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Disparities in testing for renal function in UK primary care: cross-sectional study

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Background. In the UK, explicit quality standards for chronic disease management, including for diabetes and chronic kidney disease (CKD), are set out National Service Frameworks and pay-for-performance indicators. These conditions are common with a prevalence of 4% and 5.4%, respectively. CKD is largely asymptomatic, detected following renal function testing and important because associated with increased mortality and morbidity, especially in people with diabetes and proteinuria.

Objectives. To investigate who has their renal function tested and any association with age, sex, ethnicity and diabetes.

Method. A cross-sectional survey in a primary care research network in south-west London (n = 220 721). The following data were extracted from routine data: age, gender, ethnicity, latest serum creatinine, diagnosis of diabetes and recording of proteinuria. We used logistic regression to explore any association in testing for CKD.

Results. People (82.1%) with diabetes had renal function and proteinuria tested; the proportion was much smaller (<0.5%) in those without. Women were more likely to have a creatinine test than men (28% versus 24%, $P < 0.05$), but this association was modified by age, ethnicity and presence of diabetes. People >75 years and with diabetes were most likely to have been tested. Black [adjusted odds ratio (AOR) 2.1, 95% confidence interval (CI) 2.0–2.2] and south Asian (AOR 1.65, 95% CI 1.56–1.75) patients were more likely to be tested than whites. Those where ethnicity was not stated were the only group not tested more than whites.

Conclusions. Quality improvement initiatives and equity audits, which include CKD should take account of disparities in renal function testing.

Keywords. diagnosis, diabetes mellitus, epidemiology, family practice, nephrology.

Introduction

Chronic kidney disease (CKD) is a largely asymptomatic condition associated with substantially increased risk of cardiovascular morbidity and mortality and complications of deteriorated kidney function[1] and diabetes is a common primary cause of CKD. People with both diabetes and CKD have a far worse clinical outcome than for diabetes or CKD alone. The co-existence of these conditions is a very powerful predictor of adverse cardiovascular outcomes.[2]

CKD is a structural or functional kidney abnormality that persists for at least 3 months.[3] In early stages, CKD is rarely symptomatic but it can be detected through routine laboratory measurements that include proteinuria and estimating glomerular filtration rate (GFR), from a simple formula using age, gender, ethnicity and serum creatinine.[1] The presence of albumin in the urine indicates glomerular damage. Early detection and subsequent intensified cardiovascular risk factor treatment may prevent or delay some of the adverse complications, reduce associated cardiovascular

risk and slow the progression of the disease.[4–6] However, CKD is often under-diagnosed and undertreated which represent a missed opportunity to improve outcomes for these patients.[7]

Primary care has an important role in the diagnosis and management of CKD and this is reflected in a number of quality improvement initiatives put in place within the National Health Service (NHS) since 2000.[8] National Service Frameworks (NSF) make quality standards explicit, as do the pay-for-performance (P4P) indicators for primary care. The Diabetes NSF, introduced in 2001,[9] recommends measurement of proteinuria (microalbuminuria) and kidney function and testing for proteinuria (albuminuria) and monitoring renal function in people with diabetes; this became part of P4P in 2004.[10] Part 2 of the NSF for renal services, which included the management of CKD, was published in 2005,[9] with corresponding P4P incentives the following year.[10] National and international clinical guidelines recommend quantifying urinary albumin/creatinine excretion annually for all people with diabetes and people without diabetes with a GFR <60 ml/min/1.73 m^2.[11]

Substantial differences have been described in the incidence and prevalence of CKD in different ethnic minority groups resulting in disproportionately higher share of the burden of the disease and its complications for these groups[12–14] Age, gender and ethnic disparities have been widely documented in the therapy and outcomes of CKD in patients with advanced renal failure.[15,16] Although the exact reason for these disparities is not fully understood, under-recognition of earlier stages of CKD and risk factors for CKD may partially explain some of these inequalities.[17] Recent studies have suggested that while the introduction of P4P may have narrowed differences in the quality of care provided to different socio-economic groups, it has left other disparities in care largely unchanged.[18] Little is known about whether well-documented age, gender and ethnic disparities are also present in testing for kidney function and proteinuria in UK primary care. If disparities are present that are not taken into account when prevalence is estimated, it might have important implications for clinicians and policy makers and inform future health care planning to provide equitable health care.

