Treatment needs and diagnosis awareness in primary care patients with chronic kidney disease.

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Abstract

Background
GPs in England are required to keep a register of patients with chronic kidney disease (CKD). National Institute for Health and Clinical Excellence (NICE) guidelines recommend regular follow-up, but patients are perceived to be low risk and not requiring active management.

Aim
To assess treatment needs of CKD stage 3 patients in primary care, as well as their awareness of CKD.

Design and setting
A cross-sectional analysis from a longitudinal prospective study in 32 general practices.

Method
A total of 1741 participants underwent clinical assessment including urine and blood tests. Participants were asked about awareness of their CKD. Results were reviewed and a letter recommending treatment in line with NICE guidelines was sent to their GP.

Results
The mean age of participants was 73 ± 9 years; 60% (*n* = 1052) were female and diabetes was present in 17%; 67% of participants required further intervention. Most required improved control of hypertension (*n* = 1576; 33.1% of cohort). Other recommendations included advice to investigate anaemia (*n* = 1142; 8.2%) or stop nephrotoxic drugs (*n* = 1120; 7.5%). Less than 6% of participants met NICE criteria for referral to nephrology services and 41% were unaware of their CKD diagnosis. Multivariable analysis identified subjects with formal educational qualifications, age <75 years, estimated glomerular filtration rate (eGFR) 30–44 ml/min/1.73 m^2, and significant albuminuria as more likely to be aware of their diagnosis.

Conclusion
The study data show that the majority of patients required at least one intervention to improve the management of their CKD. Most interventions could be delivered in primary care and only a minority required nephrology referral. Many patients were unaware of their CKD diagnosis, and efforts should be made to improve this to facilitate involvement in their care.

Keywords
awareness; kidney disease, chronic; primary care; treatment.

INTRODUCTION

Epidemiological studies have identified chronic kidney disease (CKD) as a major global health problem,[1] with rising incidence and prevalence. The diagnosis of CKD is important because it is associated with increased risk of death, cardiovascular events, and (for a minority) end-stage kidney disease.[2,3]

Since 2006, GPs in England have been incentivised to keep a register of patients with CKD stage 3–5, through the Quality and Outcomes Framework (QOF). Data from 2009/2010 indicate that a mean of 4.3% of adults registered with a GP are on a CKD register.[4] National guidance for the early identification and management of adults with CKD published by the National Institute for Health and Clinical Excellence (NICE) recommends regular follow-up of all patients with CKD.[5] However, in primary care the majority of patients with CKD are perceived to be low risk, not requiring active management. Some have therefore questioned the value of CKD registers or the need for patients to receive regular follow-up. To address this issue, this study sought to describe the treatment needs of a large cohort of patients with CKD stage 3 cared for in primary care.

Patient empowerment and involvement is essential for optimal management, to reduce cardiovascular risk and the risk of CKD progression. The principal interventions are treatment of hypertension and lifestyle changes. A basic prerequisite is therefore that patients should know about their diagnosis, and most patients expect that healthcare professionals will inform them of the details and implications of their medical diagnoses. Nevertheless, studies from the US suggest that patient awareness of CKD is poor.[6,7] A second aim of this study was to assess awareness of the diagnosis in the study cohort of patients with CKD stage 3.

METHOD

Participants and recruitment

Approximately 8280 eligible patients were invited to participate and 22% agreed to do so (positive response rate 8–34% in different GP surgeries). Of the original 1822 participants enrolled, 81 were excluded as they did not meet the entry criteria. Thus, 1741 patients with CKD stage 3 who had been entered onto a CKD register by their GP were studied. Detailed methods have been published previously.[8,9] Briefly, participants were recruited from 32 GP practices, as part of the Renal Risk in Derby (RRID) study, a prospective cohort study, investigating renal and cardiovascular risk factors in patients with CKD stage 3 in primary care. Participants were adult, met the National Kidney Foundation Disease Outcomes Quality Initiative (KDOQI) criteria for CKD stage 3 (estimated glomerular filtration rate (eGFR) 30–59 ml/min/1.73 m^2 on two or more occasions at least 3 months apart), and were able to give informed consent and attend their GP surgery for assessments by the researchers. People

