nephron
Clinical
Practice

Nephron 2017;137(suppl1):343–346
DOI: 10.1159/000481380

Published online: September 29, 2017

UK Renal Registry 19th Annual Report: Appendix D Methodology for Analyses of CCG/HB Incidence and Prevalence Rates and of Standardised Ratios

This appendix describes the methods used for calculating the standardised incidence ratios for the incident UK RRT cohort, the standardised prevalence ratios for the total UK RRT cohort and the standardised ratios for prevalent transplant patients.

Patients

For the incidence rate analyses, all new cases recorded by the UK Renal Registry (UKRR) as starting RRT in each year were included. For the prevalence rate analyses, prevalent patients at the end of the year were included.

Years used

Analyses have been completed for each of the last six years. Combined analyses over the six years have also been done for the incidence rates and rate ratio analyses as there can be small numbers of incident patients particularly in the smaller areas.

Geography

The areas used were the 209 English Clinical Commissioning Groups (CCGs), the seven Welsh Local Health Boards, the 14 Scottish Health Boards and the five Health and Social Care Trusts in Northern Ireland; these different types of area are collectively called CCG/HBs here. Patients were allocated to CCG/HBs using the patient's postcode (rather than the GP postcode). For the incidence rate analyses the patients' postcodes at start of RRT were used. For the prevalence rate analyses the postcodes at the end of the relevant year were used. Each postcode was linked to the ONS postcode directory (ONSPD) to give the CCG/HB code. The ONSPD contains National Statistics data © Crown copyright and database right 2015 and also Ordnance Survey data © Crown copyright and database right 2015.

Areas included in the UK Renal Registry 'covered' population

One renal centre (Cambridge) was unable to submit 2015 data to the UKRR by the closing of the database. As a consequence, coverage of the UK was complete for only five of the six years used in these analyses (2010 to 2014 complete, 2015 not complete). As an approximation, for these analyses, it was decided to use the 2014 incident and prevalent patients from Cambridge twice (for 2014 and as an approximation to the unavailable data for 2015). This was done as individual patient level data was needed for the age-gender standardisation. As the actual 2015 numbers for Cambridge were thought to be higher than for 2014, using 2014 data as an approximation to 2015 data has likely caused an underestimation of the true rates (or perhaps an over-estimation for some CCGs), and CCGs that are affected by this 'fix' have been highlighted in the relevant tables.

KARGER

Fax +41 61 306 12 34
E-Mail karger@karger.com
www.karger.com/nef

UK Renal Registry, Southmead Hospital, Southmead Road,
Bristol, BS10 5NB, UK
Email: renalregistry@renalregistry.nhs.uk

Population data

Mid-2015 population estimates by CCG/HB, gender and age group were obtained from the Office for National Statistics (ONS) website (www.statistics.gov.uk), the Northern Ireland Statistics and Research Agency (NISRA) website (www.nisra.gov.uk) and the National Records of Scotland website (www.nrscotland.gov.uk). These mid-2015 population estimates are projections based on the 2011 Census data. The CCG/HB populations range from 21,700 (Orkney) to 1.15 million (Greater Glasgow and Clyde).

The analysis for each year uses this mid-2015 population data. As the analyses only cover six years this was a reasonable approximation.

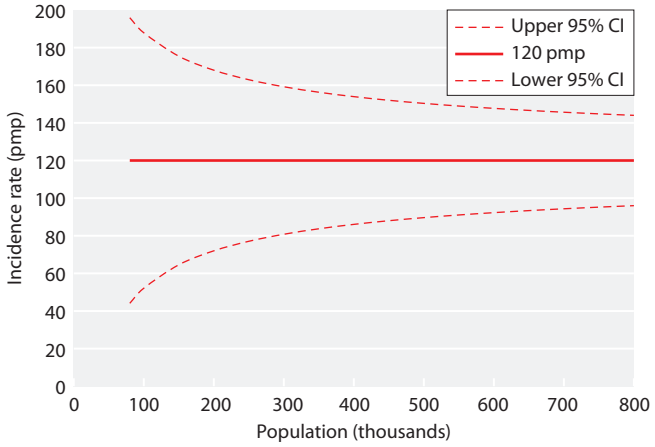

Fig. D.1. 95% confidence limits for incidence rate of 120 pmp for population size 80,000–800,000

Calculation of rates and rate ratios

Crude rates

The crude rates, per million population (pmp), were calculated for each CCG/HB for each year:

$$1{,}000{,}000 \times (\text{observed number})/(\text{population size})$$

For the combined years analyses the observed cases are summed over the available years and the population is multiplied by the number of years that the area has been covered. This is a rate per million population **per year**. It is an average over the available years.

Confidence intervals have not been calculated for these (single or combined years) rates but, if required, an assessment can be made of whether the rate for a given area is consistent with the rate in the whole covered population. This can be done by using the figures provided here showing the confidence intervals around the overall average rates for a range of CCG/HB population sizes. These are figures D.1 and D.2 for incidence rates, and D.3 and D.4 for prevalence rates.

Note that when using the confidence interval figures to assess how different an area's combined years crude incidence rate is from the overall average, the population looked up on the x-axis should be the area's population multiplied by the number of years of data that has been used (i.e. six). In doing this, the confidence intervals obtained become narrower, consistent with the analysis now being based on more than one year of data.

