The 21st UK Renal Registry Annual Report: A Summary of Analyses of Adult Data in 2017

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Introduction

The UK Renal Registry (UKRR) collects, analyses and reports data from the UK's 71 adult and 13 paediatric renal centres. Recently, the UKRR dataset was widened to include not only patients on renal replacement therapy (RRT) for end-stage kidney disease (ESKD) but also patients with acute kidney injury (AKI) in primary and secondary care (in England only) and patients with chronic kidney disease (CKD) in secondary care nephrology not on dialysis.

The UKRR annual report comprises renal centre comparisons and analyses of attainment of the Renal Association audit measures published in their guidelines [1], national averages and long-term trends. Currently, only patients on RRT for ESKD are included.

To improve the timeliness of data reporting, the format of the UKRR 21st Annual Report – data to December 31, 2017 [2] differs significantly to that of previous years. In brief, there is now very little clinical commentary, there are fewer chapters and these reflect treatment types and stage, and there is greater alignment of analyses to the Renal Association guidelines [1] – consequently, for example, phosphate and parathyroid hormone are no longer included in the report.

In this article, we summarise the analyses of adult patient data presented in the UKRR 21st Annual Report. The corresponding paediatric summary is published separately in this issue. The full report can be accessed at https://www.renalreg.org/reports/data_to_end_2017.

Materials and Methods

The UKRR collected data on adult patients receiving RRT for ESKD at the UK's 71 adult renal centres during 2017. As in previous years, most data items were collected from renal centres via secure and automatic quarterly downloads from the renal centre IT systems to the UKRR database. English, Welsh and Northern Irish renal centres sent their data directly to the UKRR, where the data were cleaned and validated before analyses were conducted. Scottish data were collected, validated and published by the Scottish Renal Registry before they were shared with the UKRR [3]. Dialysis access data at dialysis initiation were collected separately via the dialysis access audit spreadsheet submitted by renal centres. Data linkages with NHS Blood and Transplant and Public Health England enabled analyses of the care of transplant patients and of healthcare associated infections in RRT patients, respectively.

Patients starting RRT can be coded as AKI or ESKD by the treating nephrologists. Patients receiving RRT for AKI were only included in the analyses if they were later recoded as ESKD. Recoding could have occurred when the patient's clinician decided renal

Fig. 1. An example of a patient cohort diagram used in the 21st UKRR Annual Report – pathways adult patients could follow to be included in the UK 2017 prevalent RRT population. HHD, home

haemodialysis; AKI, acute kidney injury; RRT, renal replacement therapy; PD, peritoneal dialysis; ESKD, end-stage kidney disease; CKD, chronic kidney disease.

recovery would not take place, or automatically at 90 days after RRT start. Patients who recovered kidney function within 90 days of RRT start were excluded from analyses, but patients who died within 90 days of RRT start were included.

The incident cohort was those patients new to RRT for ESKD in 2017, while the prevalent cohort was all patients on RRT for ESKD at the end of 2017.

Analyses of adult data for the 21st Annual Report were grouped into the following chapters: incidence; prevalence; in-centre haemodialysis (ICHHD); peritoneal dialysis (PD); transplant and access to transplant.

Each chapter was split into 4 sections. First, an introduction, which included a diagrammatic explanation of the relevant patient cohort, Figure 1 as an example. Second, the rationale for analyses, which was based primarily on the Renal Association guidelines [1]. Third, a short list of key findings and fourth, the analyses, which comprised tables and figures. Some analyses, such as patient survival, were on historic cohorts to allow sufficient time for follow-up. If a renal centre's data completeness for a data item was below 70%, the centre was excluded from an analysis, but the national total included the centre's available data.

More details about the methods underpinning the UKRR 21st Annual Report are available in Appendix A at https://www.renal-reg.org/wp-content/uploads/2019/05/21st_UKRR_Annual_Report_AppA.pdf.