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How this fits in

Chronic kidney disease (CKD) is asymptomatic and is associated with increased risk of death, cardiovascular events, and end-stage kidney disease. GPs are required to keep a register of patients with CKD stage 3–5 and are expected to care for the majority in primary care but the treatment needs of those on CKD registers have not previously been evaluated. Awareness of their diagnosis enables patients to become active partners in their care but previous population-based studies indicate that the majority of those with CKD are unaware of their diagnosis. This study reports the first prospective assessment of the treatment needs and awareness of patients with CKD stage 3 being looked after in primary care, with recommendations of where improvements in care could be targeted.

who had previously had a solid organ transplant or were terminally ill (expected survival <1 year) were excluded.

Data collection

The first study visits were conducted from August 2008 to March 2010. Participants were sent a medical questionnaire and urine specimen bottles and were asked not to eat cooked meat for at least 12 hours prior to the assessment.[5]

Anthropomorphic and blood pressure measurements were taken. Blood and urine specimens were submitted for analysis. Diabetes was defined in line with World Health Organization (WHO) criteria.[10] A previous cardiovascular event (CVE) was defined as subject-reported myocardial infarction, stroke, transient ischaemic attack, revascularisation, amputation due to peripheral vascular disease, or aortic aneurysm. Blood pressure was measured after a minimum of 5 minutes' rest in the sitting position, and calculated as the mean of three readings that were within 10% of each other. Hypertension was defined as systolic blood pressure ≥140 mmHg, diastolic blood pressure ≥90 mmHg, or current antihypertensive medication.[11]

Albuminuria was assessed by measuring the urine albumin to creatinine ratio (ACR), and microalbuminuria was defined as a urine ACR >2.5 mg/mmol in men or >3.5 mg/mmol in women.[5]

Biochemical assessments were performed in a single laboratory. The creatinine assay was standardised against an isotope dilution mass spectrometry (IDMS) method as part of the National External Quality Assurance Scheme, and the four-variable MDRD (Modification of Diet in Renal Disease Study) equation modified for use with IDMS-standardised creatinine values was used to estimate GFR.

Assessment of treatment needs

Following study visits, results were reviewed by a single consultant nephrologist and recommendations for further management sent to the GP. All recommendations were made in accordance with NICE guidance,[5] and were coded for analysis.

Awareness of chronic kidney disease

Participants were asked the question 'Were you told that you may have an issue with your kidneys (excluding bladder or prostate problems and incontinence) before you were contacted to take part in this study?'. Those answering 'yes' were defined as being aware of their CKD diagnosis.

Statistical analysis

The results presented are a cross-sectional analysis of data from the first study visit. Variables are reported as the mean and standard deviation (SD) if normally distributed, or the median and interquartile range (IQR) if not. A *t*-test was used to compare groups where variables were normally distributed and a Mann–Whitney test used if they were not. SPSS (version 15.0) was used for analysis and $P<0.05$ was considered statistically significant. Multivariable logistic regression was used to determine independent determinants of awareness of CKD diagnosis.

RESULTS

Baseline characteristics are summarised in Table 1. The mean age of participants was 72.9 ± 9 years (<60 years = 128 (7.4%); 60–69 years = 445 (25.6%); 70–79 years = 761 (43.7%); ≥80 years = 407 (23.4%)), they were predominantly of white ethnicity, and 60% (*n* = 1052) were female. Diabetes mellitus was present in 17% (*n* = 294) and sex-adjusted anaemia in 23% (*n* = 402). Renal function was well preserved, with a mean eGFR of 52.5 ± 10.4 ml/min/1.73 m^2.

