

ESPN/ERA Registry



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An update on the Registry – January 2025





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Currently, 35 countries are participating in the ESPN/ERA Registry, providing information on more than 28,000 patients who started KRT before the age of 20 years.

The ESPN/ERA Registry collects data on KRT on an annual basis via national renal registries in Europe. So far, data have been included from sixteen subsequent years. This Annual Report epidemiological data paediatric KRT in Europe for the year 2022.

In 2022, the incidence of KRT was 5.6 (range: 0.0 to 28.5) per million agerelated population (pmarp) and the prevalence was 40.6 (range: 8.9 to 94.6) pmarp.

Five-year patient survival was 94.2% after the start of KRT and most patients for whom cause of death was reported, died of infections.

In 2024, two papers have been published and another one has been accepted for publication. The full publication list can be found below.

AJT published our paper on the clinical outcomes of paediatric KRT after childhood cancer. NDT published our paper on adult outcomes of childhood KRT in Europe from 2008 to 2019. Furthermore, our paper on access to transplantation transplantation in transplant candidates from childhood adulthood has recently been accepted by NDT.

An important part of the Registry's research activities arise from the successful internship programme. In the past year, several fellows were hosted in the ESPN/ERA Registry:

- Henna Kaijansinkko, a paediatric nephrologist from Helsinki, Finland, worked on a project on KRT after cancer in children.
- Evgenia Preka from Paris, France, continued her part-time PhD trajectory at the Registry on re-transplantation in patients transplanted during childhood, from which one paper has recently been accepted for publication.
- Lucy Plumb, a paediatric nephrologist from Bristol, United Kingdom, started a project on sex differences in paediatric KRT patients.

If you are also interested in performing a research project at the Registry or you would like to know more about participating ESPN/ERA in the Registry, please contact Marjolein Bonthuis:

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We are very proud of all the results, which would not have without possible the great dedication and efforts of those who contribute to the ESPN/ERA Registry. We would like to thank all contributors for their fruitful collaboration and hope to keep working together in the future to improve paediatric nephrology care and research in Europe.

Table 1: Incident patients on KRT

Incident paediatric patients accepted for kidney replacement therapy in 2022 and general population characteristics in the same year.

	Total		General Population Characteristics		
	KRT	patients	Children	Total Population	Children
Country	0-14 years		0-14 years	0-99 years	0-14 years
	N	pmarp	N	N	percent
Albania	4	9.0	443.227	2.761.785	16.0
Austria	4	3.1	1.291.589	8.978.929	14.4
Belarus	6	3.9	1.534.402	9.255.524	16.6
Bosnia and Herzegovina	3	5.5	543.719	3.531.159	15.4
Bulgaria	3	3.1	953.243	6.643.323	14.3
Croatia	2	3.6	550.505	3.856.602	14.3
Cyprus	0	0.0	146.756	912.704	16.1
Czech Republic	6	3.5	1.722.109	10.672.120	16.1
Denmark	3	3.2	946.645	5.903.039	16.0
Estonia	2	9.1	220.859	1.348.840	16.4
Finland ¹	7	8.3	846.061	5.556.104	15.2
France	76	6.4	11.827.399	68.022.451	17.4
Germany-CERTAIN ²	10	0.8	11.767.956	83.797.983	14.0
Greece	5	3.5	1.410.172	10.436.880	13.5
Hungary	2	1.4	1.401.612	9.644.377	14.5
celand	2	28.5	70.155	382.003	18.4
reland	0	0.0	1.007.979	5.165.700	19.5
taly ³	6	0.8	7.416.947	59.013.670	12.6
Latvia	0	0.0	300.234	1.879.383	16.0
Lithuania	0	0.0	422.256	2.831.639	14.9
Malta	0	0.0	69.483	531.508	13.1
North Macedonia	4	12.9	310.434	1.833.534	16.9
Norway	4	4.4	916.027	5.457.128	16.8
Poland	22	3.8	5.740.891	37.203.992	15.4
Portugal	4	3.0	1.337.947	10.409.706	12.9
Republic of Serbia	5	5.2	966.150	6.719.150	14.4
Romania	19	6.2	3.080.201	19.048.501	16.2
Slovakia	2	2.3	873.124	5.431.753	16.1
Slovenia	1	3.1	317.735	2.112.076	15.0
Spain	44	6.7	6.560.803	47.767.516	13.7
Sweden	17	9.3	1.834.097	10.486.944	17.5
the Netherlands	13	4.8	2.719.919	17.700.979	15.4
Turkey⁴	19	1.0	19.140.291	83.384.678	23.0
Ukraine	18	3.2	5.585.184	36.700.000	15.2
UK (England, N. Ireland, Wales, Scotland) ⁵	98	8.4	11.615.595	67.596.281	17.2
Total ⁶	376	5.6	67.566.512	426.781.630	15.8