We examined the association between testing for renal function and albuminuria and age, sex, ethnicity and diabetes in primary care using routinely collected data in general practices during 2007 in south-west London.

Method

Sample, data collection and processing

The Cutting Out Needless Deaths Using Information Technology (CONDUIT) network holds anonymized routine primary care data on patients registered with 34 participating practices in south-west London.[19] The network was initially established to examine the use of information technology as quality improvement tool in the management of diabetes and cardiovascular disease.[20–22] CONDUIT practices like UK general practice in general are highly computerized, with a number of factors contributing to high levels of data quality[23,24]: (i) a registration-based system with a centrally held unique identity number (NHS number) makes the denominator accurate; (ii) laboratory computerized links mean that test results—e.g. creatinine and (since 2006) estimated glomerular filtration rate (eGFR)—are complete in patients records. We extracted data from GP computer systems using a Department of Health sponsored data extraction tool called MIQUEST (Morbidity Information Query and Export Syntax). We used a well-established method to aggregate, clean and analyse these data.[25] We collected records for 220 721 individuals registered with 29 of 34 participating practices in the study area during 2007.

Study variables

Demographic (age, sex and ethnicity[26]) and clinical data (diagnosis of diabetes, serum creatinine, urinary protein testing, urine albumin/creatinine ratio and eGFR) were extracted for all patients. We carefully mapped the most specific ethnicity code to the National statistics '5 + 1' categories (white, mixed, Asian, black, other and 'not stated'). Approximately 75% of patients had ethnicity recorded and it is likely that there was under recording of white ethnicity. Where data were missing, we presumed that the population distribution of ethnicity were the proportions reported in the Office for National Statistics (ONS) mid-2006 estimates and corrected to these by individual age band (see below). We also took into account possible shortcomings in diabetes diagnostic data.[27]

Analysis

We compared the age and sex distribution of the sample with the most recent National Statistics population for England. We also compared ethnicity recording in our sample with that recorded in the mid-2006 ONS estimates.[28] We described creatinine measurement in the last year versus earlier measurement by ethnicity. We also described the level of proteinuria recording in people with and without diabetes. To assess the association between testing for renal function and age, sex, ethnicity and presence of diabetes, we undertook multivariable logistic regression analyses. Because the odds of testing differed across strata, we entered interaction terms into the model between age and sex, sex and ethnicity, diabetes and ethnicity and finally age and ethnicity. We also plotted these odds with their 95% confidence intervals (CIs) on separate graphs for people with and without diabetes, separating results

for each gender. We used multilevel modelling, using the Markov Chain Monte Carlo (MCMC) method to explore whether there was any significant clustering effect by comparing a single with a multilevel model; we ran this using MLwiN application.[29]

Results

Sample characteristics can be found in Table 1. Wandsworth has more young adults (25–44 years) and fewer older adults compared with the national population. The ethnic mix of the whole population was difficult to ascertain with any certainty as ~25% of individuals had no ethnic origin recorded. Comparison with census data for Wandsworth suggests that the majority of those with unrecorded ethnic status are likely to be of European origin; just fewer than 80% of the population were estimated in the ONS Mid-year estimate to be white, whereas in the CONDUIT sample, it was 55% and 45% for men and women, respectively. The sum of the white and ethnicity-not-stated group is very close to the ONS Mid-year estimate.

Creatinine recording

The complex pattern on who is tested for creatinine is displayed in Table 2. Within each ethnic stratum (displayed in columns), the data are further stratified by sex (upper and lower part of the table) and within each age group by the presence of diabetes. This complex stratification was necessary because guidelines suggest that testing should be intensive in those with diabetes; moreover, age, sex and ethnicity are associated with declining kidney function. As can be seen by the far column on the right side, with increasing age, the prevalence of diabetes increased with being <1% among people under the age of 50 years and ~20% in those >75 years. Diabetes was more common in men in all age groups.

Creatinine recording was higher in patients with diabetes in both sexes in all age groups compared to those without diabetes (Table 2). Those who had diabetes but who explicitly did not state their ethnicity have overall lower percentages of recorded creatinine when compared to the other ethnic groups with high completeness of ~95%. Focusing on the totals for males and females (in bold) who did not have diabetes, the percentage with a serum creatinine measurement varied across different ethnic groups and by sex. Among men without diabetes, Asian and Black ethnic groups had the highest rates of recording with 27% and 28%, respectively; in women, these numbers were higher with 38% and 41%, respectively. Overall, among those without diabetes, women had higher percentages with available creatinine test, when compared to men in each ethnicity, but the size of this difference varied by ethnicity.

