


INVITED COMMENTARY

Improved decision-making in living donor kidney transplantation using health data research

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Transplant International 2020; 33: 715–717

Received: 22 May 2020; Accepted: 25 May 2020

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Living donor kidney transplantation remains the gold-standard treatment for patients with end-stage renal disease (ESRD), affording the best outcomes in terms of patient and graft survival for recipients [1]. Weighted against these significant advantages for intended recipients are the ethical considerations of living kidney transplantation, balancing the willingness of donors to donate a kidney to a loved one or stranger with the medical consequences of kidney donation. From a donor perspective, the ability to better define and quantify risks of donation have been facilitated by estimating attributable risks from big data analysis of registries and electronic health records [2]. Improved risk communication, by discussing probabilities of risk from quantifiable data, facilitates informed decision-making for both donors and recipients, respectively, and can enhance the entire assessment process. Surprisingly, despite the connectivity between living donors and the recipients of their kidney, no prediction tool exists to determine outcomes for donor–recipient pairs based upon the interaction of their empirical data.

In this issue of *Transplant International*, Haller and colleagues present their iPREDICTLIVING tool designed to support pretransplant counselling for living kidney

donor–recipient pairs [3]. Utilizing data from living donor kidney procedures performed at the Oslo University Hospital between 1995 and 2007, outcomes for mortality (donor and recipient) and graft loss (recipient) were determined from donor–recipient pair characteristics available at the time of transplantation (which evolved over time such as degree of sensitization to donor-specific HLA epitopes). Analysing data from 1854 donors and 837 recipients, with median follow-up 14.6 and 13.1 years for donors and recipients, respectively, the investigators observed c-statistics of 0.81 (donor mortality), 0.77 (recipient mortality) and 0.66 (recipient graft loss) in their risk prediction models.

How can the iPREDICTLIVING tool be translated into the clinical setting? The online risk calculator (<http://www.meduniwien.ac.at/nephrogene/index.php/data/iPREICTLIVING>) provided by the authors is a simple user-friendly web interface to be utilized in clinical settings for risk communication and counselling. Sensibly the online risk calculator comes with a clear disclaimer that the bedside risk prediction tool, derived from data at a population–cohort level, should be interpreted with caution at an individual level where numerous confounders and unappreciated variables are at play. With that caveat

in mind, immediate clinical applications are likely to be twofold. Firstly, it can support risk communication for both donors and recipients as an aid to contextualize and improve comprehension of risk. As highlighted in a systematic review of prospective and cross-sectional studies by Zipkin *et al.* [4], visual aids and absolute risk formats can improve patients' understanding of probabilistic information. Secondly, if a potential kidney transplant candidate benefits from multiple potential living kidney donors, it can support the donor selection process. By highlighting the differential predicted risk outcomes, stratified by baseline variables from different living kidney donor candidates, the iPREDICTLIVING tool could improve discussions about risk and outcomes to inform living kidney donor candidacy.

In this analysis, the authors have benefitted from the significant advantages of utilizing Norwegian data, which relate to data completeness and negligible loss of follow-up in a well-characterized clinical cohort. However, limitations to the data modelling must be appreciated for any clinical application of the iPREDICTLIVING tool. This analysis does not account for risks attributable to either donor or recipient ethnicity. Previous work exploring long-term risk to living kidney donors from the Norwegian data registry did not report any non-Caucasian donors from 1963 and 2007 [5], which encompasses the time span for this analysis. Therefore, translation to other ethnic groups would require additional validation due to disparate ethnicity-based risks observed for both living donors [6] or recipients [7]. In addition, emerging clinical evidence continues to be discovered and must be appraised for every living kidney donor candidate. For example, increased body mass index in living kidney donors has been identified as independent risk factor for recipient graft loss [8] but does not factor in the iPREDICTLIVING tool. As highlighted in the accompanying disclaimer on the web interface, the online risk calculator should not be a substitute for clinical discretion and personalized risk appraisal.

The work from Haller and colleagues raises a more pertinent question about the potential opportunities from actively exploring health data research in the transplant setting. The use of health data held in

electronic health records or registries has always posed ethical and legal challenges for some due to the personal nature of the information enclosed. These challenges include the risk of compromising privacy, personal autonomy and/or the need to satisfy public demand for transparency, trust and fairness in the handling of such data [9]. The availability of robust and comprehensive datasets also does not obviate the need for careful study design and validation in different study cohorts. However, as demonstrated by Haller and colleagues, ethically approved and rigorously conducted research using health data can aid innovation that improves patient care and should be actively encouraged for our patients.

To conclude, Haller and colleagues provide the transplant community with the iPREDICTLIVING tool to be utilized as a risk predictor model for potential living donors and recipients. With important caveats in mind, such as translatability to different patient demographics, the tool can be utilized as a simple mechanism to aid risk communication and counselling for living donor–recipient pairs. While other excellent risk calculators are available for the benefit of donors and recipients, this online risk calculator innovates by factoring both donor and recipient variables into risk prediction models for the pair. From a real-world perspective, questions about risk and outcomes are frequently asked by living donor–recipient pairs who have a vested interest in the welfare of their paired opposite. To help answer these questions, Haller and colleagues have shown the benefit of health data research to inform decision-making. Diverse and fragmented healthcare datasets exist for living donors and transplant recipients across many countries. Overcoming barriers to harmonize such datasets is essential for collaborative research to avoid missed opportunities to improve clinical care.

Funding

The author has declared no funding.

Conflicts of interest

The author has declared no conflicts of interest.

REFERENCES

1. Bailey P, Edwards A, Courtney AE. Living kidney donation. *BMJ* 2016; **354**: i4746.
2. Lentine KL, Segev DL. Understanding and communicating medical risks for living kidney donors: a matter of perspective. *J Am Soc Nephrol* 2017; **28**: 12.
3. Haller MC, Wallisch C, Mjoen G, *et al.* Predicting donor, recipient and graft survival in living donor kidney transplantation to inform pretransplant counselling: the donor and recipient linked iPREDICTLIVING tool – a retrospective study. *Transpl Int* 2020; **33**: 729.
4. Zipkin DA, Umscheid CA, Keating NL, *et al.* Evidence-based risk communication: a systematic review. *Ann Intern Med* 2014; **161**: 270.

5. Mjoen G, Hallan S, Hartmann A, *et al.* Long-term risks for kidney donors. *Kidney Int* 2014; **86**: 162.
6. Muzaale AD, Massie AB, Wang MC, *et al.* Risk of end-stage renal disease following live kidney donation. *JAMA* 2014; **311**: 579.
7. Pisavadia B, Arshad A, Chappelow I, *et al.* Ethnicity matching and outcomes after kidney transplantation in the United Kingdom. *PLoS One* 2018; **13**: e0195038.
8. Naik AS, Zhong Y, Parasuraman R, *et al.* The temporal and long-term impact of donor body mass index on recipient outcomes after kidney transplantation – a retrospective study. *Transpl Int* 2020; **33**: 59.
9. Ienca M, Ferretti A, Hurst S, Puhon M, Lovis C, Vayena E. Considerations for ethics review of big data health research: a scoping review. *PLoS One* 2018; **13**: e0204937.