Results

Incidence of RRT in Adults in the United Kingdom in 2017

In 2017, 8,001 adult patients commenced RRT for ESKD in the United Kingdom, which represented a 2.6% increase in absolute numbers of starters from 2016 and an overall UK incidence rate of 121 per million population (pmp). The incidence rate has increased over the last 5 years: 109 pmp in 2013, 115 pmp in 2014, 120 pmp in 2015, and 118 pmp in 2016. The majority of patients were male (64.1%) with a median age of 63.7 years, although this was dependent on ethnicity (White 65.8 years, South Asian 61.1 years and Black 56.5 years). Diabetes remained the leading identifiable cause of ESKD in patients starting RRT (29.4%).

By day 90 after RRT start, and excluding the 5.9% of patients who had died or stopped treatment by then, 68.6% of patients were on ICHHD, 0.8% on home haemodialysis (HHD), 20.3% on PD and 10.2% had a functioning transplant (Fig. 2). These proportions have remained

largely static over the last 5 years, with modest increases in HHD (0.6–0.8%) and in transplant (8.7–10.2%), at the expense of ICHD.

The proportion of patients presenting late to nephrology (using a 2 year incident cohort, 2016–2017) – defined as being first seen by renal clinicians within 90 days of RRT start – was 16.1%, although this varied considerably between renal centres (6.1–40.5%). Patients presenting late were more likely to be anaemic (92 g/L for late vs. 100 g/L for timely) and, in those starting dialysis, were less likely to do so with definitive dialysis access, defined as an arteriovenous fistula, arteriovenous graft or a PD catheter (10.3% for late vs. 61.5% for timely; Fig. 3). Patients presenting late were also less likely to be transplanted within 3 months after dialysis start (0.3% for late vs. 1.7% for timely).

The UKRR reports survival of patients starting RRT in a variety of ways to allow centre and international comparisons. Using a 2 year incident cohort (2015–2016), the 90 day age-adjusted (to age 60 years) survival for all RRT patients was 96.6%, while the 1 year after 90 day survival was 90.4% (compared to 96.6 and 90.1%, respectively, in the previous report). No centres were outside the 99.9% survival CIs on a rolling 4 years incident cohort (2013–2016). There was no documented cause of death in 41.4% of deaths in the first 90 days. For deaths with cause of death data, 24.4% were due to cardiac disease and 19.6% were due to infection.

Prevalence of RRT in Adults in the United Kingdom in 2017

There were 64,887 adults receiving RRT for ESKD in the United Kingdom at the end of 2017, representing an increase of 3.0% from 2016 and a UK prevalence rate of 983 pmp. The prevalence rate has increased over the last 5 years: 888 pmp in 2013, 913 pmp in 2014, 941 pmp in 2015 and 962 pmp in 2016.

Most patients on RRT had a functioning transplant (55.2%) followed by ICHD (37.3%), PD (5.4%) and HHD (2.0%). The majority were male (61.1%), and the median age was 59.2 years, but depended on treatment type (ICHD 67.5 years, HHD 55.3 years, PD 64.4 years and transplant 54.8 years). Compared to 2016, the ICHD population increased by 1.4%, the HHD population by 3.9% and the transplant population by 5.1%, while the PD population fell by 2.3% (Fig. 4).

For dialysis patients, there were no centres below the 99.9% CI for age-adjusted (to age 60 years) 1 year prevalent patient survival. About 38.3% of all RRT patients had no cause of death data; for those with data the leading

Fig. 2. RRT modality at day 90 for incident adult RRT patients in 2017. HHD, home haemodialysis; PD, peritoneal dialysis; ICHD, in centre haemodialysis.

cause of death was cardiac causes (28.9%) in patients aged <65 years, while infection (20.9%) and dialysis treatment withdrawal (20.9%) were the leading causes of death in patients aged ≥65 years.

