The European Renal Association – European Dialysis and Transplant Association Registry Annual Report 2014: a summary

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A summary of the 2014 ERA-EDTA Registry Annual Report
Abstract

**Background:** This article summarizes the European Renal Association – European Dialysis and Transplant Association Registry’s 2014 annual report. It describes the epidemiology of renal replacement therapy (RRT) for end-stage renal disease (ESRD) in 2014 within 35 countries.

**Methods:** In 2016, the ERA-EDTA Registry received data on patients who in 2014 where undergoing RRT for ESRD, from 51 national or regional renal registries. Thirty-two registries provided individual patient level data and 19 provided aggregated patient level data. The incidence, prevalence and survival probabilities of these patients were determined.

**Results:** In 2014, 70,953 individuals commenced RRT for ESRD, equating to an overall unadjusted incidence rate of 133 per million population (pmp). The incidence ranged by 10-fold; from 23 pmp in the Ukraine to 237 pmp in Portugal. Of the patients commencing RRT, almost two-thirds were men, over half were aged ≥65 years and a quarter had diabetes mellitus as their primary renal diagnosis. By day 91 of commencing RRT, 81% of patients were receiving haemodialysis. On 31 December 2014, 490,743 individuals were receiving RRT for ESRD, equating to an unadjusted prevalence of 924 pmp. This ranged throughout Europe by more than 10-fold, from 157 pmp in the Ukraine to 1794 pmp in Portugal. In 2014, 19,406 kidney transplants were performed, equating to an overall unadjusted transplant rate of 36 pmp. Again this varied considerably throughout Europe. For patients commencing RRT during 2005–09, the 5-year-adjusted patient survival probabilities on all RRT modalities was 63.3% (95% confidence interval 63.0–63.6). The expected remaining lifetime of a 20- to 24-year-old patient with ESRD receiving dialysis or living with a kidney transplant was 21.9 and 44.0 years, respectively. This was substantially lower than the 61.8 years of expected remaining lifetime of a 20-year-old patient without ESRD.

**Key words:** dialysis, epidemiology, ESRD, kidney transplantation, survival analysis

Introduction

The European Renal Association – European Dialysis and Transplant Association (ERA-EDTA) Registry’s annual report describes the epidemiology of renal replacement therapy (RRT) for end-stage renal disease (ESRD) within Europe and adjacent countries based on data collected via the national and regional renal registries [1]. On an annual basis, we publish a summary of the ERA-EDTA Registry’s annual report that is intended to provide the reader with an overview of the current status of RRT for ESRD in Europe [2–4]. In 2016, we received the 2014 data from 51 national or regional renal registries in 35 countries covering a general population of 531.7 million people. This represented 65.4% of the 2014 European general population. Thirty-two national or regional renal registries from 17 countries provided individual patient data, whereas 19 countries or regions provided aggregated data (see Appendix 1). The proportion of the European population covered by the ERA-EDTA Registry in 2014 was lower than that of 2013 (73.6%) due to the absence of Russia and Slovenia from this year’s annual report.

This summary presents the 2014 incidence and prevalence of patients receiving RRT, kidney transplantation activity and the patient and graft survival in these 35 countries. The methods used to derive the results presented in this overview, along with the full results, can be found in the ERA-EDTA Registry 2014 Annual Report [1].

