What's the Risk?
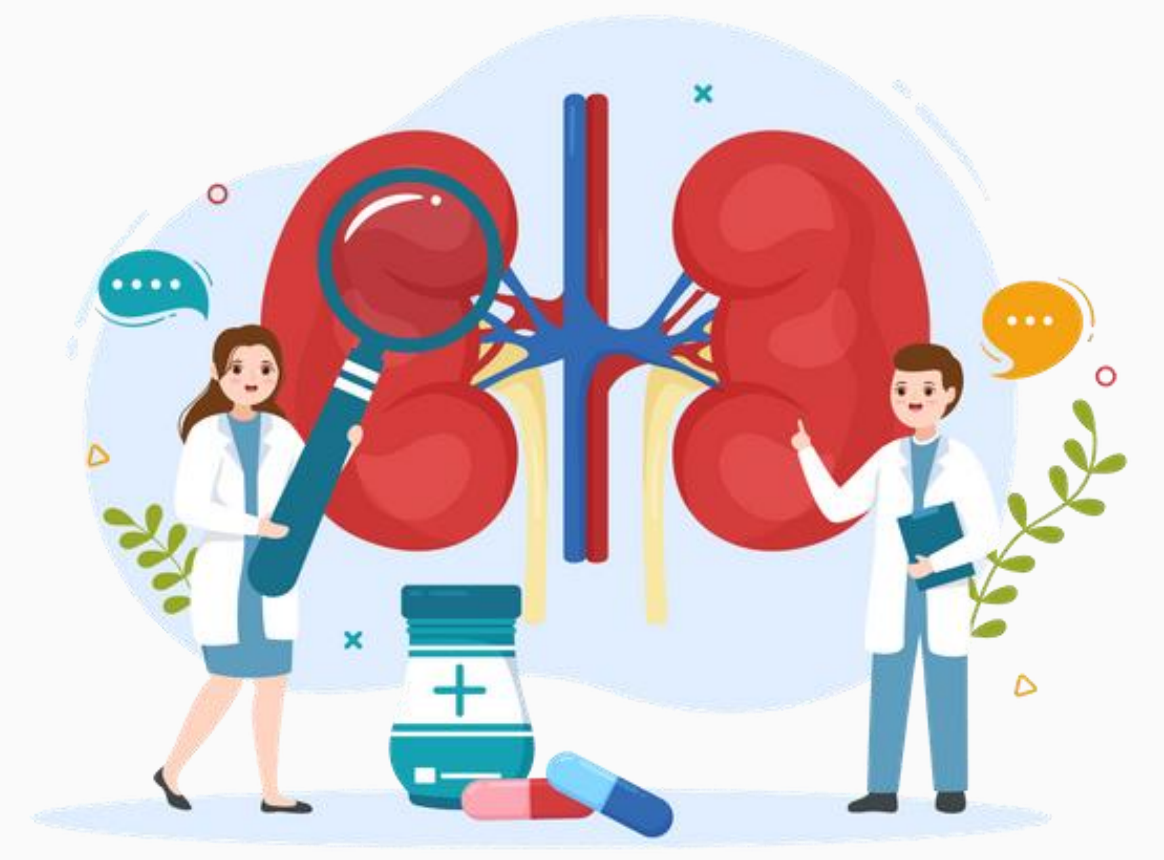## Predicting Kidney Graft Survival Post-Transplantation in the UK Population

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Background

In the UK approximately 70% of kidney transplants are from **deceased donors**. The demand for a donor kidney **greatly outweighs the supply**, so it is important to maximise the number of successful transplants. **Predictive algorithms** can estimate a transplant recipient's risk of graft failure following kidney transplantation, and help clinicians decide whether the offered kidney is the "right" one for the recipient.

If a patient experiences **death before graft failure (DBGF)**, then it is not known how long the transplanted kidney graft would have survived. DBGF influences predictions for graft failure, so DBGF is called a **competing event**.

