Differences in Comorbidity burden between those with chronic kidney disease and normal renal function

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Background

Chronic kidney disease (CKD) and renal replacement therapy are both associated with significant morbidity and mortality. CKD is common[1]. The vast majority of individuals have moderate CKD (stage 3). Less than 2% of people with CKD will progress to end stage kidney disease over the next five years, but many will be at increased risk of cardiovascular disease and mortality[2]. Co-existing comorbidity is common. How much of the increased morbidity and mortality is a result of the CKD and how much a result of the co-existing comorbidity is less clear.

Objectives

We aimed to describe the range of comorbidity at baseline in a population cohort containing all identified within a region with CKD, those on RRT and a sample of 20,000 individuals from the same population with normal renal function.

Methods

A large population based cohort (GLOMMS-II) was constructed using data linkage of patients' laboratory data to hospital episode and registry data.

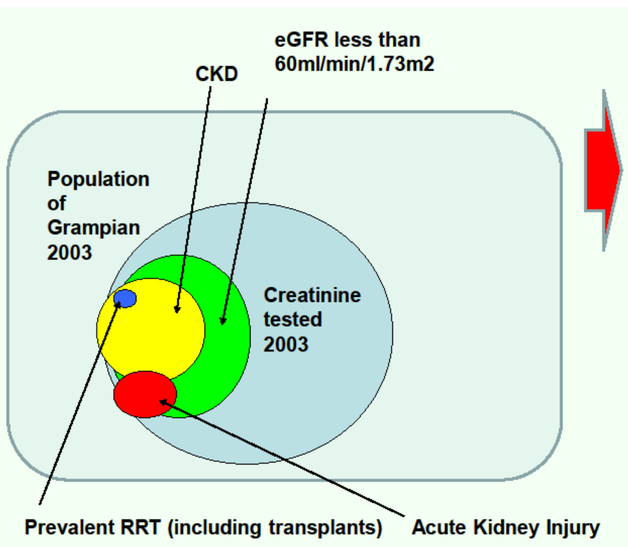
GLOMMS-II contained all individuals with a low eGFR (<60ml/min/1.73m^2) measured in the Grampian health board region in 2003 (in 2/3 of these with "CKD" the low eGFR was present for at least 90 days, in 1/3 with "impaired eGFR" it was not); all those with raised PCR and ACR; all those receiving RRT and a 20,000 sample of those with only normal eGFR measurements in 2003. A sample of ~20,000 of those who had no measurement of renal function in 2003, but samples in both 1999-2002 and 2004-2009 were also available to allow assessment of the effect of a clinical indication for sampling or otherwise.

Data linkage to hospital episode statistics in the five years prior gave information on comorbidity in 2003. The prevalence of common comorbidities in the subgroups of the cohort was described. The odds of having each comorbidity at baseline with adjustment for age and sex were presented.

Results

GLOMMSII Population

GLOMMS II comprised 70,780 people, of which approximately 19,000 had CKD.



Demographics

As shown below, those with stage 3-5 CKD and those with impaired eGFR were older and more likely to be female than those with either normal or unmeasured eGFR in 2003 and also those with stage 1-2 CKD or on RRT.

Table 1 Demographics of each risk group at baseline

		CKD						Not CKD					
		On RRT		Stage 3-5		Stage 1-2		Impaired		Normal 2003		Not measured 2003	
		n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
All	(n=70780)	345		18687		1007		10857		19834		20050	
Sex	Male	190	(55.1)	6580	(35.2)	649	(64.4)	4323	(39.8)	9346	(47.1)	8424	(42.0)
	Female	155	(44.9)	12107	(64.8)	358	(35.6)	6534	(60.2)	10488	(52.9)	11626	(58.0)
Age at index (years), mean (95% CI)		54.4	(52.7- 56.2)	74.4	(74.3- 74.6)	58.4	(57.4- 59.3)	69.4	(69.1- 69.7)	52.1	(51.8- 52.3)	52.1	(51.9- 52.3)

Prevalence of comorbidities

Most comorbidities increased in prevalence in those with more advanced CKD (including RRT, as shown in table 2 and figure 2).

