# Socioeconomic Deprivation and Mortality In Renal Replacement Therapy in Scotland

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Background

- Socioeconomic deprivation is an established risk factor for worse health outcomes and shorter life expectancy
- In the 2015 Scottish Renal Registry (SRR) Report an excess of deaths was demonstrated in those with greatest deprivation, figure 1
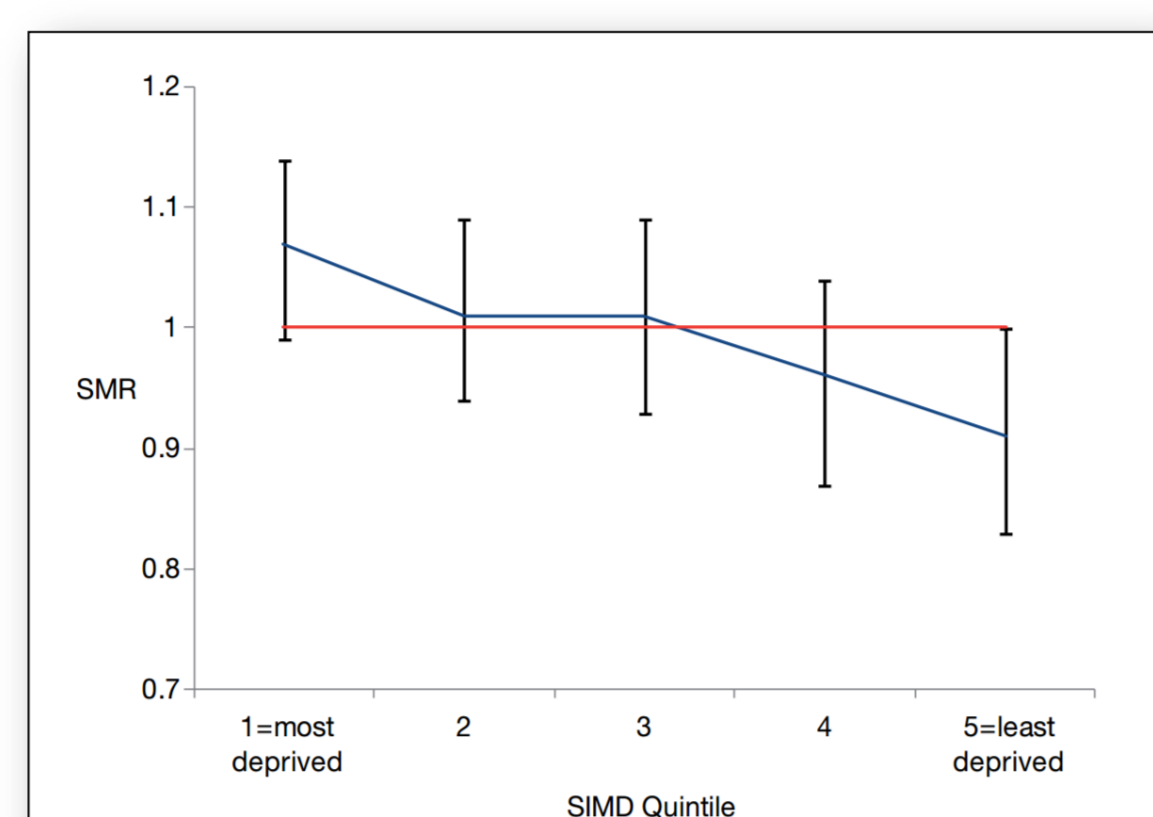
Figure 1 Standardised Mortality Ratio (SMR) by deprivation category, 1=most deprived, 5= least deprived. Scottish Renal Registry Report, 2015

- Using the Scottish Mortality Audit in Renal Replacement Therapy (SMARRT) data within the SRR we sought to explore the influence of socioeconomic deprivation on mortality in end stage renal disease

Aims

- Describe demographic data of all deaths on renal replacement therapy (RRT) comparing the most to least socioeconomically deprived
- Perform a logistic regression analysis to examine the effect of deprivation on early death, adjusting for patient comorbidity