These confidence intervals have been obtained using the Normal approximation to the Poisson distribution. For the incident analyses, confidence intervals have

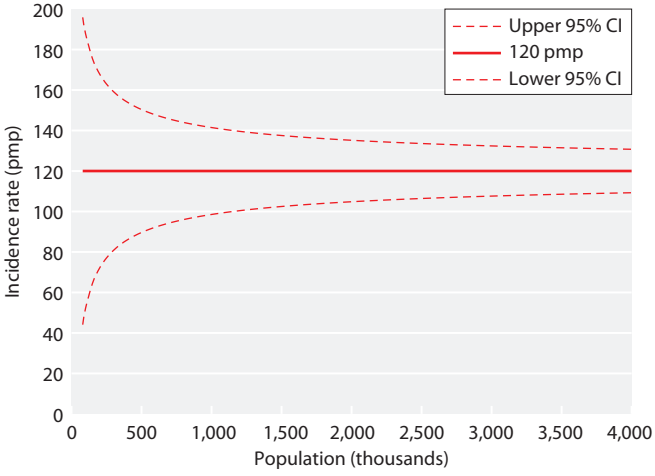

Fig. D.2. 95% confidence limits for incidence rate of 120 pmp for population size 80,000–4 million

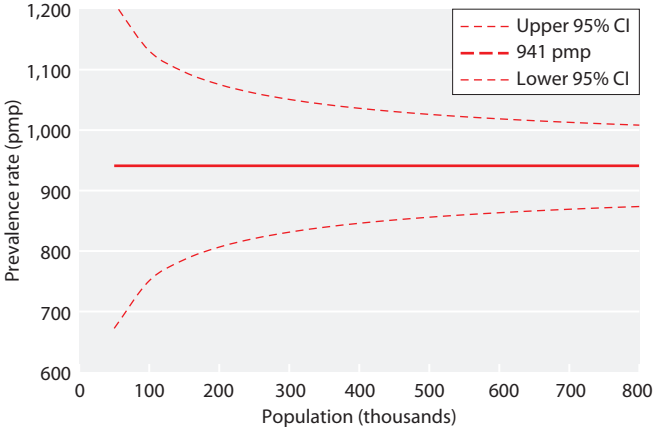

Fig. D.3. 95% confidence limits for prevalence rate of 941 pmp for catchment population size 50,000–800,000

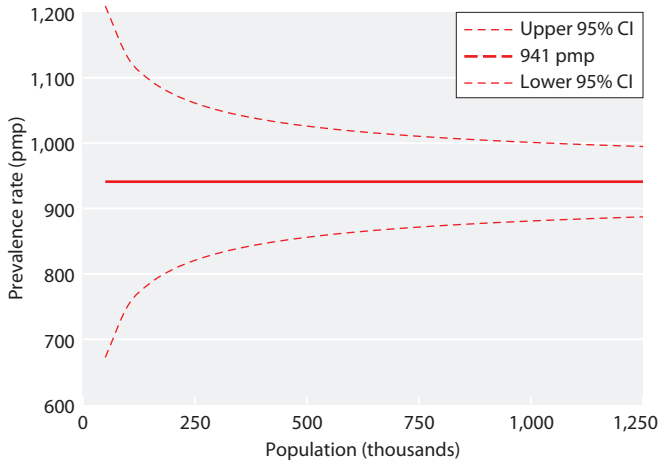

Fig. D.4. 95% confidence limits for prevalence rate of 941 pmp for catchment population size 50,000–1.25 million

only been calculated around the overall average for populations of over 80,000. This is because below this level the number of cases you would expect per area is low – with low expected numbers the Poisson distribution is skewed and the Normal approximation to it is not appropriate. Due to prevalence rates being higher, confidence intervals can be obtained using this method for lower population sizes.

Standardised incidence/prevalence ratios (SIR/SPR or SR)

There are large differences in incidence and prevalence rates for RRT between age and gender groups. As there are also differences in the age/gender breakdowns of the different areas it is useful to produce estimates standardised for age and gender. The method used is *indirect* standardisation.

Observed cases (O*i*) were calculated by summing all cases in all age and gender bands for each CCG/HB. Expected cases (E*i*) for each CCG/HB were calculated as follows:

Overall crude rates (for each year) were calculated for the whole covered population (the *standard population*) by summing the observed numbers, over the CCG/HBs, for each age/gender band and dividing this by the total covered population in that age/gender band. These crude rates (by age/gender band) were then multiplied by the population each CCG/HB has in each band to give the number of cases expected in that band if that CCG/HB had the same rates as the standard population.

These expected numbers were then summed over the age/gender bands to give an expected total number of cases in each CCG/HB. The age/gender standardised ratio (SR) for CCG/HB i is then O_i/E_i.

The expected number of cases is the number you would see if the rates seen in the standard population applied to that individual CCG/HB's age/gender breakdown. 95% confidence intervals were calculated for each area using an error factor (EF) as follows:

$$LCL = SR/EF$$

$$UCL = SR \times EF$$

Where $EF = \exp(1.96/\sqrt{(O_i)})$.

A standardised ratio (SR) of 1 indicates that the area's rate was as expected if the age/gender rates found in the total covered population applied to the CCG/HB area's population structure; a value above 1 indicates that the observed rate was greater than expected given the area's population structure, if the lower confidence limit was above one this was statistically significant at the 5% level. The converse applies to standardised ratios below one.

The combined years analyses are similar to the above except that the observed and expected numbers are summed over the years.

Remaining variability between rates

Even after standardisation there remains a large amount of variability between CCG/HBs – as can be seen by the large numbers of significantly low or high standardised ratios. This is partly because these ratios have only been adjusted for age and gender and not for ethnicity or any other factors. Higher rates are expected in populations with a high percentage of patients from South Asian or Black backgrounds and so it is hoped that in the future the UKRR will also do analyses further standardised for ethnicity.