Incidence of RRT

In 2014, 70,953 individuals commenced RRT for ESRD, which equated to an overall unadjusted incidence rate of 133 per million population (pmp, Table 1). The unadjusted incidence rate was highest in Portugal (237 pmp), Greece (218 pmp) and Cyprus (204 pmp), whereas it was lowest in the Ukraine (23 pmp) and Iceland (58 pmp, Table 1 and Figures 1 and 2). Of the patients commencing RRT, the majority were men (63%), over half were aged ≥65 years (55%) and a quarter had diabetes mellitus (26%) as their primary renal diagnosis (Figure 3). The mean age of the patients commencing RRT in all countries and regions combined was 64.6 years (Table 1). However, this ranged from a mean age of 55.1 years in Albania to 70.1 years in Dutch-speaking Belgium. Of the incident patients alive and receiving RRT at day 91 after the start of treatment, the majority were receiving haemodialysis (81%), 13% were receiving peritoneal dialysis and 6% were living with a kidney transplant (Figure 4). However, the modality of RRT at day 91 after the start of treatment varied considerably between age groups; as the age of the patient increased the proportion of patients receiving either peritoneal dialysis or living with a kidney transplant decreased. Furthermore, patients with a primary renal diagnosis of diabetes mellitus were half as likely to have a kidney transplant by day 91 compared with the non-diabetic group (3% versus 7%).

Prevalence of RRT

On 31 December 2014, 490,743 individuals were receiving RRT for ESRD (Table 2). This equated to an unadjusted prevalence of 924 pmp. Again there was considerable variation between countries, with the highest unadjusted prevalence rates seen in Portugal (1794 pmp), the Spanish regions of Catalonia (1312 pmp), Valencia (1298 pmp), Galicia (1265 pmp) and Murcia (1258 pmp).
**Table 1.** Incidence of RRT in 2014 at day 1, for all primary renal diseases combined and diabetes mellitus types 1 and 2, by count (N) and unadjusted rate per million population, and for all primary renal diseases combined, the mean age at the start of RRT, presented by country/region