When focusing on rates of testing for serum creatinine across age groups, there was an increasing recording of creatinine with increasing age in those without diabetes, while a less pronounced trend was observed in those with diabetes, due to a higher completeness of testing in those with diabetes. However, percentages tested within each ethnicity at ages 75+ were remarkably similar for men and women at older age within a given ethnicity among those without diabetes. We also examined the date of recorded creatinine test, and the distribution of dates for the creatinine test was similar across the different ethnicities with all ethnic groups having approximately two-thirds of the serum creatinine measures in the last year (data not shown).

Proteinuria recording

Microalbuminuria testing was recorded for 82.1% of people with diabetes (Table 3). There was a clear preference for using tests for microalbuminuria over other tests for proteinuria among those with diabetes. Among those without diabetes, there was only very infrequent testing for either proteinuria or albuminuria with <1% tested. For the very few who were tested, there appeared to be a greater proportion of people of Asian or Black origin, although these differences did not achieve statistical significance. In both diabetic

TABLE 1 *Ethnic distribution of the sample, Wandsworth (mid-2006 estimates) and England (mid-2006 estimates)*

Ethnic group	CONDUIT total sample				Wandsworth (ONS mid-2006 estimate)			
	Male		Female		Male		Female	
	n	%	*n*	%	*n*	%	*n*	%
White	50 648	45.7	60 249	54.8	107 200	79.7	114 700	79.7
Not stated	33 942	30.6	22 198	20.2				
Mixed	2912	2.6	3376	3.1	4300	3.2	4600	3.2
Asian	9638	8.7	8679	7.9	10 100	7.4	9900	7.4
Black	12 177	11.0	13 563	12.4	9700	7.3	11 300	7.3
Other	1 554	1.4	1782	1.6	3200	2.4	3700	2.4
Total	110 871		109 847					

TABLE 2 *Recording of creatinine by gender, ethnicity, age band and diabetes*

	Age band		White			Not stated			Mixed			Asian			Black			other			Total	DM
		Diabetes	*N*	*n*	%	*N*	*n*	%	*N*	*n*	%	*N*	*n*	%	*N*	*n*	%	*N*	*n*	%	*n*	Prev
Male	<18	DM	9	1	11.1	6	2	33.3	2	1	50.0	5	0	0.0	7	5	71.4	0	0	0.0	29	0.2
		No DM	7019	184	2.6	6177	197	3.2	1071	34	3.2	1642	0	0.0	2696	126	4.7	239	8	3.3	18 844	
	18–24	DM	9	6	66.7	2	1	50.0	1	1	100	5	5	100	3	3	100	0	0	0.0	20	0.3
		No DM	2061	246	11.9	2204	235	10.7	255	30	11.8	859	111	12.9	1022	117	11.4	120	13	10.8	6521	
	25–49	DM	336	295	87.8	37	33	89.2	17	16	94.1	166	159	95.8	172	163	94.8	7	6	85.7	735	1.2
		No DM	30 912	5780	18.7	18 910	2479	13.1	1293	279	21.6	4509	1085	24.1	5524	1525	27.6	873	177	20.3	62 021	
	50–74	DM	951	933	98.1	78	72	92.3	47	44	93.6	597	585	98.0	499	488	97.8	32	31	96.9	2204	11.4
		No DM	7322	3022	41.3	6132	1825	29.8	191	126	66.0	1531	956	62.5	1766	1154	65.3	234	121	51.7	17 176	
	75+	DM	360	351	97.5	24	22	91.7	14	14	100	117	111	94.9	170	168	98.8	10	10	100	695	20.9
		No DM	1670	1473	88.2	371	214	57.7	21	18	85.7	208	170	81.7	317	266	83.9	39	31	79.5	2626	
Male summary		DM	1665	1586	95	147	130	88	81	76	94	888	860	97	851	827	97	49	47	96	3683	3.3
		No DM	48 983	10 705	22	33 795	4950	15	2831	487	17	8660	2322	27	11 326	3188	28	1505	350	23	107 188	
		All	50 648	12 291	24	33 942	5080	15	2912	563	19	9548	3182	33	12 177	4015	33	1554	397	26	110 871	
Female	<18	DM	8	3	37.5	6	0	0.0	0	0	0.0	5	3	60.0	7	1	14.3	0	0	0.0	26	0.1
		No DM	6757	226	3.3	6058	209	3.4	1033	38	3.7	1544	80	5.2	2706	108	4.0	282	17	6.0	18 380	
	18–24	DM	19	14	73.7	1	1	100	2	0	0.0	3	2	66.7	4	4	100.0	0	0	0.0	29	0.4
		No DM	3725	590	15.8	1764	321	18.2	343	86	25.1	767	191	24.9	1281	271	21.2	169	22	13.0	8049	
	25–49	DM	201	171	85.1	21	20	95.2	34	30	88.2	100	95	95.0	144	139	96.5	6	6	100	506	0.8
		No DM	37 431	8695	23.2	9786	2769	28.3	1592	507	31.8	3868	1445	37.4	6042	2680	44.4	1045	267	25.6	59 764	
	50–74	DM	618	612	99.0	74	71	95.9	44	43	97.7	508	501	98.6	590	585	99.2	15	15	100	1849	10.3
		No DM	8080	5784	71.6	3777	2037	53.9	258	189	73.3	1557	1122	72.1	2255	1787	79.2	223	162	72.6	16 150	
	75+	DM	447	437	97.8	34	27	79.4	20	20	100	95	93	97.9	198	194	98.0	10	10	100	804	15.8
		No DM	2963	2662	89.8	677	431	63.7	50	43	86.0	232	184	79.3	336	283	84.2	32	24	75.0	4290	
Female summary		DM	1293	1237	96	136	119	88	100	93	93	711	694	98	943	923	98	31	31	100	3214	2.9
		No DM	58 956	17 957	30	22 062	5767	26	3276	863	26	7968	3022	38	12 620	5129	41	1751	492	28	106 633	
		All	60 249	19 194	32	22 198	5886	27	3376	956	28	8679	3716	43	13 563	6052	45	1782	523	29	10 9847	
		All	110 897	31 485	28	56 140	10 966	20	6288	1519	24	18 227	6898	38	25 740	10 067	39	3336	920	28	22 0718	