¹Data from Finland were provided on an aggregated level.

²Data from the German transplantation registry are based on 18 transplantation centres. In 2022, 130 patients under the age of 21 years were transplanted in Germany.

³The incidence in Italy is an underestimation of the true incidence, with coverage of 65% to 85% of all patients.

⁴The incidence in Turkey is an underestimation of the true incidence.

⁵In the UK the incidence is underestimated by approximately 7.5% due to one centre not providing data and patients opting out of data sharing for research purposes.

⁶Germany, Italy and Turkey were excluded from the overall incidence.

Table 2: Treatment modality at start of KRT in 2022

Treatment modality at day 1, among patients < 15 years of age starting KRT in 2022. Patients from Germany, Italy, and Turkey are excluded.

	N	Percent	Pmarp
HD at start	168	44.7	2.5
PD at start	119	31.6	1.8
Pre-emptive transplantation	89	23.7	1.3
Unknown	0	0	0

Table 3: PRD distribution at start of KRT in 2022

Cause of kidney failure, among patients < 15 years of age, starting KRT in 2022.

According to new (2012/2018) and old (1995) ERA Registry PRD codes (Boerstra et al, Clin Kidney J 2023; 17(2): sfad281.)

Patients from Germany, Italy, and Turkey are excluded.

	N		Percent		Pmarp	
	New	Old	New	Old	New	Old
CAKUT	113	106	30.4	28.5	1.68	1.57
Glomerulonephritis	53	46	14.1	12.2	0.78	0.67
Cystic kidney disease	49	49	13.3	13.3	0.73	0.73
Hereditary nephropathy	-	24	-	5.4	-	0.30
Metabolic and tubulointerstitial disorders	19	15	5.1	4.1	0.28	0.22
Toxic/ischemic renal failure	9	5	2.4	1.4	0.13	0.07
HUS	20	20	5.4	5.4	0.30	0.30
Vascular	2	2	0.5	0.5	0.03	0.03
Miscellaneous	59	30	15.7	7.9	0.87	0.43
Unknown	52	79	13.0	21.4	0.72	1.18

Table 4: eGFR at start of KRT

Estimated GFR based on age, height and serum creatinine levels, calculated according to the new bedside Schwartz formula, among incident KRT patients, aged < 15 years in 2022.

Patients from Germany, Italy, and Turkey are excluded.

	N	Percent
eGFR<8 ml min ⁻¹ per 1.73 m ²	63	46.7
eGFR 8 - 15 ml min ⁻¹ per 1.73 m ²	57	42.2
eGFR>15 ml min ⁻¹ per 1.73 m ²	15	11.1

Table 5: Prevalent Patients on KRT

Prevalent paediatric patients on kidney replacement therapy on the 31st of December 2022. Prevalent counts and prevalence per million age-related population, by age groups.