| General population covered by the registry in thousands | Incidence in 2014 at day 1 | Total N | Total pmp | Mean age | DM N | DM pmp |
|---------------------------------------------------------|-----------------------------|---------|-----------|----------|------|--------|
| Albania 2863                                           | 252                         | 88      | 55.1      | 30       | 11   |
| Austria 8508                                            | 1036                        | 122     | 64.2      | 259      | 30   |
| Belgium, Dutch-speakinga 6444                          | 1145                        | 178     | 70.1      | 207      | 32   |
| Belgium, French-speakinga 4788                          | 828                         | 173     | 67.5      | 188      | 39   |
| Bosnia and Herzegovina 3508                             | 421                         | 120     | 60.7      | 125      | 36   |
| Bulgariab 7217                                          | 1197                        | 166     | 64.6      | 281      | 39   |
| Croatia 4070                                            | 640                         | 157     | 63.7      | 186      | 46   |
| Cyprus 847                                              | 173                         | 204     | 64.6      | 58       | 69   |
| Czech Republicb 10 222                                  | 2017                        | 197     |           |          |      |
| Denmark 5700                                            | 748                         | 131     | 64.2      | 184      | 32   |
| Estonia 1315                                            | 115                         | 88      | 61.1      | 20       | 15   |
| Finland 5462                                            | 461                         | 84      | 59.3      | 165      | 30   |
| France 66 262                                           | 10 791                      | 163     | 67.6      | 2379     | 36   |
| Georgia 4491                                            | 743                         | 166     | 58.4      | 159      | 35   |
| Greece 10 892                                           | 2372                        | 218     | 69.7      | 575      | 53   |
| Iceland 327                                             | 19                          | 58      | 62.0      | 1        | 3    |
| Israel 8216                                             | 1608                        | 203     | 64.6      | 807      | 98   |
| Italy (6 of 20 regions) 21 274                           | 3243                        | 152     | 68.6      | 558      | 26   |
| Latvia 1590                                             | 152                         | 96      | 63.3      | 23       | 15   |
| Lithuania 2943                                           | 306                         | 104     | 57.8      | 48       | 16   |
| Macedonia 2022                                          | 268                         | 133     | 63.2      | 62       | 31   |
| Montenegroa 622                                          | 58                          | 93      | 56.2      | 20       | 32   |
| Norway 5137                                             | 523                         | 102     | 62.4      | 90       | 18   |
| Poland 36 338                                           | 4341                        | 120     |           |          |      |
| Portugal 10 427                                          | 2473                        | 237     | 63.0      | 1520     | 33   |
| Romania 19 710                                          | 2997                        | 152     | 61.1      | 442      | 22   |
| Serbia 7131                                             | 985                         | 138     | 61.2      | 250      | 35   |
| Slovakia 5421                                           | 831                         | 153     | 63.8      | 316      | 58   |
| Spain 46 771                                            | 6229                        | 133     | 63.0      | 1520     | 33   |
| Spain, Andalusia 8394                                   | 1046                        | 125     | 62.6      | 270      | 32   |
| Spain, Aragon 1329                                      | 163                         | 123     | 64.1      | 40       | 30   |
| Spain, Asturias 1059                                     | 147                         | 139     | 64.5      | 33       | 31   |
| Spain, Basque country 2166                               | 241                         | 111     | 65.5      | 39       | 18   |
| Spain, Cantabriaa 587                                    | 61                          | 104     | 61.4      | 12       | 21   |
| Spain, Castile and Leóna 2487                           | 299                         | 120     | 67.6      | 79       | 32   |
| Spain, Castile-La Manchaa 2069                          | 252                         | 122     | 63.7      | 62       | 30   |
| Spain, Catalonia 7519                                    | 1178                        | 157     | 66.0      | 259      | 34   |
| Spain, Extremadura 1100                                  | 124                         | 113     | 66.0      | 28       | 26   |
| Spain, Galicia 2741                                      | 398                         | 145     | 65.0      | 114      | 42   |
| Spain, Community of Madrid 6454                         | 828                         | 128     | 64.3      | 201      | 31   |
| Spain, Region of Murcia 1467                             | 194                         | 132     | 62.9      | 46       | 31   |
| Spain, Navarre 636                                       | 83                          | 130     | 65.0      | 14       | 22   |
| Spain, Valencian region 5005                             | 704                         | 141     | 65.9      | 156      | 31   |
| Sweden 9696                                              | 1168                        | 121     | 62.5      | 273      | 28   |
| Switzerlandd 8230                                       | 800                         | 97      | 64.5      | 157      | 19   |
| The Netherlands 16 865                                   | 1941                        | 115     | 63.6      | 358      | 21   |
| Tunisia, Sfax region 1186                                | 165                         | 139     | 60.1      | 59       | 50   |
| Turkey 77 696                                            | 11 447                      | 147     | 64.5      | 1042     | 13   |
| Ukraine 42 903                                           | 998                         | 23      | 62.3      | 196      | 5    |
| UK, Englanda 54 317                                      | 6311                        | 116     | 62.3      | 1441     | 27   |
| UK, Northern Irelanda 1840                               | 170                         | 92      | 64.6      | 39       | 21   |
| UK, Scotland 5348                                       | 557                         | 104     | 58.8      | 164      | 31   |
| UK, Walesa 3092                                          | 364                         | 118     | 65.5      | 94       | 30   |
| All countries 531 690                                    | 70 953                      | 133     | 64.6      | 13 566   | 32   |

When cells are left empty, the data are unavailable and, therefore, could not be used for the calculation of the summary data.

DM, diabetes mellitus as cause of renal failure.

*Patients younger than 20 years of age are not reported. The true incidence counts are, therefore, slightly higher than the counts reported here.

Data on incidence include dialysis patients only.

Data on incidence of cause of renal failure (DM) include dialysis patients only.

