
Renal quality outcomes framework and eGFR: impact on secondary care

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Summary

Background: The prognostic significance of impaired renal function has driven the need for its early recognition and the widespread introduction of the estimated glomerular filtration rate (eGFR) reporting, and the incorporation of Chronic Kidney Disease (CKD) in the revised Quality Outcomes Framework (QOF) of the General Medical Services (GMS) contract in the UK.

Aim: To characterize the effect of these changes on referral numbers and appropriateness to a nephrology service, and the impact of a newly introduced Map of Medicine[®]-based patient care pathway coupled to the systematic screening of all new referrals.

Methods: The study was carried out within a single NHS Trust covering five primary health care Local Health Boards and a population of 560 000.

Results: Introduction of eGFR reporting and CKD QOF domains was associated with a rapid 61% increase in new patient referral, and an increase in the mean age of the patients at referral from

63.0 ± 18.1 to 69.1 ± 18.5 . The referrals did not correlate with the QOF reported prevalence of CKD. Systematic screening of new referrals demonstrated 36% to be either inappropriate or inadequate in terms of clinical information supplied. Introduction of the renal patient care pathway was associated with a fall in both the number of inadequate and total new referrals received. Overall 62% of all primary care practices registered with the Map of Medicine[®] and these sent a higher proportion of appropriate referrals and were less likely to generate referrals with inadequate information. The initiative also enabled managed discharges from secondary to primary care settings, freeing up outpatient capacity.

Conclusion: The study describes the impact of the introduction eGFR reporting and revision of the GMS contract with Renal QOF, on patient referrals to a nephrology service. In addition, we provide evidence that a new management pathway has helped to regulate and proactively manage the increased demand within the current resources.

Introduction

End stage renal failure is a public health problem with increasing incidence and prevalence, high costs and poor outcomes.¹ The earlier stages of chronic kidney disease (CKD 1–3) are the most common, and they are associated with adverse outcomes including loss of kidney function, cardiovascular disease (CVD) and premature death.²

Furthermore, studies have suggested that CKD, and in particular early CKD, was under recognized in primary care,^{3,4} and that CKD, when identified, is poorly treated.^{5–7} Appreciation of the significance of impaired renal function has driven the need to improve early detection and recognition, as controlled clinical trials show that the treatment of early

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stages of CKD slows down the rate of progression of kidney damage, and has beneficial effects on complications.^{8,9} The Kidney Disease Outcomes Quality Initiative (K/DOQI) guidelines recommend the classification of CKD based on the estimated glomerular filtration rate (eGFR),¹⁰ rather than serum creatinine alone, and this has now been accepted internationally.

Routine eGFR reporting has divided opinion, with enthusiasts highlighting to potential benefits of better early identification of CKD as compared to the poorly sensitive serum creatinine.^{11,12} Conversely, others underline inaccuracies and imprecision in formula derived measurements of renal function in people with normal or near-normal renal function.¹³ Furthermore, eGFR reporting may be considered by some as screening for CKD, a role that has not been appropriately tested.^{14,15} Regardless of the pros and cons of eGFR reporting, the system has now been adopted internationally. Classification of CKD based on eGFR, and recent policy changes, has focused attention on the prevalence of CKD in the United Kingdom. In particular, automatic reporting of eGFR is a requirement of the National Service Framework (NSF) for Renal Services in Wales, which was implemented in April 2006. In April 2004 a new contract for General Practice, the General Medical Services (GMS) Contract, was introduced in the United Kingdom, in which a significant proportion of practice income is derived from performance against targets in a new Quality and Outcomes Framework (QOF). As part of the new contract GPs are encouraged to use evidence-based interventions, particularly in the management of chronic diseases. In 2006, in response to the heightened awareness of the increasing prevalence of renal disease, the revised QOF of the GMS Contract added CKD to the previously identified domains of chronic disease. This revised QOF now requires GPs to keep a register of patients with CKD with eGFRs below 60 ml/min/1.73 m². The introduction of eGFR reporting, and the development of CKD registers in primary care, have been predicted to dramatically increase the recognition of CKD and, therefore, lead to a surge in referrals.¹⁶ The rationale behind the alterations in the reporting of renal function, and in the recognition of patients with CKD in General Practice disease registers, is to enable its early identification. This may benefit patients by triggering medication review, improved cardiovascular risk factor management and in the assessment of factors likely to predict progression of renal disease such as proteinuria, or its associated complications such as anaemia or bone disease.

To date little has been published regarding the impact of highlighting the importance of CKD in

primary care on nephrology secondary care services and vice versa. In this study, our aim was to determine the effect of eGFR reporting and introduction of CKD into the QOF on the demand for renal services in secondary care. In addition, we describe the impact of introduction of vigorous process of assessing referrals, supported by an education and management pathway, which was developed using the Map of Medicine[®]. This provides an internet-based patient care pathway developed to support patient referral and to facilitate discharge of certain patients back to primary care within an agreed support system based on National published guidelines.