	Total	KRT	Age Groups		
Country			Infants		Adolescents
Country		years	0-4 years	5-9 years	10-14 years
	N	pmarp	pmarp	pmarp	pmarp
Albania	13	29.3	22.7	45.6	19.0
Austria	46	35.6	20.8	39.1	47.1
Belarus	43	28.0	21.6	15.6	46.1
Bosnia and Herzegovina	5	9.2	5.7	0.0	20.8
Bulgaria	14	14.7	6.7	15.6	20.8
Croatia	29	52.7	5.7	50.2	97.1
Cyprus	7	47.7	0.0	41.0	101.7
Czech Republic	36	20.9	12.5	14.1	35.4
Denmark	33	34.9	16.1	29.6	57.3
Estonia	6	27.2	0.0	41.1	38.3
Finland ¹	80	94.6	83.1	96.6	101.5
France	497	42.0	14.6	41.5	65.2
Germany-CERTAIN ²	300	25.5	5.8	29.9	41.5
Greece	30	21.3	7.2	13.0	39.3
Hungary	48	34.2	21.5	27.9	53.3
Iceland	6	85.5	131.4	89.0	40.2
Ireland	9	8.9	3.3	17.8	5.4
Italy ³	195	26.3	8.5	23.7	42.0
Latvia	6	20.0	10.9	18.5	29.9
Lithuania	11	26.1	15.7	20.4	40.7
Malta	1	14.4	0.0	42.2	0.0
North Macedonia	12	38.7	31.5	27.6	56.4
Norway	46	50.2	21.5	58.6	66.7
Poland	229	39.9	14.5	35.5	66.5
Portugal	56	41.9	9.6	53.2	59.2
Republic of Serbia	29	30.0	3.2	30.8	54.9
Romania	60	19.5	5.2	15.6	35.8
Slovakia	18	20.6	10.3	20.4	31.3
Slovenia	13	40.9	10.3	65.3	44.0
Spain	331	50.5	21.6	39.0	81.2
Sweden	92	50.2	22.3	49.8	76.3
the Netherlands	118	43.4	12.7	31.2	82.6
Turkey ⁴	361	18.9	5.3	21.4	29.5
Ukraine	117	20.9	7.0	23.2	28.2
UK (England, N. Ireland, Wales, Scotland) ⁵	704	60.6	21.8	53.3	101.3
Total ⁶	2745	40.6	16.1	37.1	64.5

¹Data for Finland were provided on an aggregated level.

²Data from the German transplantation registry are based on 18 transplantation centres. In 2022, 130 patients under the age of 21 years were transplanted in Germany.

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⁴The prevalence in Turkey is an underestimation of the true prevalence.

⁵In the UK the prevalence is underestimated by approximately 8.4% due to one centre not providing data and patients opting out of data sharing for research purposes.

Table 5: Prevalent Patients on KRT (continued)

Prevalent paediatric patients on kidney replacement therapy on the 31st of December 2022. Prevalent counts and prevalence per million age-related population, by sex and treatment modality.

	Gender		Treatment Modality		
Country	Males 0-14 years pmarp	Female 0-14 pmarp	HD 0-14 years pmarp	PD 0-14 years pmarp	Transplantation 0-14 years pmarp
Allegate	04.4	07.5	00.0	0.0	4.5
Albania	31.1	27.5	22.6	2.3	4.5
Austria	46.7	23.9	0.8	2.3	32.5
Belarus	41.0	13.1	1.3	5.9	20.9
Bosnia and Herzegovina	10.8	7.6	7.4	0.0	1.8
Bulgaria	16.3	12.9	2.1	1.0	11.5
Croatia	56.6	48.5	1.8	32.7	18.2
Cyprus	52.9	42.2	6.8	20.4	20.4
Czech Republic	23.8	17.8	2.3	7.0	11.6
Denmark	53.5	15.2	1.1	3.2	30.6
Estonia	17.7	37.2	0.0	0.0	27.2
Finland ¹	111.0	77.4	1.2	1.2	92.2
France	49.7	33.9	6.8	3.0	32.0
Germany-CERTAIN ²	32.6	18.0	-	-	25.0
Greece	30.3	11.7	7.8	4.3	9.2
Hungary	41.7	26.4	2.9	5.7	25.0
Iceland	110.6	58.8	14.3	14.3	57.0
Ireland	11.6	6.1	0.0	2.0	6.9
Italy ³	33.8	18.3	2.3	5.7	18.3
Latvia	19.4	20.6	0.0	6.7	13.3
Lithuania	36.9	14.6	2.4	11.8	11.8
Malta	27.8	0.0	0.0	0.0	14.4
North Macedonia	49.9	26.6	3.2	9.7	25.8
Norway	61.6	38.2	1.1	1.1	46.9
Poland	49.5	29.7	4.7	7.3	27.7
Portugal	52.5	30.7	3.0	9.0	29.9
Republic of Serbia	40.2	19.2	4.1	15.5	9.3
Romania	21.5	17.4	12.3	2.9	4.2
Slovakia	20.1	21.1	3.4	13.7	3.4
Slovenia	48.9	32.4	9.4	12.6	18.9
Spain	63.4	36.8	4.6	2.9	42.8
Sweden	53.0	47.2	1.1	5.5	43.6
the Netherlands	48.1	38.5	1.8	2.6	39.0
Turkey ⁴	20.0	17.7	2.2	7.6	9.0
Ukraine	23.6	18.3	3.8	3.9	13.2
UK (England, N. Ireland, Wales, Scotland) ⁵	75.0	45.5	7.1	7.0	46.6
Total ⁶	49.3	31.5	5.1	5.2	30.3