Data on incidence of cause of renal failure (DM) are based on 2836 of 11 447 patients (24.8%).
pmp), and French- and Dutch-speaking Belgium (1250 pmp and 1238 pmp, respectively, Table 2 and Figures 5 and 6). The unadjusted prevalence of RRT was considerably lower in the Ukraine (157 pmp) and Albania (374 pmp). Of the prevalent patients, the majority were men (60%); however, now just under half were aged ≥65 years (44%) and a fifth had diabetes mellitus (19%) as their primary renal diagnosis (Figure 7). The mean age of the prevalent patients receiving RRT in all countries and regions combined was 60.9 years (Table 2). This ranged from a mean age of 51.4 years in Albania to 66.4 years in Portugal. The majority of prevalent patients were receiving haemodialysis (57%), just over a third of patients were living with a kidney transplant (37%) and only 5% were receiving peritoneal dialysis (Figure 8). Once again the modality of RRT varied considerably between age groups; as the age of the prevalent patients increased the proportion living with a kidney transplant decreased. For those aged 20–44 years, 65% were living with a kidney transplant, whereas this was only 40% of patients aged 65–74 years. Again prevalent patients with a primary renal diagnosis of diabetes mellitus were much less likely to be living with a kidney transplant compared with the non-diabetic group (28% versus 49%).

**Kidney transplantation**

In 2014, 19,406 kidney transplantations were performed that equated to an overall unadjusted transplant rate of 36 pmp (Figure 9). Once again this figure varied considerably between age groups.
countries with the highest unadjusted transplant rates seen in the Netherlands (59 pmp), Spain (57 pmp) and Norway (53 pmp), with some Spanish regions reaching even higher rates. Conversely, the lowest unadjusted transplant rates were reported in the Ukraine (2 pmp), Georgia (6 pmp) and Bulgaria (7 pmp). Overall the unadjusted deceased donor transplant rate was more than double that of the unadjusted living donor transplant rate (27 pmp versus 12 pmp, Figure 10; 68% versus 31%, Figure 11). The highest unadjusted rates of deceased donor transplants were seen in Spain (48 pmp), Croatia (46 pmp) and the Czech Republic (43 pmp, Figure 10), whereas the highest unadjusted rate of living donor transplants were seen in the Netherlands (31 pmp), Turkey (30 pmp) and Northern Ireland (28 pmp, Figure 10).

**Survival of patients receiving RRT**

For patients commencing RRT in the period 2005–09, the 1-, 2- and 5-year-adjusted patient survival probabilities on all RRT modalities were 90.0% [95% confidence interval (CI) 89.9–90.2],
82.8% (95% CI 82.6–83.0) and 63.3% (95% CI 63.0–63.6), respectively (see Appendix 2 and Table 3 for a description of the adjustments made and the countries/regions included in this analysis). For the same cohort of patients commencing dialysis between 2005 and 2009, the 1-, 2- and 5-year-adjusted patient survival probabilities (with kidney transplantation considered as a censored event) were 88.1% (95% CI 87.9–88.2), 79.5% (95% CI 79.2–79.7) and 55.7% (95% CI 55.3–56.1), respectively. Patient survival after a first kidney transplant performed during 2005 and 2009 was much better than for those patients receiving dialysis (Figure 12). For those with a transplant, 5-year-adjusted patient and graft survival remain higher with a living donor transplant compared with a deceased donor transplant [95.7% (95% CI 95.2–96.2) versus 92.3% (95% CI 91.9–92.7) for patient survival and 87.0% (95% CI 86.3–87.8) versus 81.6% (95% CI 81.1–82.2) for graft survival. See Appendix 2 and Table 3 for a description of the adjustments made and the countries/regions included in this analysis.}

Expected remaining lifetime

There remains a substantial difference in the expected remaining lifetime between the general population and those receiving dialysis (Figure 13). Patients aged 20–45 years old...
Table 2. Prevalence of RRT on 31 December 2014, for all primary renal diseases combined and diabetes mellitus types 1 and 2, by count (N) and unadjusted rate per million population, and for all primary renal diseases combined, the mean age of prevalent patients, presented by country/region

