The Kidney Failure Risk Equation (KFRE) is a well-validated risk prediction tool for a kidney replacement therapy (KRT) in the next two or five years in individuals with chronic kidney disease (CKD) stages 3a-5. To estimate the risk of KRT, the four-variable KFRE uses:

- Age
- Sex
- Estimated glomerular filtration rate (eGFR)
- Urine albumin:creatinine ratio (ACR)

The **KFRE** was developed and underwent validation in 31 CKD cohorts from 30 countries including over 700,000 individuals and 23,000 KRT cases. The statistical performance to predict KRT was found to be good to excellent in all cohorts. The **KFRE** has subsequently been validated in other independent CKD cohorts including in primary care in the East Midlands. This study led to re-calibration of the KFRE for the UK, a common finding when risk prediction tools are studied in new settings.

Publicly available websites may use the non-UK calibrated KFRE, so caution should be used with these. NICE has made a calculator available for the UK calibrated KFRE. A UK website and calculator can also be accessed here.

The KFRE should be calculated when an individual with CKD Stage 3a-5 has an eGFR and ACR measured. This should be at least on an annual basis, but more frequently with more advanced disease. Table 2 of the NICE CKD guidelines describes frequency of testing for CKD. We would recommend that both eGFR and ACR should be within six months of each other, and ideally within a month.

The **KFRE** will give a risk of KRT over the next two or five years. Five-year predictions may be used in primary care to counsel patients regarding referral to secondary care. Two-year predictions may be more applicable to secondary care when discussing the risk of requiring KRT over a shorter timeframe. Discussing KRT risk should follow NICE's guidelines for 'shared decision making' and should include:

- Discussing KRT risk in the context of a patient's life – such as comorbidities and what matters most to the patient
- Describing KRT risk over the appropriate timeframe using 'natural frequencies' such as '10 in 100', instead of percentages such as '10%'
- Use a mixture of numbers and pictures

As **KFRE** uses eGFR and urine ACR to make a prediction, the same limitations for eGFR and urine ACR are also applicable to **KFRE.** Examples include assessment of patients at extremes of weight or muscle mass, or where a patient is being assessed in the context of acute kidney injury, or for ACR where a patient has a urinary tract infection**.** Please see the sections on **eGFR** and **albuminuria** for further explanation. In addition, **KFRE** should always be viewed in the context of the individual, their comorbidities, and their risk of dying from other causes over a period of the next two/five years.

There has been limited specific validation of the **KFRE** in primary renal pathologies such as glomerulonephritis, cystic kidney disease and vasculitis. Therefore, in these groups caution should be used when making predictions based on **KFRE.**

The UK re-calibrated KFRE has recently been recommended by NICE to guide personalised care for people with CKD stages 3a-5 including referral to secondary care. If the risk of KRT is >5% in the next 5 years, referral should be considered factoring in the patient's 'wishes and comorbidities'. This threshold has replaced the previous recommendation for considering referral if eGFR is less than 30 ml/min/1.73m^2. This is because it is likely to be more sensitive and specific for KRT and may reduce the number of people referred unnecessarily.

Summary

KFRE is a well validated risk prediction for KRT in the next two or five years. It uses age, sex, eGFR and urine ACR. **KFRE**'s use is recommended by NICE for personalised care and guiding referrals to secondary care.

Further information:

- NICE Guidance: Chronic Kidney Disease: Assessment and Management, Sections 1.5.1 and 1.5.5 (2021) - https://www.nice.org.uk/guidance/ng203
- NICE Guidance: Shared Decision Making (2021) - https://www.nice.org.uk/guidance/ng197Tangri N *et al., JAMA*. 2011 Apr 20;305(15):1553-9.
- Tangri N *et al,* JAMA 2016;315(2):164-74.
- Major RW *et al.* PLoS Medicine 2019;16(11):e1002955.