
<td>29%</td>
<td>33%</td>
<td>24%</td>
</tr>
<tr>
<td>Total</td>
<td>71</td>
<td>104</td>
<td>175</td>
<td>41%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8. Donor and recipient blood group
There is still a significant disparity in the proportion of registered blood group O donors and blood group O recipients; but there have been an increasing proportion of O donors registered throughout 2013, and cumulatively the ratio of registered blood group O recipients to donors is 1.5:1.

Figure 8. Blood groups in 178 registered donors and 175 registered recipients

31/12/2013
9. Pool composition and transplanted patients by blood group

Another key measure of KPD performance is the ability to match and transplant blood group O patients. Despite the imbalance between donors and recipients with blood group O and although 57% of enrolled transplant candidates were blood group O, 54% of the transplanted patients in AKX were also blood group O.

Figure 9. Blood group of registered versus transplanted patients

![Blood group of registered vs. transplanted patients](image)

10. Transplant rates using ABO incompatible matching

So far, 14 of 71 (20%) recipients, or patients scheduled for transplant surgery in 2014, have been matched with an ABO-incompatible donor kidney transplant. These patients were distributed across 12 chains that resulted in 31 recipients being transplanted, or scheduled for surgery in 2014, as part of an ABO-incompatible loop. Reliance on ABO-incompatible matching has decreased in 2013 because of the higher proportion of blood group O donor registered.

Figure 10. ABO-incompatible matching and transplant rates

![ABO-incompatible matching and transplants efficiency](image)
11. Transplanted patients wait time to match and match to surgery by blood group

Transplanted patient wait time is the actual wait time for those patients who have been transplanted. Among the 71 transplanted patients, the average wait time to match is 142 days and the median wait is 51 days (95% CI 5-639). Blood group O recipients and blood group B recipients wait the longest, on average 3 times as much as blood group A recipients. The time from match to surgery does not differ by blood group.

Figure 11. Transplanted patients – average wait time to match and surgery by blood group

12. Transplanted patients wait time to match and match to surgery by cPRA

Recipients with cPRA >95% wait the longest, in general twice as long as patients with <95% cPRA. There is a clear interaction between cPRA and blood group, with blood group O recipient with cPRA >50% with an average wait time of 220 days (410 days if cPRA >95%).

Figure 12. Transplanted patients – average wait time to match and surgery by cPRA
13. Time from match to transplant surgery
The time from match to transplant surgery is an important factor for patients who have been told they will receive a live donor kidney transplant through the AKX program. Because allocation rounds are performed quarterly, ideally all patients matched in a previous round should be transplanted by the time of the subsequent match run. A kidney transplant is performed within less than 3 months from matching in 67% of cases. No patient matched in 2013, who went on to have surgery in 2013, had to wait longer than 6 months after a match for transplant surgery.

Figure 13. Time from match to surgery

14. Wait times >1 year by cPRA
The cPRA distribution of transplant candidates who wait > 1 year to find a match or are still unmatched shows that the majority of them will have a cPRA of >75%. The proportion of recipients with cPRA >95% waiting > 1 year has dropped from 56% by the end of 2012 to 42% by the end of 2013.

Figure 14. Registered recipient waiting > 1 year by cPRA
15. **Non-proceeding crossmatch negative matches**

Some patients did not proceed to transplantation even if they were matched and the crossmatch was negative, meaning there were no immunological barriers to kidney transplantation. The major cause of chain breakdown was medical unsuitability of the recipient. In 2013 no crossmatch-negative matches were cancelled because of recipient’s unsuitability. Although in 3 cases the donor was deemed unfit by the recipient team, all these donors satisfied the medical and surgical suitability criteria.

**Figure 15. AKX: non-proceeding transplants**

16. **Registered and transplanted patients by centre**

AKX has facilitated transplants in every state; 29 in Victoria, 23 in New South Wales, 13 in Western Australia, 4 in Queensland and 2 in South Australia. Royal Melbourne Hospital is the leading hospital for enrolments (n=42) and transplants (n=19).

**Figure 16. Number of registered and transplants by referral centre**
17. **Participating transplant centres**

<table>
<thead>
<tr>
<th>Hospital Name</th>
<th>City</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alfred Hospital</td>
<td>Melbourne</td>
<td>VIC</td>
</tr>
<tr>
<td>Austin Hospital</td>
<td>Melbourne</td>
<td>VIC</td>
</tr>
<tr>
<td>John Hunter Hospital</td>
<td>Newcastle</td>
<td>NSW</td>
</tr>
<tr>
<td>Mater Children’s Hospital</td>
<td>Brisbane</td>
<td>QLD</td>
</tr>
<tr>
<td>Monash Medical Centre</td>
<td>Melbourne</td>
<td>VIC</td>
</tr>
<tr>
<td>Monash Medical Centre paediatric</td>
<td>Melbourne</td>
<td>VIC</td>
</tr>
<tr>
<td>Royal Adelaide Hospital</td>
<td>Adelaide</td>
<td>SA</td>
</tr>
<tr>
<td>Royal Children’s Hospital</td>
<td>Melbourne</td>
<td>VIC</td>
</tr>
<tr>
<td>Royal Melbourne Hospital</td>
<td>Melbourne</td>
<td>VIC</td>
</tr>
<tr>
<td>Royal North Shore Hospital</td>
<td>Sydney</td>
<td>NSW</td>
</tr>
<tr>
<td>Royal Perth Hospital</td>
<td>Perth</td>
<td>WA</td>
</tr>
<tr>
<td>Royal Prince Alfred Hospital</td>
<td>Sydney</td>
<td>NSW</td>
</tr>
<tr>
<td>Prince of Wales Hospital</td>
<td>Sydney</td>
<td>NSW</td>
</tr>
<tr>
<td>Princess Alexandra Hospital</td>
<td>Brisbane</td>
<td>QLD</td>
</tr>
<tr>
<td>Princess Margaret Hospital</td>
<td>Perth</td>
<td>WA</td>
</tr>
<tr>
<td>Sir Charles Gairdner Hospital</td>
<td>Perth</td>
<td>WA</td>
</tr>
<tr>
<td>St. Vincent’s Hospital</td>
<td>Melbourne</td>
<td>VIC</td>
</tr>
<tr>
<td>Sydney Children’s Hospital</td>
<td>Sydney</td>
<td>NSW</td>
</tr>
<tr>
<td>The Children’s Hospital at Westmead</td>
<td>Sydney</td>
<td>NSW</td>
</tr>
<tr>
<td>The Women’s and Children’s Hospital</td>
<td>Adelaide</td>
<td>SA</td>
</tr>
<tr>
<td>Westmead Hospital</td>
<td>Sydney</td>
<td>NSW</td>
</tr>
</tbody>
</table>