| Country               | General population covered by the registry in thousands | Prevalent patients on RRT in 2014 | Total N | Total pmp | Mean age | DM N | DM pmp |
|-----------------------|--------------------------------------------------------|----------------------------------|---------|-----------|---------|------|--------|
| Albania               | 2863                                                   | 1072                             | 374     | 51.4      | 120    | 42   |
| Austria               | 8508                                                   | 9038                             | 1062    | 60.8      | 1791   | 211  |
| Belgium, Dutch-speaking | 6444                                                  | 7980                             | 1238    | 65.5      | 1379   | 214  |
| Belgium, French-speaking | 4788                                                  | 5983                             | 1250    | 64.6      | 1035   | 216  |
| Bosnia and Herzegovina | 3508                                                   | 2662                             | 759     | 59.4      | 501    | 143  |
| Bulgaria              | 7217                                                   | 4168                             | 578     |           |        |      |
| Croatia               | 4070                                                   | 4295                             | 1055    | 64.6      | 1246   | 306  |
| Cyprus                | 847                                                    |                                  |         |           |        |      |
| Czech Republic        | 10 222                                                 | 10 931                           | 1069    |           |        |      |
| Denmark               | 5700                                                   | 5164                             | 906     | 58.4      | 869    | 153  |
| Estonia               | 1315                                                   | 834                              | 634     | 57.8      | 155    | 118  |
| Finland               | 5462                                                   | 4571                             | 837     | 58.8      | 1167   | 214  |
| France                | 66 262                                                 | 80 144                           | 1210    | 62.2      | 12 604 | 190  |
| Georgia               | 4491                                                   | 2096                             | 467     | 56.1      | 435    | 97   |
| Greece                | 10 892                                                 | 13 101                           | 1203    | 63.8      | 2399   | 220  |
| Iceland               | 327                                                    | 221                              | 675     | 56.0      | 24     | 73   |
| Israel                | 8216                                                   | 6286                             | 765     | 60.9      | 2909   | 354  |
| Italy (6 of 20 regions) | 21 274                                               | 24 721                           | 1162    | 61.8      | 2941   | 138  |
| Latvia                | 1590                                                   | 996                              | 627     | 55.7      | 97     | 61   |
| Lithuania             | 2943                                                   | 2146                             | 729     |           |        |      |
| Macedonia             | 2022                                                   | 1543                             | 763     | 56.9      | 225    | 111  |
| Montenegro*           | 622                                                    | 296                              | 476     | 52.4      | 47     | 76   |
| Norway                | 5137                                                   | 4716                             | 918     | 59.1      | 628    | 122  |
| Poland                | 36 338                                                  | 31 106                           | 856     |           |        |      |
| Portugal*             | 10 427                                                  | 18 703                           | 1794    | 66.4      | 3332   | 320  |
| Romania*              | 19 710                                                  | 17 620                           | 894     | 59.9      | 1897   | 96   |
| Serbia                | 7131                                                   | 5860                             | 822     | 58.3      | 936    | 131  |
| Slovakia*             | 5421                                                   | 3273                             | 604     | 62.7      | 1067   | 197  |
| Spain                 | 46 771                                                  | 55 062                           | 1177    | 59.5      | 7630   | 163  |
| Spain, Andalusia      | 8394                                                   | 9537                             | 1136    | 60.0      | 1427   | 170  |
| Spain, Aragon         | 1329                                                   | 1524                             | 1147    | 62.5      | 268    | 202  |
| Spain, Asturias       | 1059                                                   | 1228                             | 1160    | 62.4      | 201    | 190  |
| Spain, Basque country | 2166                                                   | 2571                             | 1187    | 61.5      | 264    | 122  |
| Spain, Cantabria*     | 587                                                    | 601                              | 1025    | 61.0      | 85     | 145  |
| Spain, Castile and León* | 2487                                           | 2696                             | 1084    | 63.8      | 467    | 188  |
| Spain, Castile-La Mancha* | 2069                                          | 2180                             | 1054    | 61.6      | 335    | 162  |
| Spain, Catalonia      | 7519                                                   | 9863                             | 1312    | 62.3      | 1410   | 188  |
| Spain, Extremadura    | 1100                                                   | 1221                             | 1110    | 61.4      | 191    | 174  |
| Spain, Galicia        | 2741                                                   | 3468                             | 1265    | 61.9      | 600    | 219  |
| Spain, Community of Madrid | 6454                                         | 6739                             | 1044    | 61.4      | 1183   | 183  |
| Spain, Region of Murcia | 1467                                      | 1845                             | 1258    | 61.7      | 251    | 171  |
| Spain, Navarre*       | 636                                                    | 714                              | 1122    | 61.9      | 79     | 124  |
| Spain, Valencian region | 5005                                         | 6495                             | 1298    | 62.7      | 853    | 170  |
| Sweden                | 9696                                                   | 9263                             | 955     | 59.5      | 1641   | 169  |
| Switzerland*          | 8230                                                   | 2834                             | 344     | 68.1      | 540    | 66   |
| The Netherlands       | 16 865                                                  | 16 311                           | 967     | 59.9      | 1991   | 118  |
| Tunisia, Sfax region* | 1186                                                   | 806                              | 678     | 58.2      | 140    | 118  |
| Turkey*               | 77 696                                                  | 71 318                           | 918     |           | 2821   | 36   |
| Ukraine               | 42 903                                                  | 6742                             | 157     |           | 902    | 21   |
| UK, England*          | 54 317                                                  | 49 698                           | 915     | 58.4      | 8043   | 148  |
| UK, Northern Ireland* | 1840                                                   | 1598                             | 868     | 58.2      | 243    | 132  |
| UK, Scotland          | 5348                                                   | 4757                             | 890     | 56.5      | 724    | 135  |
| UK, Wales*            | 3092                                                   | 2828                             | 915     | 59.5      | 483    | 156  |
| All countries         | 531 690                                                 | 490 743                          | 924     | 60.9      | 62 962 | 155  |