N, population; *n,* number of people with creatinine recorded; %, $(n/N) \times 100$; DM, people with diabetes mellitus; No DM, people without diabetes; Prev, prevalence of diabetes.

and non-diabetic subgroups, there was a higher likelihood of testing with rising age (chi-square test for trend: $P < 0.0001$ in both cases). There was no evidence for a between-sexes difference in either microalbuminuria or macroalbuminuria testing:

- Microalbuminuria: diabetes—82.7% male versus 81.4% female: $P = 0.41$
- Macroalbuminuria: diabetes—19.4% male versus 19.2% female: $P = 0.84$
- Microalbuminuria: no-diabetes—0.26% male versus 0.25% female: $P = 0.65$
- Macroalbuminuria: no-diabetes—0.18% male versus 0.23% female: $P = 0.24$

Multivariable analysis of predictors of serum creatinine measurements

A multivariable model was constructed to formally test the odds of having a creatinine test. We found significant interactions between diabetes and sex, sex and ethnicity and diabetes and age, and results are displayed accordingly in Table 4 and graphically in Figure 1.

Within each sex, results differ by presence of diabetes, presence of ethnicity and there are differences in the age effects between men and women and by diabetes. If there was only confounding by age, sex or ethnicity, the numbers would all overlap, but because there are multiplicative interactions, the estimated effects differ by subgroup.

TABLE 3 *Recording of proteinuria and microalbuminuria in people with and without diabetes*

		Diabetes, *N*	Urine protein		Microalbuminuria		Not DM, *N*	Urine protein		Microalbuminuria	
			n	%	*n*	%		*n*	%	*n*	%
Ethnicity	White	2959	617	20.9	2396	81	107 938	183	0.17	265	0.25
	Not stated	284	44	15.5	144	50.1	55 856	132	0.24	51	0.09
	Mixed	181	33	18.2	153	84.5	6107	4	0.07	7	0.11
	Asian	1600	273	17.1	1360	85	16 717	30	0.18	93	0.56
	Black	1793	339	18.9	1541	85.9	23 947	72	0.3	125	0.52
	Other	80	27	33.8	69	86.3	3256	7	0.21	7	0.21
Age band	<18	53	1	1.9	3	5.7	37 224	9	0.02	5	0.01
	18–24	49	2	4.1	22	44.9	14 570	10	0.07	12	0.08
	25–49	1241	155	12.5	865	69.7	121 785	92	0.08	135	0.11
	50–74	4053	809	20	3476	85.8	33 326	178	0.53	251	0.75
	75+	1499	364	24.3	1297	86.5	6916	139	2.01	145	2.1
	Total	6897	1331	19.3	5663	82.1	213 821	428	0.2	548	0.26
	All patients						220 718	1759	0.8	6211	2.81

DM, people with diabetes mellitus; Not DM, people without diabetes.