¹Data from Finland were provided on an aggregated level.

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⁶Germany, Italy and Turkey were excluded from the overall prevalence.

Table 6: Hypertension and height in children on KRT

Height z-score based on recent national reference charts, or, if unavailable, on reference charts for Northern and Southern Europe (Bonthuis et al, PLoS ONE 7(8): e42506. doi:10.1371/journal.pone.0042506). Blood pressure z-score was calculated following the fourth report of the National High Blood Pressure Education Program (NHBPEP). Hypertension was defined as having a systolic or diastolic blood pressure z-score ≥ 1.64 (≥ 95th percentile) (Pediatrics 2004; 114: 555–576).

	Dialysis	Transplantation
Blood pressure		
% of patients with hypertension	46.3 (44.7-47.9)	27.6 (26.6-28.6)
Mean z-score systolic blood pressure	1.32 (1.27-1.36)	0.81 (0.78-0.83)
Mean z-score diastolic blood pressure	1.18 (1.14-1.22)	0.72 (0.69-0.74)
Height		
% of patients with height z-score < -2	46.5 (45.3-47.8)	37.6 (36.5-38.8)
Mean height z-score	-1.88 (-1.93;-1.82)	-1.70 (-1.74;-1.66)

Figure 1: Five-year patient survival

Incident KRT patients under the age of 15 years starting KRT from 2007 onwards. Follow-up until 31st of December 2022.

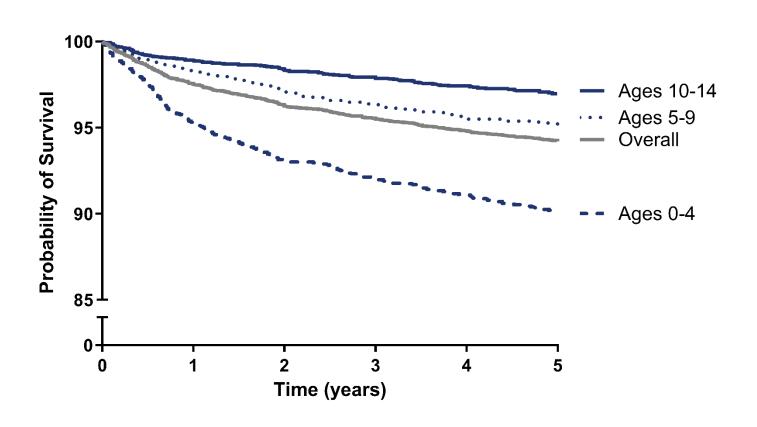


Table 7: Causes of Death

Causes of death according to the ERA Registry coding list.

Incident KRT patients < 15 years starting KRT from 2007 onwards are included. Follow-up until 31st of December 2022.