The **Kidney Donor Risk Index (KDRI)**, developed in the US in 2009, can be used to predict survival following transplantation. It uses 13 donor-related characteristics but **does not consider DBGF as a competing event**.
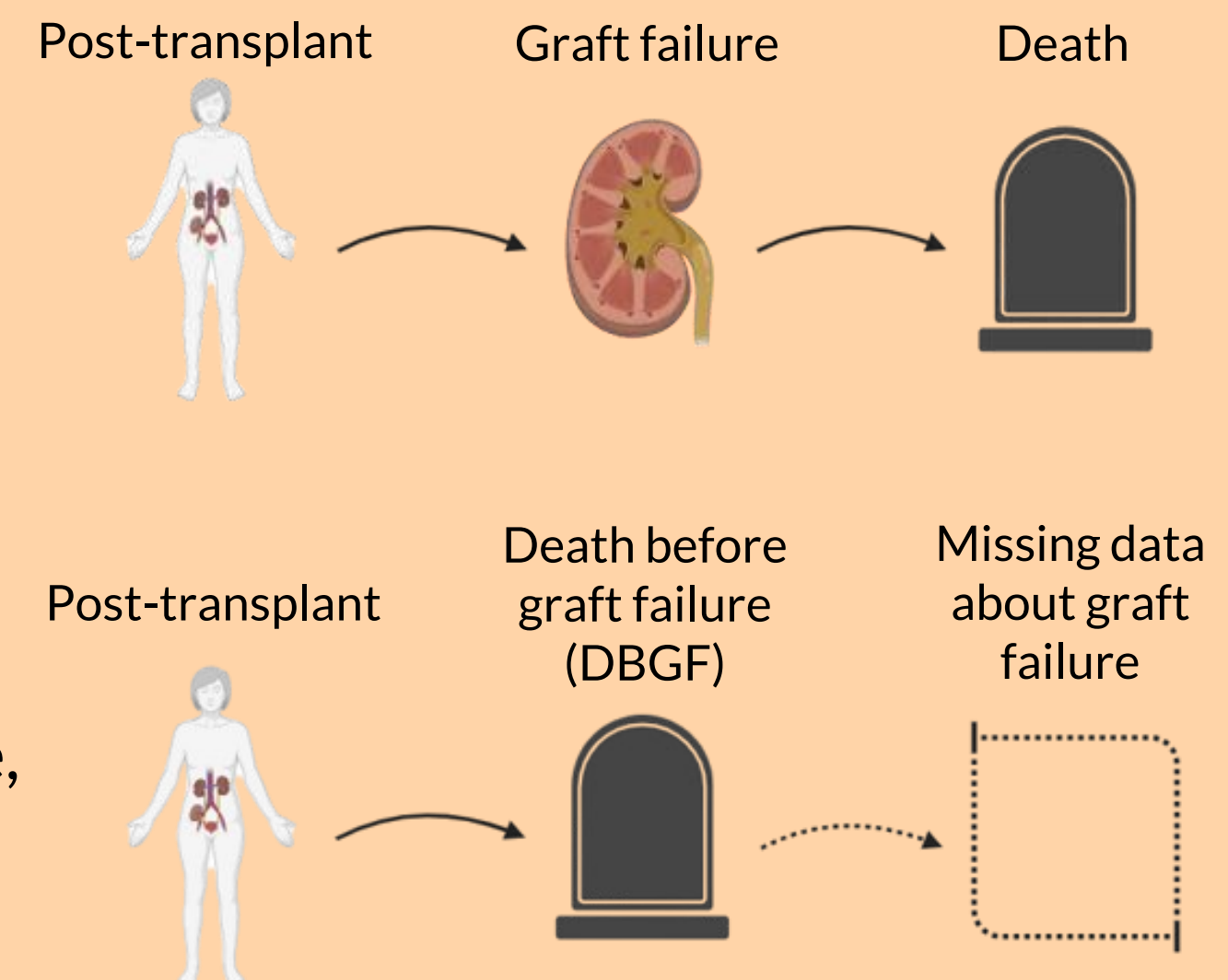
Aims

Assess the predictive performance of the KDRI in the UK transplant population.