TABLE 4 *Logistic regression of the predictors that creatinine was tested and recorded*

		Male				Female			
		No diabetes		Diabetes		No diabetes		Diabetes	
		OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Ethnicity	White	1	Reference	1	Reference	1	Reference	1	Reference
	Not stated	0.45	0.43–0.47	0.53	0.29–0.99	0.94	0.90–0.98	0.36	0.18–0.70
	Mixed	1.04	0.93–1.16	0.99	0.35–2.75	1.43	1.30–1.56	0.75	0.32–1.75
	Asian	1.18	1.11–1.25	1.53	0.97–2.42	1.65	1.56–1.75	1.64	0.90–3.00
	Black	1.34	1.27–1.41	1.86	1.15–3.02	2.1	2.00–2.20	2.06	1.17–3.63
	Other	0.89	0.77–1.01	0.95	0.22–4.03	1.08	0.96–1.21	No meaningful result[a]	
Age band	<18	0.01	0.01–0.01	0.02	0.01–0.04	0.01	0.01–0.01	0.01	0.00–0.03
	18–24	0.03	0.02–0.03	0.12	0.04–0.39	0.04	0.03–0.04	0.08	0.03–0.20
	25–49	0.05	0.04–0.05	0.3	0.18–0.50	0.07	0.06–0.07	0.28	0.17–0.48
	50–74	0.28	0.25–0.31	1.15	0.67–1.97	0.37	0.34–0.41	2.18	1.20–3.98
	75+	1	Reference	1	Reference	1	Reference	1	Reference

OR, odds ratio. Within each sex/diabetes group, the reference comparator is age 75 years and white. The OR of diabetes relative to no diabetes in white men of age 75 years was 6.84 (95% CI: 4.83–9.70). The OR of diabetes relative to no diabetes in white women of age 75 years was 5.03 (95% CI: 53.53–7.18). The effect of being female versus male at age 75 years in non-diabetic white was 0.98 (95%CI: 0.86–1.11), while age effects differed between sexes at other ages as displayed in the table above. The *P*-values for interaction between diabetes and sex, between sex and ethnicity and between diabetes and age were all <0.0001.

[a]31/31 (100%) patients with diabetes in ethnic group had a creatinine record compared with 1237/1293 (95.7%) in the white reference group, yielding an OR >400 000 ($P = 0.97$).