Cause of death	Number of deaths	Percent
Myocardial ischemia and infarction	5	0.8
Cardiac failure	51	7.8
Cardiac arrest/sudden death other cause	60	9.2
Cerebro-vascular accident	23	3.5
Infection	141	21.6
Suicide/refusal or cessation of treatment	3	0.5
Treatment withdrawn	18	2.8
Cachexia	1	0.2
Malignant disease	32	4.9
Other identified cause of death	109	16.7
Cause of death uncertain/not determined	209	32.1

ESPN/ERA Registry Scientific Committee

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Julien Hogan, France, ESPN/ERA Registry vice-chair*
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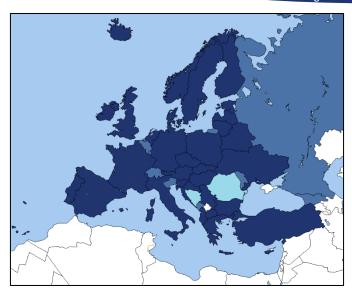
ESPN/ERA Registry

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Publication list 2024

- 1. Adult outcomes of childhood kidney replacement therapy in Europe from 2008 to 2019: an ERA Registry study. Montez de Sousa IR, Bonthuis M, Kramer A, Ordoñez FA, de la Cerda Ojeda F, Rydell H, Helve J, Groothoff JW, Hommel K, Buchwinkler L, Segelmark M, Arici M, Palsson R, Bell S, Trujillo-Alemán S, Bakkaloglu SA, Sørensen SS, Vila A, Ortiz A, Stel VS, Jager KJ. Nephrol Dial Transplant. 2024 (Online ahead of print).
- 2. Clinical outcomes of pediatric kidney replacement therapy after childhood cancer An ESPN/ERA Registry study. Kaijansinkko H, Bonthuis M, Jahnukainen K, Harambat J, Vidal E, Bakkaloglu SA, Inward C, Sinha MD, Roperto RM, Kuehni CE, Biró E, Kwon T, Mota C, Adams B, Szczepańska M, Bieniaś B, Höcker B, Fomina S, Gjerstad AC, Vondrak K, Alpay H, Plumb LA, Hommel K, Molchanova MS, Hubmann H, Alonso-Melgar A, Jager KJ, Jahnukainen T. Am J Transplant. 2024 (Online ahead of print).
- 3. Access to transplantation and re-transplantation in European kidney transplant candidates from childhood to adulthood: Long-term data from the ERA Registry. Preka E, Bonthuis M, Marks SD, Kramer A, de Vries APJ, Sørensen SS, Bakkaloğlu SA, Bistrup C, Jahnukainen T, Rodriguez Arévalo OL, Buchwinkler L, Segelmark M, Sanchez JE, Arnol M, Ordóñez-Álvarez FA, de la Cerda-Ojeda F, Plumb LA, Methven S, Palsson R, Lundgren T, Ríos H, Ortiz A, Stel VS, Harambat J, Jager KJ. Nephrol Dial Transplant (Accepted for publication).

^{*} ESPN representatives on the ERA Registry Committee



Provided extended data to the ESPN/ERA Registry in 2024

Provided data to the ESPN/ERA Registry before 2024

Provided data via the ERA Registry

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Germany - CERTAIN K Krupka, B Höcker, L Pape, B Tönshoff

Greece G Moustakas

Hungary G Reusz, O Horváth, Cs Berecki,

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M Bates, M Kinlough, S Bracken

Italy B Gianoglio, I Guzzo, E la Porta,

F Paglialonga, C Corrado, E Vidal,

E Verrina

Latvia A Popova, S Derkevica, V Kuzema

Lithuania A Jankauskiene, S Rudaitis

Malta V Said-Conti North Macedonia N Abazi

Norway A Åsberg, AV Reisæter, A Bjerre

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United Kingdom, All the staff of the UK Renal Registry and

England/Wales/ of the renal units submitting data
Northern Ireland

United Kingdom, All of the Scottish Renal Registry team

Scotland