Advice given to GPs is summarised in Table 2. Analysis revealed that advice to alter at least one aspect of management was given for 67% of participants. The most common was advice to improve control of hypertension (*n* = 576, 33%) or reduce antihypertensive medication in those with systolic blood pressure <120 mmHg (*n* = 53, 3%). Mild anaemia was relatively common and advice to investigate this was given for

Table 1. Baseline characteristics

	Total cohort *n* = 1741	Aware of diagnosis *n* = 1026	Not aware of diagnosis *n* = 715	*P*-value[a]
Age, years	72.9 ± 9	71.8 ± 9	74.4 ± 8	<0.001
Sex, female	1052 (60)	598 (58)	454 (64)	0.032
Ethnicity, white	1698 (98)	1001 (98)	697 (98)	1.00
eGFR, ml/min/1.73m^2	52.5 ± 10.4	51.5 ± 10.7	53.9 ± 9.7	<0.001
Haemoglobin, g/dl	13.2 ± 1.4	13.2 ± 1.4	13.2 ± 1.3	0.86
Diabetes mellitus	294 (17)	180 (18)	114 (16)	0.398
Previous CVE	387 (22)	223 (22)	164(23)	0.558
On NSAID therapy	146 (8.4)	83 (8.1)	63 (8.8)	0.60
Ii use	1123 (65)	681 (66)	442 (62)	0.053
Hypertension	1528 (88)	904 (88)	624 (87)	0.604
BP <140/90 mmHg	1117 (64)	674 (66)	443 (62)	0.115
Qualification[b]	788 (45)	501 (64)	287 (36)	<0.001
Albuminuria[c]	293 (17)	205 (20)	88 (12)	<0.001
CKD stage 3B[d]	407 (23)	285 (28)	125 (18)	<0.001
Age <75years	917 (53)	586 (57)	331 (46)	<0.001

Data are mean ± SD, or number (%). BP = blood pressure. CVE = cardiovascular event. eGFR = estimated glomerular filtration rate. NSAID = non-steroidal anti-inflammatory drug. RAASI = renin–angiotensin–aldosterone system inhibitor. [a]Patients aware of CKD diagnosis versus those not aware. [b]Formal educational qualification. [c]Albuminuria = microalbuminuria or greater amounts of proteinuria. [d]CKD 3B = eGFR 30–44 ml/min/1.73m^2.

Table 2. Advice given to GPs

Advice given	*n*	%
Continue routine follow-up	576	33.1
Improve control of high blood pressure	576	33.1
Reduce antihypertensives for low blood pressure	53	3.0
Refer to nephrology services	103	5.9
Investigations for anaemia	142	8.2
Statin therapy for dyslipidaemia	69	4.0
Advice to stop potentially nephrotoxic drugs[a]	120	7.5
Repeat eGFR and refer if necessary	98	5.6
Management of hypocalcaemia	39	2.2
Management of hypercalcaemia	34	2.0
Follow-up of non UTI-related haematuria	64	3.7
Potassium management	26	1.5
Phosphate management	6	0.3
Mild proteinuria to be rechecked in 6 months	13	0.8

eGFR = estimated glomerular filtration rate. UTI = urinary tract infection. [a]NSAIDs = 116.

8.2% (*n* = 142). For 7.5% (*n* = 120) of participants, advice was given to stop nephrotoxic drugs (non-steroidal anti-inflammatory drugs (NSAIDs) = 116). Despite most people needing some intervention, few (<6%) met the NICE criteria for referral to nephrology. Reasons for recommending nephrology referral are summarised in Table 3. Of participants with a GFR decline of >10 ml/min/1.73 m^2 over 5 years, 11.6% (*n* = 8) had significant proteinuria and 11.6% had also progressed to CKD stage 4.

Forty-one per cent of participants were unaware of their CKD diagnosis (range 7–65% between practices). Univariate analysis revealed subjects with a formal educational qualification, age <75 years, male sex, eGFR <45ml/min/1.73 m^2 (CKD stage 3B), or albuminuria were significantly more likely to be aware of their CKD diagnosis (Table 1). Factors previously identified as being associated with increased risk of CKD (smoking, diabetes, previous CVE, hypertension and treatment with a NSAID, or renin–angiotensin–aldosterone system inhibitors)[12] did not show a significant association with awareness of CKD. Furthermore, the proportion of patients who were aware of their CKD diagnosis did not increase with increasing prevalence of these risk factors. Multivariable logistic regression analysis identified age <75 years, formal educational qualification, CKD stage 3B, and albuminuria as independent determinants of CKD awareness (Table 4). There was a significant trend of increasing awareness of CKD with an increasing number of these independent determinants present (Table 5; *P*<0.001 for trend).