Table 2 Proportion of each risk group with given comorbidity at baseline

	CKD							Not CKD		
	HD/PD n (%)	Transplant n (%)	Stage 5 n (%)	Stage 4 n (%)	Stage 3b n (%)	Stage 3a n (%)	Stage 1-2 n (%)	Impaired n (%)	Normal 2003 n (%)	Not measured 2003 n (%)
Comorbidity at baseline										
Ischaemic heart disease	44 (23.4)	13 (8.3)	29 (20.1)	304 (24.4)	948 (19.1)	1630 (13.2)	91 (9.0)	1578 (14.5)	1002 (5.1)	399 (2.0)
Congestive cardiac failure	19 (10.1)	0 (0.0)	21 (14.6)	210 (16.9)	477 (9.6)	555 (4.5)	15 (1.5)	594 (5.5)	174 (0.9)	96 (0.5)
Peripheral vascular disease	35 (18.6)	10 (6.4)	12 (8.3)	100 (8.0)	271 (5.5)	371 (3.0)	35 (3.5)	335 (3.1)	196 (1.0)	114 (0.6)
Cerebrovascular disease	23 (12.2)	5 (3.2)	17 (11.8)	107 (8.6)	344 (6.9)	559 (4.5)	31 (3.1)	569 (5.2)	303 (1.5)	210 (1.0)
Hypertension	107 (56.9)	43 (27.4)	37 (25.7)	252 (20.2)	651 (13.1)	1064 (8.6)	91 (9.0)	941 (8.7)	624 (3.1)	294 (1.5)
Haematological malignancy	1 (0.5)	0 (0.0)	2 (1.4)	11 (0.9)	44 (0.9)	109 (0.9)	4 (0.4)	102 (0.9)	66 (0.3)	5 (0.0)
Non haematological malignancy	8 (4.3)	13 (8.3)	16 (11.1)	80 (6.4)	388 (7.8)	829 (6.7)	48 (4.8)	1085 (10.0)	767 (3.9)	435 (2.2)
Dementia	2 (1.1)	0 (0.0)	2 (1.4)	33 (2.6)	90 (1.8)	131 (1.1)	3 (0.3)	266 (2.5)	88 (0.4)	42 (0.2)
Chronic obstructive pulmonary disease	6 (3.2)	1 (0.6)	4 (2.8)	81 (6.5)	289 (5.8)	492 (4.0)	33 (3.3)	668 (6.2)	516 (2.6)	312 (1.6)
Connective tissue disease	18 (9.6)	5 (3.2)	5 (3.5)	41 (3.3)	133 (2.7)	298 (2.4)	12 (1.2)	287 (2.6)	210 (1.1)	45 (0.2)
Diabetes	37 (19.7)	18 (11.5)	27 (18.8)	168 (13.5)	504 (10.2)	745 (6.0)	266 (26.4)	665 (6.1)	372 (1.9)	142 (0.7)
Chronic liver disease	4 (2.1)	2 (1.3)	1 (0.7)	15 (1.2)	45 (0.9)	86 (0.7)	11 (1.1)	148 (1.4)	163 (0.8)	60 (0.3)
Vascular comorbidity	81 (43.1)	25 (15.9)	51 (35.4)	477 (38.3)	1457 (29.4)	2430 (19.7)	145 (14.4)	2337 (21.5)	1432 (7.2)	699 (3.5)

