

## Editorial

# ABO-Incompatible Kidney Transplants: Twice as Expensive, Half as Good

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This analysis by Axelrod et al (1) concludes that transplanting across the ABO blood barrier “appears clinically and economically appropriate.” We think this conclusion is not justified by the analysis.

The authors estimated Medicare spending for all covered services for 270 ABO-incompatible (ABOi) and 27 000 ABO-compatible (ABOc) transplants for the period 30 days before transplant through 3 years after transplant and found that costs for ABOi transplants were 74% higher than those for ABOc transplants. The authors also estimated adjusted hazard ratios (AHRs) for both graft failure and all-cause mortality using a Cox proportional hazards model, controlling for >20 measurements of recipient and donor characteristics. The Cox results showed that ABOi-transplanted patients had 1.9 times the risk of both death and graft failure compared with ABOc patients. These estimates indicate that ABOi transplantation costs more and has a large negative impact on the health of recipients compared with ABOc transplantation.

We suggest a major weakness of the paper is that the authors compared ABOi transplants with ABOc transplants, whereas they should have compared ABOi transplants with this same population of (incompatible) patients receiving dialysis therapy. The authors did not estimate increases in either the quality or length of life of the recipients of ABOi transplants—necessary measures to show the benefit of ABOi transplantation compared with dialysis. Given that the authors chose to use ABOc-transplanted patients as the comparison group, their analysis should have concluded that ABOi transplantation approaches twice the expense (of ABOc transplantation) but is only half as good.

So the basic question—not answered by the authors—is, what are the benefits for a dialysis patient receiving a transplant from an ABOi living donor?

Regarding cost-effectiveness, the authors compared ABOi transplantation with dialysis therapy and concluded that ABOi transplantation is cost-effective because costs of maintenance and subsequent retransplants are less than those for dialysis. This conclusion, however, does not follow from the authors’ analysis, which estimates a risk factor of 1.9 for ABOi transplants, incremental costs that are at least 74% higher than those for ABOc transplants and possible decreases in the length and quality of life.

The authors reported that, compared with ABOc patients, ABOi patients experience early mortality losses following transplantation, but after that, “survival curves appear to be parallel.” However, early losses are losses nonetheless and maybe the worst losses. The authors’ 3 years of follow-up survival, reported as univariate plots, are not convincing because estimating half-lives, for example, with just a few years of follow-up for a population with early losses is prone to error (2,3).

To recap, these two statistical results (AHR of 1.9 and “excellent” univariate survival curves) are inconsistent. We find the adverse result (AHR of 1.9) more credible than the survival curves.

Opelz et al noted in a 2015 paper (4) on “experienced centers” that “recipients of an ABO-incompatible living-donor kidney transplant … experience no penalty in graft and patient survival … but confirmation that these results can be widely replicated is lacking.” We would argue that this study by the authors does not provide the confirmation that Opelz is seeking.

This paper has the following policy implications:

- (i) The authors provide some evidence of a trend toward ABOi transplants being performed more frequently in patients with private insurance than in patients with Medicare insurance. This would be consistent with transplant centers being able to pass on the higher cost of ABOi transplants to private insurance companies but not to Medicare, which generally has a fixed price per transplant procedure. If it is decided that ABOi transplantation is a desired public policy, then Medicare payments for such transplants may need to be increased.

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- (ii) The movement to perform ABOi transplants should be seen as another reaction to the drastic shortage of transplant kidneys.
- (iii) The authors properly conclude that a better solution to donor–recipient incompatibility is kidney paired donors (KPDs; we note that this is the only source of kidney donors that is growing) (5). The authors mention two possible impediments to this alternative: (a) a shortage of blood group O and B donors in KPD programs and (b) higher costs to the donor (we note that there is growing support in the transplant community for compensating donors for their expenses) (6). We agree with the authors that limited numbers of O and B donors in KPD programs may present additional challenges if kidney donation continues to be inadequate.
- (iv) The authors describe incremental costs of ABOi transplants (higher than those for ABOb transplants) of \$86 000 over the first 3 years and \$126 000 over a 10-year period as “economically appropriate.” We note that a recent paper (3) argued that government compensation of only \$45 000 for living donors and \$10 000 for deceased donors would likely induce a large supply of donated kidneys, so it would be much easier to find donors and recipients who are medically compatible. We recognize that this new proposal is controversial but so was transplanting across the ABO barrier and transplanting patients with diabetes at the time they were proposed.

## Disclosure

The authors of this manuscript have no conflicts of interest to disclose as described by the *American Journal of Transplantation*.

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