DISCUSSION

Summary

This large observational study found that two-thirds of patients with CKD stage 3 on GP registers required at least one intervention to improve their management, largely relating to blood pressure control. In contrast, only a minority (6%) met NICE criteria for nephrology referral. The most common indication for referral was a progressive decline in GFR. Proteinuria was uncommon and accounted for only 13% of recommendations for referral. Surprisingly, 41% of participants were unaware of their CKD diagnosis, despite being on a CKD register. Those with formal educational qualifications, age <75 years, eGFR 30–44 ml/min/1.73 m^2, and albuminuria were more likely to be aware of their diagnosis.

Strengths and limitations

This is the first study to investigate the treatment needs (as recommended by NICE guidelines) of a large cohort of patients with CKD stage 3 being cared for by GPs. This is important because most CKD research is conducted in secondary care, yet the majority of patients are managed in primary care. A further strength is that, before entry, participants had to have at least two consecutive GFR measurements at least 3 months apart that were 30–59 ml/min/1.73 m^2. Many epidemiological studies have relied on only a single GFR measurement, resulting in inclusion of patients who probably did not have CKD.

Several limitations must be conceded.

Table 3. Primary reasons for recommending referral to a nephrology service (*n* = 103)

Reason	*n* (%)
GFR decline >10 ml/min/1.73m^2 over 5 years	69 (67)
GFR decline >5 ml/min/1.73m^2 in 1 year	16 (15.5)
Proteinuria	13 (12.6)
Complications of CKD	1(1.0)
Progression to CKD stage 4 or 5	4 (3.9)

CKD = chronic kidney disease. GFR = glomerular filtration rate.

Table 4. Independent determinants of awareness of CKD diagnosis

Variable	*P*-value	Odds ratio	95% CI
Qualification[a]	0.001	1.40	1.14 to 1.70
CKD 3B	<0.001	1.96	1.53 to 2.52
Under 75 years	<0.001	1.66	1.36 to 2.03
Albuminuria	0.001	1.59	1.21 to 2.11

CKD = chronic kidney disease. [a]Formal educational qualification.

Table 5. Proportion of participants who were aware of their diagnosis of CKD according to the number of independent determinants of CKD awareness (see Table 4)

Number of factors	Total patients	Aware of CKD	
		n	%
0	291	131	45
1	693	380	55
2	590	378	64
3	131	105	80
4	35	31	89

CKD = chronic kidney disease. P<0.001 for trend.

Participants were asked to volunteer for the study and there may therefore have been some bias towards recruiting patients who were more concerned about their CKD. Comparison with another study suggests that the present cohort is broadly representative of patients on GP CKD registers in England.[13] Nevertheless, if the above bias were present, the data would represent the lower end of the spectrum of treatment needs and the upper end of the spectrum of disease awareness. The study participants were almost all white, reflecting the demography of Derbyshire, so the study findings may not be directly applicable to populations with a greater proportion of ethnic minorities. Due to socioeconomic factors and a higher prevalence of comorbid conditions, it is likely that ethnic minorities would have more treatment needs and a lower awareness of CKD, but further studies are required to investigate this. The question asked to assess awareness of a diagnosis of CKD was deliberately phrased in broad terms, in order to detect even minimal awareness. The study data therefore represent the highest possible estimate of CKD awareness in the study population. Due to the simple nature of the question asked, the assessment of CKD awareness was binary and it was not possible to explore the level of awareness or knowledge in individual patients. Further research is required to assess the extent of patients' knowledge of CKD and their treatment.