Determine whether considering DBGF as a competing event impacts the quality of predictions.

Approach

The KDRI was calculated for **20,035 kidney transplant recipients** across the UK between 2004 and 2018. The predictive performance of the KDRI was assessed both **ignoring** and **accounting for** DBGF as a competing event.

The predictive performance was measured using:
- **Discrimination**: the percentage of patients for whom the algorithm correctly identifies their outcome.
- **Calibration**: the agreement between the observed and predicted risks.

Predictive Performance of the KDRI
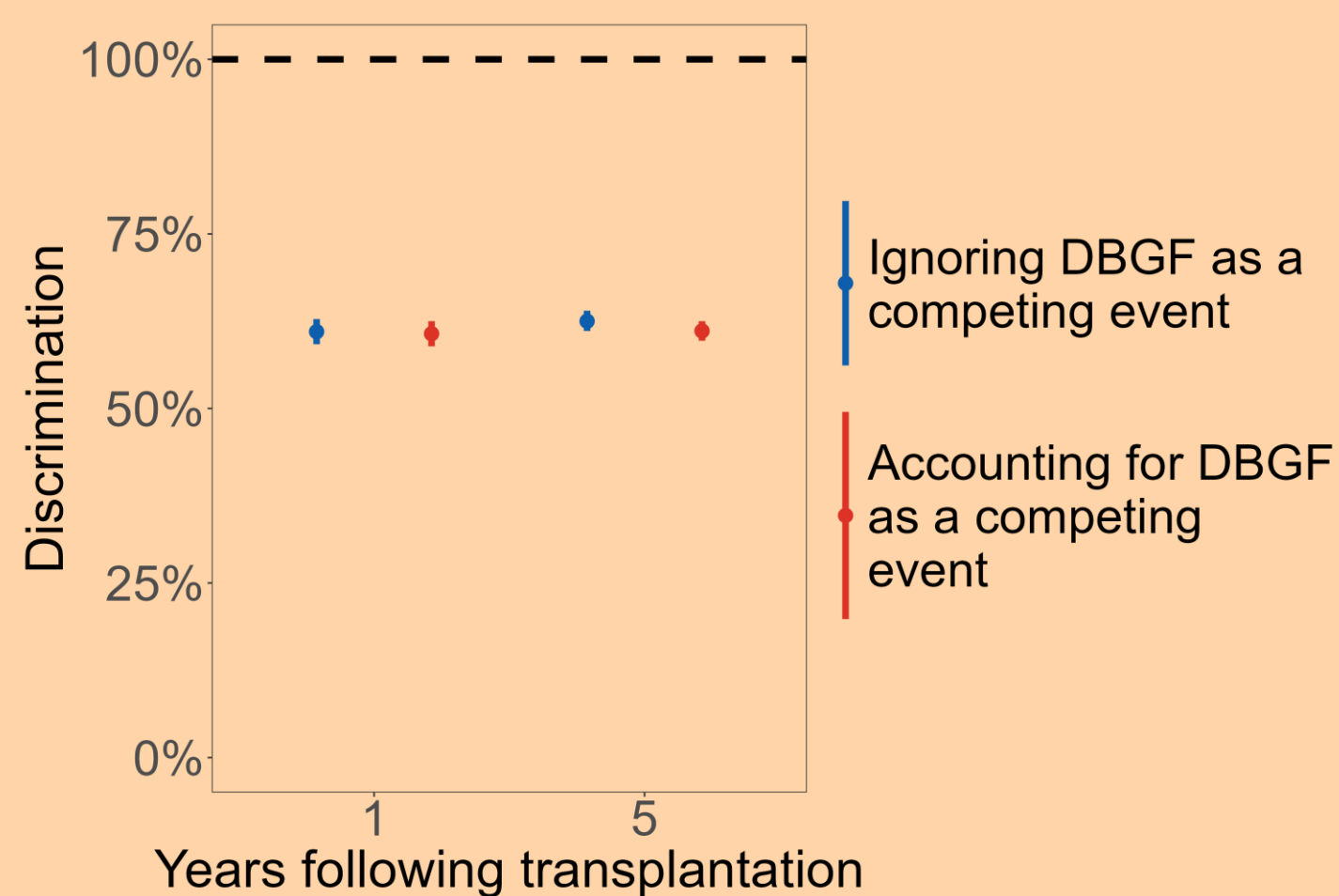
Discrimination, and 95% confidence intervals, of the KDRI. The dashed black line shows the perfect discrimination value.