Adults on ICHD in the United Kingdom in 2017

Most ICHD patients received dialysis 3 times per week (94.5%) and had dialysis for between 4 and 5 h (74.5%). In total, 86.8% achieved dialysis adequacy as defined by a urea reduction ratio of >65%.

Totally, 92.6% of patients were on an erythropoiesis-stimulating agent (ESA) at a median dose of 8,000 IU/week, with the UK ICHD median haemoglobin being 111 g/L. 0.8% of ICHD patients had a haemoglobin <100 g/L not on an ESA and 19.2% had a haemoglobin >120 g/L on an ESA.

About 82.6 and 80.3% of patients, respectively, achieved the midweek predialysis potassium target range (4.0–6.0 mmol/L) and the bicarbonate target range (18–26 mmol/L), while 10.8% of patients were above the target range for adjusted calcium (2.2–2.5 mmol/L).

Sixteen of 41 centres that provided adequate data achieved the 80% target for definitive dialysis access amongst prevalent dialysis patients (Fig. 5).

The 2-year rates (2016–2017) in England and Wales of methicillin-resistant *Staphylococcus aureus* and methicillin-sensitive *S. aureus* bacteraemia were 0.19/100 patient years and 2.55/100 patient years, respectively.

Fig. 3. First dialysis access at RRT start for incident adult dialysis patients in 2017 by presentation time. NTL, non-tunnelled line; TL, tunnelled line; AVF, arteriovenous fistula; AVG, arteriovenous graft; PD, peritoneal dialysis; RRT, renal replacement therapy.

Fig. 4. Growth in numbers of prevalent adult RRT patients by RRT modality between 2007 and 2017. HHD, home haemodialysis; PD, peritoneal dialysis; ICHD, in centre haemodialysis; RRT, renal replacement therapy.

Adults on PD in the United Kingdom in 2017

The median age of PD patients was 64.4 years and 60.5% were male. Forty percent of PD patients were on continuous ambulatory PD and 60% were on automated PD.

The median haemoglobin and ferritin for PD patients were 111 g/L and 308 µg/L, respectively. Compared to ICHD, a lower proportion of PD patients was on an ESA (78.6%), and the median dose was lower (4,000 IU/week).

The 2-year PD peritonitis rate (2016–2017, England only) was 45/100 PD patient years (1 in 26.7 months), but there was marked variation between centres (Fig. 6). In future, results will be published allowing centres to be identified.

Adults with a Kidney Transplant in the United Kingdom in 2017

There was a 4% increase in overall kidney transplant numbers performed in 2017 compared to 2016, with a 10% increase in transplants from donors after brain death (DBD), but a 2% fall from donors after circulatory death (DCD) and a 1% fall from living kidney donors (LKD). The median estimated glomerular filtration rate (eGFR) 1 year after transplantation, for patients transplanted between 2010 and 2016, was 57.2 mL/min/1.73 m² from LKD, 52.3 mL/min/1.73 m² from DBD and 47.6 mL/min/1.73 m² from DCD. About 15.9% of transplant patients had an eGFR <30 mL/min/1.73 m². The median

Fig. 5. Dialysis access used for prevalent adult dialysis patients in 2017 by centre. Number of patients on dialysis in a centre in brackets. Centres are sorted by decreasing proportion of patients on RRT with a line. Renal centre abbreviations are available at: https://www.renalreg.org/wp-content/uploads/2019/05/21st_UKRR_Annual_Report_Abbrev.pdf. AVF, arteriovenous fistula; AVG, arteriovenous graft; PD, peritoneal dialysis.

decline in eGFR slope of prevalent patients beyond the first year after transplantation was $-0.77 \text{ mL/min/1.73 m}^2$.

Even using the higher target of 140/90 mm Hg, on account of incomplete proteinuria data to differentiate the lower target of 130/80 mm Hg, there was marked centre variation in the attainment of target blood pressure in transplant recipients, as shown for patients with an eGFR $<30 \text{ mL/min/1.73 m}^2$ (Fig. 7).