Comparison with existing literature

Few previous studies have investigated the treatment needs of patients with CKD in primary care. One study reported that management of hypertension in patients with CKD was regarded as problematic by primary care healthcare staff in the UK.[14] Few practitioners focused on the potential benefits for patients of closer monitoring and active treatment of hypertension, with many being cautious of older people's tolerance of antihypertensive medications. Sixty-four per cent of the study participants had achieved a blood pressure below 140/90 mmHg, a proportion comparable to that of 67% reported in a similar study conducted in nephrology clinics.[15] These are higher rates of adequate blood pressure control than reported in previous studies of patients with CKD, where they range from 20% to 56%,[16–19] suggesting that the QOF has contributed to improved management of hypertension. Nevertheless over one-third of participants required intervention to improve blood pressure control. Awareness of CKD diagnosis in previous studies has been low: 9.4% in a US community-based study of patients with diabetes,[7] and 6.7–22% in patients with CKD stage 3,[20–23] although these studies included participants with previously undiagnosed CKD and not on a CKD register. This may reflect issues such as poor healthcare-provider recognition of CKD, difficulty in explaining CKD to patients, and uncertainty about the accuracy of CKD diagnosis.[14,24] Indeed, when compared to awareness rates of other long-term conditions such as hypertension (awareness rate of 74%)[25] and diabetes (70%),[26] awareness of CKD appears to be substantially lower (6% for CKD stages 1–4 and 10% for CKD stage 3).[6] However, hypertension and diabetes have a longer history of understanding by primary care healthcare providers and public health awareness campaigning. Previous studies have reported that more men than women were aware of their diagnosis of CKD,[6,7] and the present study has found similarly that 64% of those who were not aware of their diagnosis were female. When analysing variables associated with awareness, risk factors for CKD and cardiovascular disease

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Ethical approval

The study was approved by the Nottingham Research Ethics Committee 1 and abides by the principles of the Declaration of Helsinki. All participants provided written consent. The study was included on the National Institute for Health Research (NIHR) Clinical Research Portfolio (NIHR Study ID: 6632) and was independently audited by QED Clinical Services in November 2009.

Provenance

Freely submitted; externally peer reviewed.

Competing interests

The authors have declared no competing interests.

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surprisingly did not show a significant association in the present study cohort. In contrast, other studies have identified factors such as hypertension, diabetes, and previous CVE as independent determinants for awareness of a CKD diagnosis.[6,20,22] The reasons for these differences are not clear but the present observations support a case for improving awareness of CKD among other patient groups at high risk for developing CKD.

Implications for research and practice

The observation that two-thirds of patients with CKD stage 3 required at least one intervention to optimise treatment lends support to the NICE recommendation that such patients should receive regular follow-up at intervals of 6–12 months. On the other hand, the majority of interventions required, including adjustment of antihypertensive medication, avoidance of nephrotoxic drugs, investigation of anaemia, and reduction of cardiovascular risk, can readily be delivered in primary care using staff and resources already in place for managing other long-term conditions. Only a minority (6%) of participants met NICE criteria for referral to nephrology. Thus the establishment of CKD registers need not result in a large surge of referrals to secondary care. A startling observation from this study is that 41% of patients were unaware of their diagnosis of CKD, despite being on a register. As discussed, this probably represents a low estimate of the proportion of patients who are unaware of their diagnosis. Whereas patients with more advanced CKD were more likely to be aware, those with one or more risk factors for CKD were no more likely to be aware. On the other hand, older people and those without formal educational qualifications were less likely to be aware. Given the importance of patient engagement and empowerment in the management of CKD, the present data highlight the need for improved communication and education. It is recommended that all patients newly identified with CKD should be informed about the diagnosis and be offered the opportunity to receive more information about their condition and its treatment. This, in turn, should lead to ongoing involvement in their care. High-risk groups, older people, and the less well educated, in particular, should be the focus of these efforts. At present, there is no requirement for patient education within the QOF and one way to improve patient knowledge and empowerment may be to include this in future.

These data suggest several avenues for further research. The criteria used to recommend nephrology referral were based on NICE guidance but the utility of these criteria has not been evaluated. Assessment of outcomes following referral according to NICE guidance will provide valuable information about the appropriateness of the criteria to inform future revisions. This study evaluated awareness of a CKD diagnosis on a superficial level only. Further research is required to investigate the level of CKD awareness and knowledge in greater depth. One recent study among patients attending a nephrology clinic identified areas of poor knowledge, allowing investigators to identify subjects on which further patient education should be focused.[27] It is very likely that the profile of CKD knowledge would be different in a population of patients followed up in primary care and that further detailed study would identify areas to target when designing education programmes best suited for those managed in primary care.

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