Method

- SMARRT is a SRR project established in 2008, includes all Scottish adult renal units and consistently achieves ≥95% completeness of data
- We examined patients from 01 January 2008 to 31 December 2015
- Using patient postcode we calculated their Scottish Index of Multiple Deprivation (SIMD) and divided our cohort into 2 cohorts: 'Deprived', consisting of the 40% most deprived and the remainder 'Not deprived'.
- Clinical variables and factors influential at death were included
- To examine the impact of deprivation on life-expectancy we arbitrarily divided our group: death aged <60 years and death aged ≥60 years
- Demographics are compared and a multivariable logistic regression performed incorporating age at starting RRT, sex, deprivation, rurality, diabetic nephropathy, cardiovascular comorbidities, malignancy and presence of non-compliance.
- Statistical analyses were performed using SPSS v 22

Results

- There were 3,501 deaths in those on RRT for end stage renal disease
- Postcode derived SIMD was available in 3465 (99%) and 1643 (47%) resided in the 40% most deprived areas
- 'Deprived' patients were more likely to die at a younger age, have a prior history of ischaemic heart disease, COPD or smoking, and less likely to die following dialysis withdrawal. Non-compliance was more common in the deprived group, table 1
- 733 patient died before their 60th birthday, demographic differences are in table 2
- Multivariable logistic regression adjusted for age, sex, co-morbidity and the effect of non-compliance revealed that deprivation is significantly associated with death aged less than 60 years (OR 1.76, p<0.001), table 3

Discussion

- In an all-inclusive national study of deaths in those on RRT for end-stage renal disease 47% of patients were in the 40% most socioeconomically deprived groups
- Those with deprivation die younger, have more IHD, smoking, COPD and non-compliance contributing to death
- On adjusted analyses socioeconomic deprivation is significantly associated with death at a younger age

Variable	Not Deprived	Deprived	p-value
N (%)	1822 (52.6)	1643 (47.4)	
Age at death, median years (IQR)	72.9 (15.4)	70.7 (18.1)	<0.0001
Female, n (%)	735 (40.3)	682 (41.5)	0.485
Follow-up pre-RRT, median days (IQR)	715 (1597)	722 (1661)	0.297
Primary Renal Diagnosis, n (%)			
Diabetes	411 (22.6)	416 (25.3)	0.057
Glomerulonephritis	253 (13.9)	216 (13.1)	0.525
Interstitial	352 (19.3)	359 (21.9)	0.065
Multisystem	484 (26.6)	375 (22.8)	0.011
Other	321 (17.6)	277 (16.9)	0.555
Modality at Death, n (%)			
HD	1414 ()	1311 (79.8)	
PD	129 ()	91 (5.5)	
Transplant	270 ()	236 (14.4)	0.199
Duration of RRT, median days (IQR)	1385 (2415)	1385 (2476)	0.878
Past Medical History, n (%)			
Ischaemic heart disease	787 (44.4)	791 (49.0)	0.007
Valvular disease	273 (15.4)	243 (15.1)	0.778
Congestive cardiac failure	464 (26.2)	450 (27.9)	0.276
Peripheral Vascular disease	518 (29.2)	519 (32.3)	0.056
Cerebrovascular disease	510 (28.8)	470 (29.1)	0.820
COPD	210 (11.9)	233 (14.4)	0.025
Diabetes	636 (35.9)	624 (38.6)	0.099
Malignancy	499 (28.2)	389 (24.2)	0.008
Smoking Status			
Yes	780 (42.8)	887 (54.0)	
No	788 (37.0)	568 (30.1)	<0.0001
Cause of Death			
Cardiovascular	582 (31.9)	543 (33.0)	0.487
Infection	389 (41.4)	391 (23.8)	0.085
Malignancy	198 (10.9)	175 (10.7)	0.838
Other	239 (13.1)	218 (13.3)	0.896
RRT complications	36 (2.0)	40 (2.4)	0.357
Withdrawal	343 (18.8)	266 (16.2)	0.042
Contributors to death			
Withdrawal	627 (35.5)	506 (31.3)	0.01
Access Failure/infection	143 (8.1)	136 (8.4)	0.733
Dialysis complications	90 (5.1)	86 (5.3)	0.765
Non-compliance	55 (3.1)	82 (5.1)	0.004
PD infection	52 (2.9)	39 (2.4)	0.342
Transplant complication	125 (7.1)	101 (6.3)	0.338
HAI	118 (6.7)	136 (8.4)	0.055
Malignancy	322 (18.2)	249 (15.4)	0.029