Access to Kidney Transplantation for Adults in the United Kingdom in 2017

This analysis aimed to evaluate whether access to kidney transplant wait listing and access to kidney transplantation were equitable for adults in the United Kingdom. Patients who commenced RRT (2012–2014) were followed up to assess rates of wait listing (Fig. 8) and wait-listing times within 2 years, followed by rates of transplantation within 2 years of wait listing.

Fig. 6. PD peritonitis rates per 100 PD patient years (2016–2017 data) for prevalent adult PD patients (England only) by centre. PD, peritoneal dialysis.

Fig. 7. Percentage of prevalent adult transplant patients in 2017 with eGFR <30 mL/min/1.73 m² achieving blood pressure of <140/90 mm Hg by centre. The number preceding the centre name

indicates the percentage of missing data for that centre. DBP, diastolic blood pressure; E, England; NI, Northern Ireland; SBP, systolic blood pressure; W, Wales.

Fig. 8. Percentage of incident adult RRT patients (2012–2014 data) wait listed prior to or within 2 years of starting RRT by centre. RRT, renal replacement therapy.

After adjusting for age, sex and primary renal disease (PRD), there was no significant difference in the likelihood of kidney transplant wait listing for adult non-White patients within 2 years of starting RRT, compared to adult White patients. However, once on the waiting list, non-White patients had a 61% lower chance of receiving a kidney transplant of any type within 2 years (OR 0.39, 95% CI 0.35–0.44).

Compared to men, women had a 13% lower chance of being added to the kidney transplant waiting list within 2 years of starting RRT (OR 0.87, 95% CI 0.80–0.94), after adjusting for age, ethnicity and PRD. Once on the transplant waiting list, women had a 16% lower chance of receiving a kidney transplant of any type within 2 years (OR 0.84, 95% CI 0.75–0.93).

Patients treated at non-transplant centres were less likely to be wait listed within 2 years of starting dialysis compared to patients treated at transplant centres (OR 0.68, 95% CI 0.62–0.74), after adjusting for age, ethnicity, sex and PRD. They were also less likely to receive a transplant within 2 years of wait listing (OR 0.88, 95% CI 0.79–0.99), although this varied between donor types. Patients at non-transplant centres were more likely to receive a DCD kidney (OR 1.38, 95% CI 1.19–1.60), but were less likely to receive an LKD kidney (OR 0.65, 95% CI 0.58–0.74); there was no significant difference in the likelihood of receiving a DBD kidney (OR 1.05, 95% CI 0.91–1.21).

Future Analyses

The new format of the UKRR annual report better reflects the patient journey with kidney disease and makes

it easier to add new chapters. The UKRR 22nd Annual Report – data to December 31, 2018, will include a separate chapter on the HHD cohort of patients. Patients with CKD or AKI will be presented in future reports, which will enable greater understanding about which patients go on to start RRT and, for the first time, report patients who do not receive RRT for ESKD. Analyses will continue to be updated to reflect the latest Renal Association guidelines [1] and both patient reported experience measures and patient reported outcome measures are likely to contribute to future reports.

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Statement of Ethics

The 21st UKRR Annual Report was produced in accordance with the provisions and regulations of the government of the United Kingdom and Northern Ireland, the National Health Service in England, Northern Ireland, Scotland and Wales, the Information Commissioner's Office and where applicable the devolved governments of Northern Ireland, Scotland and Wales. Due to the number of patients whose data are included in the annual report, the UKRR relies on provisions under health and social care legislation (both British and devolved) that nullify the requirement for common law consent to be collected for audit purposes.

Disclosure Statement

The authors have no conflicts of interest to declare.

Author Contributions

All authors made a substantial contribution to the content included in this summary, participated in drafting and critically revising the summary, approved the final version to be published and agreed to be accountable for all aspects of the work.

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