

## Lower limb amputation within 5 years of commencing dialysis for patients in England: GIRFT retrospective analysis of linked Renal Registry and Hospital Episode Statistics data 2001-2017

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### Background/ Aims:

Renal dialysis is a recognised risk factor for lower limb amputation (LLA). Exact rates and risk factors associated with LLA in dialysis patients in England have not previously been described. The aim of this study was to establish the incidence of LLA in the first 5 years of receiving dialysis in England. We compared three groups of patients, defined at RRT start - patients reported to have “diabetic nephropathy” (DN), “diabetic others” (DO) and “non-diabetic” (ND) patients. We also investigated for any centre variation in incidence of amputations.

### Methods:

Retrospective analysis of linked ‘UK Renal Registry’ (UKRR) and ‘Hospital Episode Statistics’ (HES) data was undertaken for incident dialysis (haemodialysis and peritoneal dialysis) patients between 2001-2012 in England.

Demographic data at dialysis start (age, gender, ethnicity, index of multiple deprivation (IMD)) and co-morbidities (diabetes, ischaemic heart disease (IHD) and peripheral vascular disease (PVD)) were extracted from the UKRR and/or HES databases. Date of first ‘minor’ (toe/foot/ankle) or ‘major’ (above/below knee) amputation in the 5 years after dialysis start was identified. Kaplan-Meier plots were created to illustrate incidence of amputations in 3 groups of interest (DN, DO, ND). Patients were censored at transplantation, death or recovery of renal function. Hazard ratios were calculated using Cox proportional hazards model and were adjusted for age, sex, ethnicity, IMD quintiles, PVD, IHD, and calendar year. Parameter estimates from this adjusted model were used to investigate centre-level variation.

### Results:

There were 54,931 incident dialysis patients 2001-2012 (Median age 65 years, 62% males, 80% Caucasian, 26% most deprived IMD quintile). The proportion of patients in each study category was: DN 25%, DO 10%, ND 65%.

2.4% of patients had already had an amputation prior to dialysis start (DN 7.38%, DO 2.42%, ND 0.37%). The proportion of patients with amputations in 5 years following dialysis start were DN 12.4%, DO 4.7% and ND 0.9%. The incidence rates (amps/100 dialysis patient years) were ND 0.35, DO 1.82 and DN 4.45.

(Figure 1) shows the incidence of amputations throughout the 5-years. Age, gender, ethnicity, IHD and PVD were all significant risk factors for amputation (Table 1).

Adjusted individual renal centre rates of amputation within five years varied between 7.5 amps/100 DN patients to 27.0 amps/100 DN patients and four centres were above the 99.9% confidence limits suggesting there is unexplained variation beyond the variables adjusted for.

#### Discussion:

Our findings demonstrate the high risk of LLA in dialysis patients with diabetes, with the highest risk group being those who are known to have diabetic nephropathy. Male gender, Caucasian ethnicity, age 40-59 years, a history of PVD and, to a lesser extent, of IHD are all associated with additional risk. Increased amputation risk in Caucasian patients has also been reported in non-renal amputation literature and may be linked with factors such as smoking status. There appears to be considerable national variation in amputation rates for patients with diabetic nephropathy and this may be linked to local availability of high quality foot care for diabetic patients.