Table 1 Demographics at death - those from the least and most deprived area of Scotland,

Variable	Age <60 years	Age ≥60 years	p-value
N (%)	733 (21.2)	2732 (78.8)	
Age at death, median years (IQR)	51.9 (11.0)	74.9 (11.4)	<0.0001
Female, n (%)	305 (41.6)	1112 (40.7)	0.657
Follow-up pre-RRT, median days (IQR)	554 (1503)	772 (1680)	0.014
Primary Renal Diagnosis, n (%)			
Diabetes	262 (35.7)	565 (20.7)	<0.0001
Glomerulonephritis	110 (15.0)	359 (13.1)	0.190
Interstitial	199 (27.1)	512 (18.7)	<0.0001
Multisystem	94 (12.8)	765 (28.0)	<0.0001
Other	68 (9.3)	530 (19.4)	<0.0001
Modality at Death, n (%)			
HD	498 (68.4)	2227 (81.8)	
PD	51 (7.0)	169 (6.2)	
Transplant	179 (24.6)	327 (12.1)	<0.0001
Duration of RRT, median days (IQR)	1785 (3862)	1315 (2167)	<0.0001
Past Medical History, n (%)			
Ischaemic heart disease	251 (35.1)	1327 (49.7)	<0.0001
Valvular disease	89 (12.4)	427 (16.0)	0.019
Congestive cardiac failure	159 (22.2)	755 (28.3)	0.001
Peripheral Vascular disease	212 (29.7)	825 (30.9)	0.509
Cerebrovascular disease	162 (22.7)	818 (30.6)	<0.0001
COPD	52 (7.3)	391 (14.6)	<0.0001
Diabetes	311 (43.4)	949 (35.5)	<0.0001
Malignancy	143 (20.0)	745 (28.0)	<0.0001
Smoking Status			
Yes	335	1332	
No	274	895	0.100
Cause of Death			
Cardiovascular	269 (36.7)	856 (31.3)	0.006
Infection	157 (21.4)	623 (22.8)	0.425
Malignancy	88 (12)	285 (10.4)	0.222
Other	124 (16.9)	333 (12.2)	0.001
RRT complications	26 (3.5)	50 (1.8)	0.005
Withdrawal	59 (8.0)	550 (20.1)	<0.0001
Contributors to death			
Withdrawal	139 (19.4)	994 (37.3)	<0.0001
Access Failure/infection	61 (8.5)	218 (8.2)	0.775
Dialysis complications	56 (7.8)	120 (4.5)	<0.0001
Non-compliance	80 (11.2)	57 (2.1)	<0.0001
PD infection	21 (2.9)	70 (2.6)	0.656
Transplant complication	91 (12.7)	135 (5.1)	<0.0001
HAI	43 (6.0)	211 (7.9)	0.084
Malignancy	106 (14.8)	465 (17.4)	0.092

Table 2 Demographics at death – death aged less than or greater than and equal to 60 years

Variable	OR (95% CI)	P-value
Age at starting RRT	0.82 (0.81-0.84)	<0.001
Female	1.08 (0.82-1.43)	0.57
Socio-economic Deprivation	1.76 (1.32-2.34)	<0.001
Living in Rural residence	1.29 (0.87-1.9)	0.21
Past Medical History		
Ischaemic heart disease	0.50 (0.38-0.67)	<0.001
Peripheral Vascular disease	0.71 (0.52-0.96)	0.03
Cerebrovascular disease	0.98 (0.71-1.34)	0.88
Malignancy	0.64 (0.45-0.90)	0.01
Diabetic Nephropathy as primary renal disease	5.30 (3.82-7.35)	<0.001
Non-compliance	2.98 (1.64–5.41)	<0.001

Table 3 Mutlivariable logistic regression analysis for variables influencing death aged less than 60 years

The Scottish Mortality Audit in Renal Replacement Therapy (SMARRT)