Methods

The study was designed to determine the impact of introduction of eGFR reporting and incorporation of CKD into the Primary Care QOF in within a single NHS trust in South East Wales. The Trust covers five Local Health Boards (LHBs) and has a population catchment area of ~560 000. In Wales, LHBs are responsible for determining the health and well-being needs of their local population, and commissioning services from NHS Trusts and others to meet these needs. Around three quarters of the health budget is allocated directly to LHBs for this purpose.

Information of the number of new patient referrals was collected and analysed on a monthly basis from April 2005. In addition, patient age, sex and eGFR at time of referral was collected on the total number of new referrals for the 12 months prior to and 30 months following introduction of eGFR reporting. Subsequently, and following introduction of eGFR reporting, all new patient referral letters received were analysed in 6 consecutive months prior to and 6 consecutive months following the launch of a patient referral pathway (Figure 1) which was developed in partnership with the Map of Medicine and launched in November of 2007.¹⁷

The Map of Medicine[®] is a web-based visual representation of evidence-based patient care journeys covering 28 medical specialties and 390 pathways. The aim of the renal patient pathway was to bring together the numerous guidelines currently available to primary care physicians and the recommendations of the Welsh Renal NSF and so provide clear guidance on referral together with the minimal clinical data required to prioritize the outpatient appointment. In addition, the pathway provided the appropriate support and education to facilitate discharge of patients with stable uncomplicated renal impairment to primary care, with clear guidelines on future monitoring and re-referral

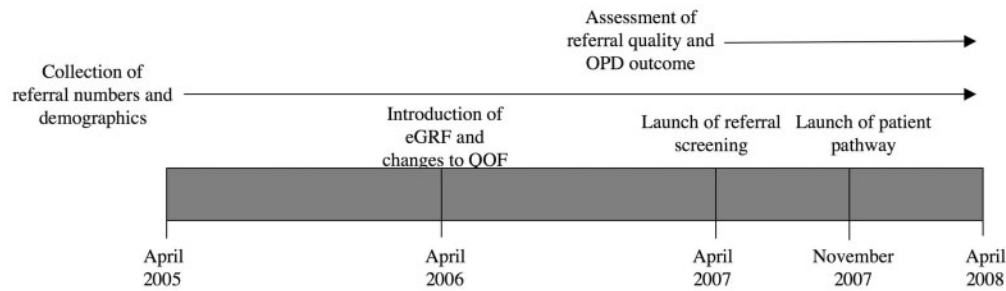


Figure 1. Schematic representation of the timing of data collections and interventions.

criteria. The pathway has been based on the current agreed guidelines prepared by the UK Renal Association and endorsed by the Royal College of General.¹⁸ The development of the pathway was facilitated by discussions with all the appropriate stakeholders (Nephrology through the Welsh Association of Renal Physicians and Surgeons [WARPS], Renal NSF through the NSF implementation group, Primary care physicians through Gwent GP trainers and selected primary care physicians), and its launch supported by numerous educational meetings aimed at both primary care physicians and practice-based nurses.

The quality of new referrals were assessed by a single nephrologist, and categorized as appropriate (appointment given), inappropriate (not needing nephrology follow-up or referred to the inappropriate speciality) or inadequate (insufficient clinical information to prioritize outpatient appointment) based on the current recommendations of the criteria for referral and information needed on referral by the current agreed UK Renal Association guidelines.¹⁸ All those classified as 'inappropriate' were either referred to the appropriate speciality, or a letter of advice was sent back to the referring physician providing a structured care plan based on the Map of Medicine patient pathway. Letters with inadequate clinical information resulted in a request for more information being sent to the referring physician highlighting current referral guidelines, and following the launch of the pathway, a link to the Map of Medicine[®] CKD pathway was also provided.

Prevalence for each LHB was calculated using the number of patients on the GP CKD register and dividing this by the Census population of the LHB analysed to give a prevalence per million population (pmp). The 95% CIs for the estimated prevalence were derived using the formula $1.96 \times [\text{prevalence (pmp) in LHB} / \sqrt{\text{LBH population}}]$. Data were thus expressed as Prevalence (pmp) \pm 95% CI.

The relationship between renal disease prevalence, referral patterns and socioeconomic characteristics was determined using The Welsh Index of

Multiple Deprivation 2008 (WIMD) score. This is the official measure of deprivation for small areas in Wales developed for the Welsh Assembly Government by the Assembly's Statistical Directorate and the Local Government Data Unit. The score is a composite of eight potential indicators of deprivation: income, employment, health, education, housing, access to services, environment and crime/fire.¹⁹

To determine the effects of the change in policy on patient discharge patterns, the outcome of all outpatient consultations (new referrals and follow-up appointments), were assessed in a 6-month period prior to introduction of eGFR reporting, and in the two consecutive 6-month periods prior to and following the launch of a patient referral pathway (Figure 1).

Statistical analysis

To try and smooth out natural month to month variation in referrals to outpatients we used a 3 month rolling average for Figure 2A. The 95% CI for the estimated prevalence were derived using the formula $1.96 \times [\text{prevalence (pmp) in LHB} / \sqrt{\text{LBH population}}]$. Data were thus expressed as Prevalence (pmp) \pm 95% CI.