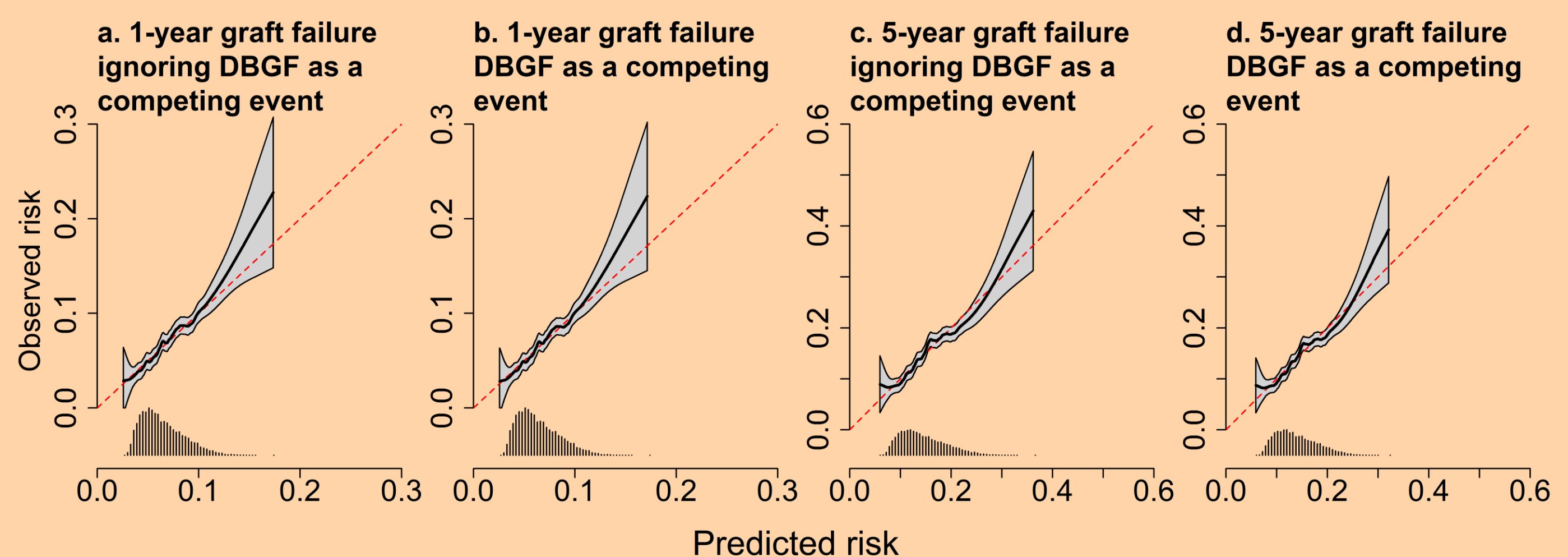
Calibration plots for the KDRI. The dashed red line shows the perfect calibration when the predicted risks are equal to the observed risks.

Conclusions and Future Work

For most UK transplant recipients, the KDRI predicted well. However, it **underestimated the risk** for those at higher risk of graft failure. Ignoring DBGF as a competing event did **not impact** the quality of predictions from the KDRI.

Only 17% of patients had DBGF as a competing event, so future work will seek to provide guidance on **when a competing event should be considered**.

Acknowledgements

UNIVERSITY OF PLYMOUTH
School of Engineering, Computing & Mathematics

UKRI Engineering and Physical Sciences Research Council

NHS University Hospitals Plymouth NHS Trust