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DM, diabetes mellitus as cause of renal failure.

*Patients younger than 20 years of age are not reported. The true prevalent counts are, therefore, slightly higher than the counts reported here.

Data on prevalence include dialysis patients only.

The overall prevalence of RRT is underestimated by approximately 3% due to an estimated 30% underreporting of patients living on a functioning graft.

Data on the prevalence of cause of renal failure (DM) are based on 8897 of 71 318 patients (12.5%).
receiving dialysis are expected to live only one-third as long as the age-matched general population. The prospect is even worse for patients aged 55–64 years, as they are expected to live only a quarter as long as their age-matched counterparts in the general population. Patients living with a kidney transplant fare better than their counterparts receiving dialysis. However, for the transplant recipients aged 20–49 years their life expectancy is still approximately one-third less than that of the age-matched general population. As the age of the transplant recipient increases, the disparity in life expectancy increases.
expectancy with the age-matched general population also increases.

**Affiliated registries**

Albanian Renal Registry (M. Barbullushi, A. Koroshi and all team of Nephrology); Austrian Dialysis and Transplant Registry (OEDTR) (R.K.); Dutch-speaking Belgian Society of Nephrology (NBVN) (B. De Moor, F. Schroven and J. De Meester); French-speaking Belgian Society of Nephrology (GNFB) (J.-M. de G. and F. Collart); Renal Registry Bosnia and Herzegovina (H.R., L. Lukić and S. Corić); Bulgarian (E.S.V., I. Velinova and M. Gitcheva); Croatian Registry of Renal Replacement Therapy (CRRRT) (I.B., S. Rački and N. Janković); Cyprus Renal Registry (K.I. and all of the renal units providing data); Czech Republic: Registry of Dialysis Patients (RDP) (I. Rychlík, J. Potucek and F.L.); Danish Nephrology Registry (DNS) (J.G.H.); Estonia: Registry of Dialysis Patients (E. Pechter, M.R. and K. Lilienthal); Finnish Registry for Kidney Diseases (P.F. and C. Groenhagen-Riska); France: The Epidemiology and Information Network in Nephrology (REIN) (M.L. and C. 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Fig. 7. Unadjusted prevalent percentages by (A) gender, (B) age and (C) primary renal diagnosis on 31 December 2014. See Appendix 1 for a list of countries and regions supplying individual patient level or aggregated level data.
Fig. 9. Kidney transplants performed in 2014, as counts and per million population (unadjusted) by country/region. Registries providing individual patient data are shown as dark bars and registries providing aggregated data as light bars. Data based on patients aged ≥20 years in Dutch-speaking Belgium, French-speaking Belgium, Montenegro, the Spanish regions of Cantabria, Castile and Leon, Castile-La Mancha and Navarre, and the UK: England, Northern Ireland and Wales. The total count for Austria is based on residents and non-residents. For Romania the transplantation activity reflects 70% of the total transplantation activity in the country due to an underreporting of pre-emptive transplantation.