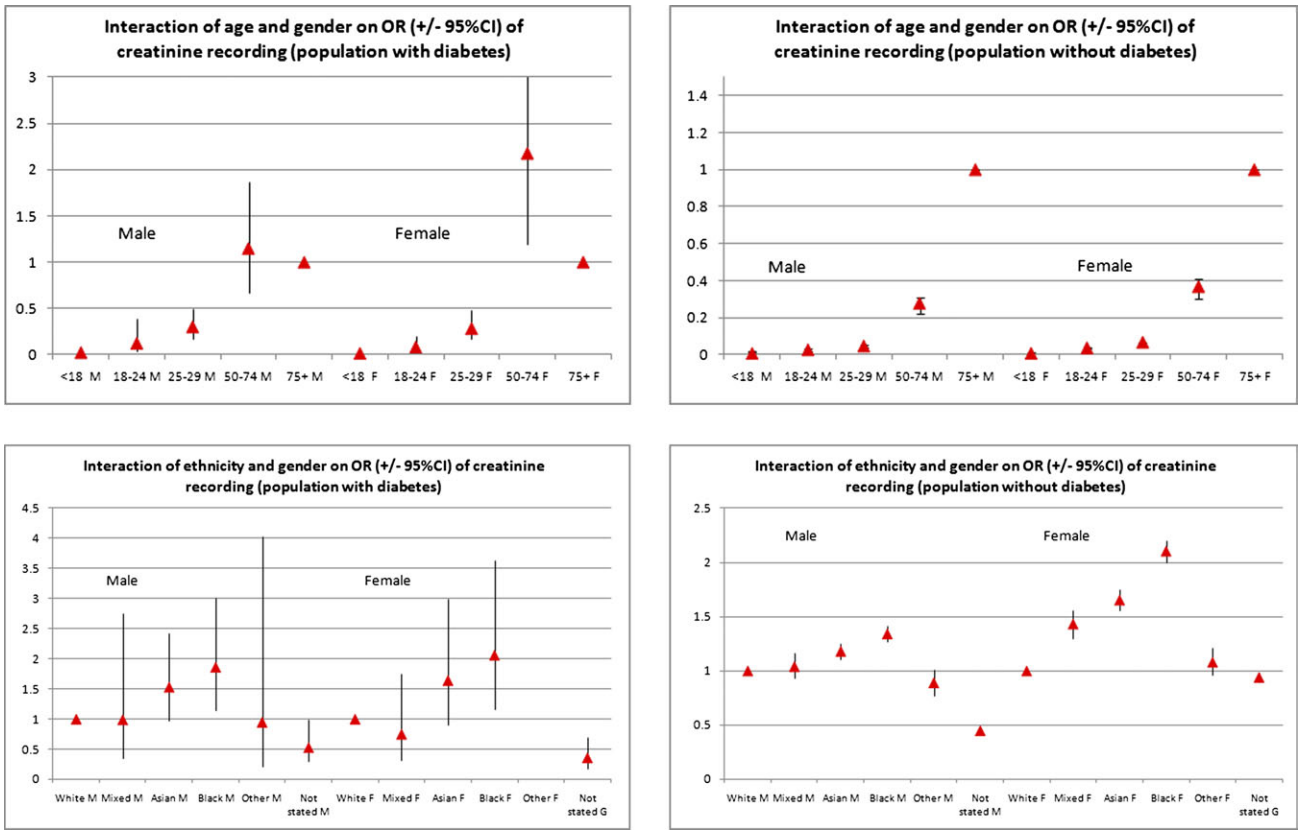

FIGURE 1 *Interaction graphs of the influence of age and gender (top two graphs) and ethnicity*

For example, when examining the effects of ethnicity among men (age-adjusted), the odds of being tested for creatinine is higher among ethnic minorities and in particular in men from ethnic minorities who have diabetes. A similar but more pronounced effect is seen for women across ethnicities. In particular, the 95% CIs for the effect of Asian and black ethnicity in women without diabetes are not consistent with the effects as seen for men in the same stratum.

When examining the effects of age for testing, the trends of testing for creatinine with decreasing age are similar for men and women with diabetes and the odds of being tested generally higher when compared to those of similar age who do not have diabetes. Trends with age are however different for men and women without diabetes; middle-aged women are more likely to have a creatinine test performed when compared to men at the same age, over and above the effect of women in general in all groups being tested more often than men.

The logistic regression for proteinuria testing was not carried out due to the lack of records in people without diabetes and so few numbers that a model did not converge.

Multilevel modelling to explore any effect of clustering by practice

While heterogeneity does exist between practices, this does not undermine the results of the single-level model. There was no qualitative difference between a single-level model ignoring practice and a MCMC model taking this effect into account (see supplementary data available in *Family Practice* online).

Discussion

Principal findings

This is the first population-based study to examine disparities in testing for chronic renal failure in a multiethnic population after the introduction of major quality improvement programmes in the UK.

Our data show considerable variation in kidney function testing in UK primary care. Testing was higher in women, older patients, south Asian and black patients and those with diabetes. People with diabetes were considerably more likely to have a microalbuminuria test compared to those without diabetes with 82.1% recording rate. Microalbuminuria testing was higher in people with south Asian and black ethnicity compared to white patients in people without diabetes. In those without diabetes, testing for proteinuria and/or microalbuminuria was very infrequent. Overall, women were more likely to have their renal function tested compared to men. The difference compared to men was influenced by the presence of diabetes, ethnicity and age.

Implications of the findings

Despite intensive focus on the early detection of CKD in high-risk individuals during the last few years, our data suggest that testing has been carried out unequally across different age, gender and ethnic groups. This inequity in testing may result in differential case ascertainment between the more and less tested groups.