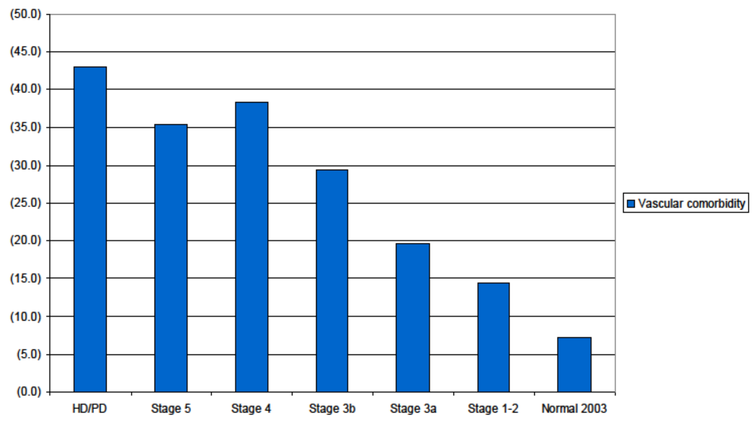
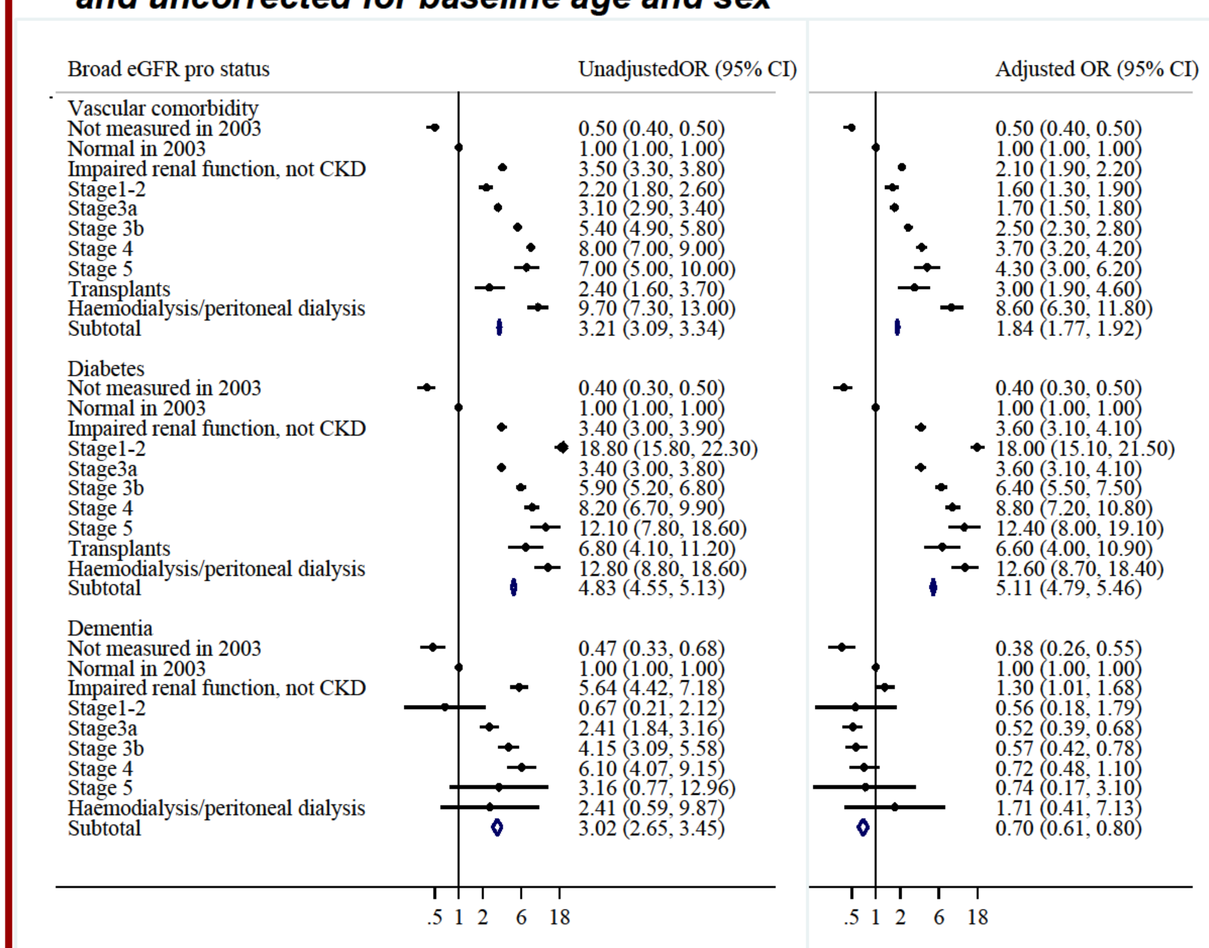


Figure 2 Percentage of each risk group with vascular (Ischaemic heart disease, peripheral vascular disease or cerebrovascular disease at baseline

After correction for age and sex, vascular comorbidity (ischaemic heart disease, cerebrovascular disease and peripheral vascular disease) (figure 3), diabetes and haematological malignancy continued to be strongly associated with more advanced CKD. The association for other comorbidities was less marked, particularly for dementia (figure 3).

Impaired eGFR that was not present for at least 3 months was also associated with many of these comorbidities.

Figure 3 Odds of having comorbidity at baseline, both uncorrected and uncorrected for baseline age and sex



Conclusions

More advanced CKD was strongly associated with vascular comorbidity and diabetes even after correction for age. This association may in part be due to the role of these comorbidities in the aetiology of CKD, as well as a consequence. In the assessment of outcomes in CKD, the effect of these comorbidities on outcome over and above that of CKD itself should be investigated further.

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2. Marks A, Black C, Fluck N, et al. Translating chronic kidney disease epidemiology into patient care--the individual/public health risk paradox.. Nephrol Dial Transplant. 2012 Oct;27 Suppl 3:iii65-72

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