Fig. 10. Unadjusted deceased donor (left panel) and living donor (right panel) kidney transplants per million population performed in 2014 by country/region. Registries providing individual patient data are shown as dark bars and registries providing aggregated data as light bars. Data based on patients aged ≥20 years in Dutch-speaking Belgium, French-speaking Belgium, Montenegro, the Spanish regions of Cantabria, Castile and León, Castile-La Mancha and Navarre, and the UK: England, Northern Ireland and Wales. The total count for Austria is based on residents and non-residents. For Romania, the transplantation activity reflects 70% of the total transplantation activity in the country due to an underreporting of pre-emptive transplantation.

Fig. 11. Percentage of kidney transplants performed in 2014 by kidney donor type. See Appendix 1 for a list of countries and regions supplying individual patient level or aggregated level data.
Table 3. The 1-, 2- and 5-year survival probabilities by treatment modality and cohort from day 1 of the start of RRT/dialysis or from the day of transplantation

| Survival probabilities as percentage (95% CI) | Cohort: 2005–09 | Cohort: 2008–12 |
|----------------------------------------------|-----------------|-----------------|
|                                              | 1 year | 2 year | 5 year | 1 year | 2 year |
| Patient survival on RRT                      |        |        |        |        |        |
| Unadjusted                                   | 82.7 (82.5–82.8) | 72.0 (71.8–72.1) | 49.4 (49.2–49.5) | 83.8 (83.6–84.0) | 73.7 (73.5–73.9) |
| Adjusteda                                    | 90.0 (89.9–90.2) | 82.8 (82.6–83.0) | 63.3 (63.0–63.6) | 90.6 (90.4–90.7) | 83.8 (83.6–84.0) |
| Patient survival on dialysis (with kidney transplantation as a censored observation) |        |        |        |        |        |
| Unadjusted                                   | 81.7 (81.5–81.9) | 69.7 (69.5–69.9) | 41.5 (41.3–41.6) | 82.7 (82.6–82.9) | 71.3 (71.1–71.4) |
| Adjusteda                                    | 88.1 (87.9–88.2) | 79.5 (79.2–79.7) | 55.7 (55.3–56.1) | 89.0 (88.9–89.2) | 81.1 (80.8–81.3) |
| Patient survival after first kidney transplantation (deceased donor) |        |        |        |        |        |
| Unadjusted                                   | 96.1 (95.8–96.3) | 94.2 (93.9–94.5) | 87.9 (87.5–88.3) | 96.4 (96.1–96.6) | 94.4 (94.1–94.6) |
| Adjustedb                                    | 97.6 (97.4–97.8) | 96.4 (96.2–96.6) | 92.3 (91.9–92.7) | 98.0 (97.8–98.1) | 96.8 (96.6–97.0) |
| Graft survival after first kidney transplantation (deceased donor) |        |        |        |        |        |
| Unadjusted                                   | 90.9 (90.6–91.2) | 88.1 (87.7–88.4) | 79.0 (78.6–79.4) | 91.2 (90.9–91.5) | 88.3 (88.0–88.6) |
| Adjustedb                                    | 92.2 (91.8–92.5) | 89.7 (89.3–90.1) | 81.6 (81.1–82.2) | 92.7 (92.4–93.0) | 90.2 (89.8–90.6) |
| Patient survival after first kidney transplantation (living donor) |        |        |        |        |        |
| Unadjusted                                   | 98.4 (98.1–98.7) | 97.5 (97.1–97.8) | 94.2 (93.7–94.7) | 98.8 (98.6–99.0) | 97.9 (97.6–98.2) |
| Adjustedb                                    | 98.8 (98.6–99.1) | 98.2 (97.9–98.5) | 95.7 (95.2–96.2) | 99.2 (99.0–99.3) | 98.6 (98.3–98.8) |
| Graft survival after first kidney transplantation (living donor) |        |        |        |        |        |
| Unadjusted                                   | 95.5 (95.0–95.9) | 93.6 (93.0–94.1) | 87.0 (86.4–87.7) | 96.3 (95.9–96.6) | 94.5 (94.1–94.9) |
| Adjustedb                                    | 95.5 (95.0–96.0) | 93.7 (93.1–94.2) | 87.0 (86.3–87.8) | 96.3 (96.0–96.7) | 94.6 (94.2–95.1) |