The differences in testing rates need to be further explored. Lower rates of testing in people without diabetes may be because some GPs do not think that CKD is really a disease. Focus group studies would support this hypothesis as some GPs worry that CKD is just part of normal ageing, especially in the absence of vascular co-morbidities.[30] Higher rates of testing in black and Asian people may be due to recognition of the increased risk of renal failure and complications of diabetes. It is much harder to explain the increased testing of females, especially of black and Asian ethnicities as there is more vascular disease and renal failure among men.

The implications for policy and practice are that there are disparities in testing which do not necessarily follow increased risk. Educational or other interventions may be needed to realign testing with risk of deterioration.

Strengths and limitations of the study

Participating practices in the CONDUIT network have invested over many years in improving their data quality[21,22] with a special focus on diabetes and cardiovascular diseases. CONDUIT practices have been provided incentives to record ethnicity and feedback about their data quality and therefore have more complete ethnicity recording compared to the UK primary care settings.[31] The data extraction techniques and processing techniques have been developed over a decade.[25] Despite these strengths, there are several limitations. There was a group who did not provide ethnicity information. Despite comprehensive quality checks, CONDUIT is dependent on accurate and complete coding by individual family physicians or practices. Payments to GPs are weighted by prevalence of CKD; therefore, practices are financially incentivized to measure and record kidney function and proteinuria.

We only had access to coded data in computerized medical records, and we did not have access to further data such as free text. Proteinuria dipstick testing, widely performed as part of new patient health checks and at other times, are not being recorded as coded data and therefore invisible to our searches.

There are other factors which will effect whether renal function is tested: some groups attend the practice more than others, particularly those who are unwell or have an ongoing condition and these factors will also contribute to the likelihood of being tested.

Comparison with the literature

A similar level of proteinuria recording was found in the NEw Opportunities for Early Renal Intervention by Computerised Assessment (NEOERICA) study[32] though levels of recording have improved in other samples of routinely collected data they remain patchy.[33] Previous studies have shown higher measurement of cardiovascular risk factors and this might reflect the awareness of the higher cardiovascular risk in south Asian and black people.[19] These data also refute the hypothesis that infrequent testing of renal function in ethnic minority groups explains the recent rise of ethnic minority patients needing replacement therapy.[34] However, although there is better testing of renal function in ethnic minority groups, surrogate markers of the quality of care of people from black and Asian ethnicities remains worse than other ethnic groups in the CONDUIT study population.[21,22]

Women consult more than men and this may provide greater opportunities for testing renal function;[35] additionally, the Modified Diet in Renal Disease (MDRD) formula commonly used to estimate GFR is different for females further exaggerating the effect of increased testing. The female prevalence of CKD is 7.3% compared with 3.5% in males.[33]

The testing pattern observed fits with National Institute for Health and Clinical Excellence (NICE) guidelines.[36] These guidelines suggest that people with risk factors (predominantly diabetes and cardiovascular disease) should have their renal function tested and those without them should not be tested. This logic appears to be being applied by CONDUIT practices.

Call for further research

Local health services in the UK have a statutory responsibility to conduct Health Equity Audits to ensure fair access and availability of services.[37] The findings of this paper may add a further new dimension to be explored in this type of audit. Most importantly, we need to know if this inequity of testing and recording renal function is associated with any poor health outcomes in those who are less frequently tested. There is an argument for not testing patients at ages <55 years without diabetes as those are less likely to have CKD.[38]

Conclusions

There is variation in testing in renal function in primary care. Although the pattern of testing largely follows that in National guidance, differential testing may lead to more case ascertainment, selection bias, in some groups and less in others, exclusion bias. Policy makers and practitioners need to analyse rates of testing before reporting prevalence of a condition and explore if there are differences between genders, ethnicities and age groups. These differences need to be

taken into account when interpreting prevalence calculations and rates of co-morbidity in CKD based on routinely collected primary care data.

What is known about this subject

Diabetes has been a quality improvement target for UK general practice since 2004 and CKD from 2006.

There are known disparities in CKD incidence and prevalence in different ethnic groups and also increased burden of disease.

Age, gender and ethnic disparities have been widely documented in the therapy and outcomes of CKD in patients with advanced renal failure.

Under-recognition has been proposed as a mechanism to explain these disparities.

What this study adds

This is the first population-based study to examine disparities in testing for chronic kidney disease in a multiethnic population.

Testing was higher in women, older patients, south Asian and black patients and those with diabetes.

Disparity in recording needs to be taken into account when interpreting prevalence data, particularly for younger people and those without diabetes.

Further research is needed to explore whether inequity is testing is associated with poor outcomes.

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