This is based on data from the following registries providing individual patient data: Austria, Belgium (Dutch-speaking), Belgium (French-speaking), Denmark, Finland, France, Greece, Iceland, Norway, Spain (Andalusia), Spain (Aragon), Spain (Asturias), Spain (Basque country), Spain (Canarias), Spain (Castile and León), Spain (Castile-La Mancha), Spain (Catalonia), Spain (Extremadura), Spain (Galicia), Spain (Valencian region), Sweden, the Netherlands and the UK (all countries).

aAnalyses were adjusted using fixed values: age (60 years), gender (60% men) and primary renal disease (20% diabetes mellitus, 17% hypertension/renal vascular disease, 15% glomerulonephritis and 48% other causes).

bAnalyses were adjusted using fixed values: age (45 years), gender (60% men) and primary renal disease (10% diabetes mellitus, 8% hypertension/renal vascular disease, 28% glomerulonephritis and 54% other causes).
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Conflict of interest statement
None declared.

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Appendix 1

Countries or regions providing individual patient level data. Austria, Dutch-speaking Belgium, French-speaking Belgium, Bosnia and Herzegovina, Denmark, Estonia, Finland, France, Greece, Iceland, Montenegro, Norway, Romania, Serbia, the Spanish regions of Andalusia, Aragon, Asturias, Basque country, Cantabria, Castile and León, Castile-La Mancha, Catalonia, Extremadura, Galicia, Community of Madrid, Murcia, Navarre and Valencian region, Sweden, the Netherlands, UK (England/Northern Ireland/Wales) and UK (Scotland).

Countries or regions providing aggregated patient level data. Albania, Bulgaria, Croatia, Cyprus, Czech Republic, Georgia, Israel, Italy, Latvia, Lithuania, Macedonia, Poland, Portugal, Slovakia, Spain, Switzerland, Tunisia (Sfax region), Turkey and Ukraine.

Appendix 2

Analyses for patient survival on RRT and dialysis were adjusted using the following fixed values: age (60 years), gender (60% men) and primary renal diagnosis (20% diabetes mellitus, 17% hypertension/renal vascular disease, 15% glomerulonephritis and 48% other causes).

Analyses for patient and graft survival after a first kidney transplant were adjusted using the following fixed values: age (45 years), gender (60% men) and primary renal diagnosis (10% diabetes mellitus, 8% hypertension/renal vascular disease, 28% glomerulonephritis and 54% other causes).

The survival analyses presented here were based on data from Austria, Dutch- and French-speaking Belgium, Denmark, Finland, France, Greece, Iceland, Norway, the Spanish regions of Andalusia, Aragon, Asturias, Basque country, Cantabria, Castile and León, Castile-La Mancha, Catalonia, Extremadura, Galicia and Valencian region, Sweden, the Netherlands and the UK.