Results

Alterations in new referrals and impact on waiting lists

Monthly referral rates for the 12 months prior to April 2006 (launch of eGFR and introduction of renal QOF) were constant. Subsequently, there was an abrupt increase in number of new referrals accepted onto the waiting list each month. In the pre-QOF year there were (mean \pm standard deviation) 36 ± 6 per month. In the first year post-QOF this increased to 60 ± 10 , and in the second year to 58 ± 10 . In the whole 30 month post-QOF period the number of monthly accepted referrals was

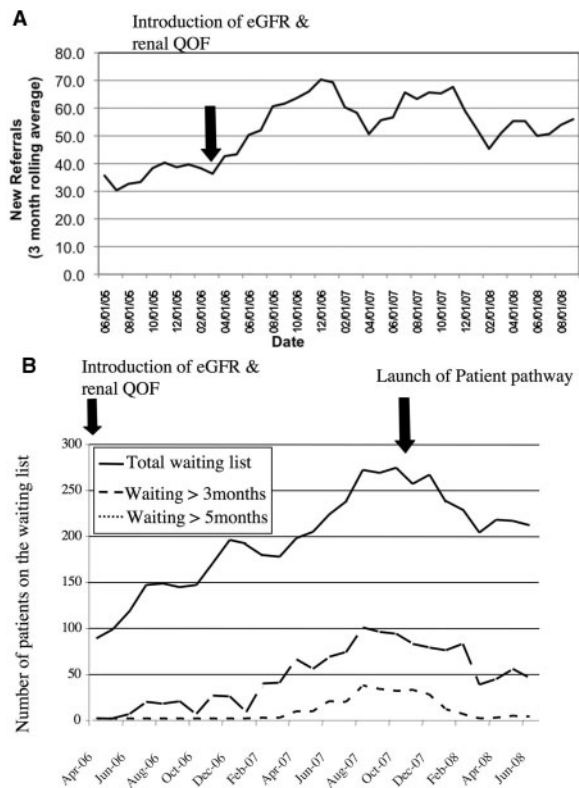


Figure 2. Impact of eGFR reporting on monthly (3 month rolling average) accepted new patient referrals (A), and the number of patients waiting to be seen (B).

58 ± 10 per month, a 61% increase over the pre-QOF era (Figure 2A). This increase in the number of referrals led to an increase in the patients waiting to be seen. By November 2007 (the date of the launch of the Map of Medicine care pathway) 32% had been waiting for >3 months and 12% for >5 months (Figure 2B).

Relationship to QOF prevalence of CKD

We next sought to relate the increase in number of patients referred to the renal service to the QOF prevalence of renal disease as determined by the prevalence of patients on the CKD register (CKD stages 3–5), for each of the five LHBs within the referral catchment area. QOF prevalence of CKD (pmp ± 95% CI) varied between 20 461 ± 1065 pmp and 35 972 ± 1253 pmp, with the lowest prevalence detected in the area with the highest deprivation index and the highest prevalence in the area with lowest deprivation (Figure 3A). The reported QOF prevalence of CKD was not reflected in the patterns of referral. Similar referral rates were seen from each LHB, the only exception being the one closest to the renal outpatient service. This had a significantly

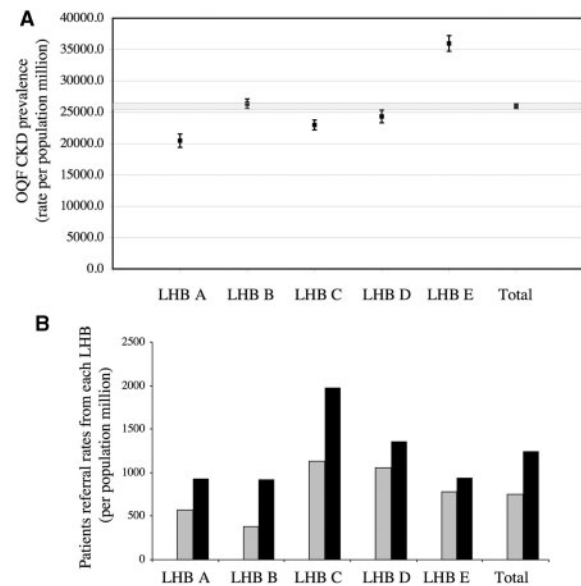


Figure 3. (A) QOF reported prevalence of CKD stages III, IV and V in the five LHBs which refer patients to the single NHS, trust placed in order of deprivation index as assessed by the Welsh Index of Multiple Deprivation with LHB A representing the highest level of deprivation. (B) Referral patterns from each of the LHB prior to (grey bars) and following (black bars) implementation of eGFR reporting and introduction of renal QOF.

higher rate of referral and also the highest growth rate following eGFR reporting and introduction of CKD into QOF. For each LHB, there was, however, an increase in the number of referrals after implementation of eGFR and QOF changes in April 2006 (Figure 3B). For all LHBs, the majority (>80%) of referrals were directly from General Practice, and this did not change following the introduction of the changes.

Characterization of the patients

Overall, there was no difference in the eGFR or the male:female ratio of the patients referred (data not shown). There was, however, a significant increase in the mean age of the patients referral, which was consistent in all of the LHBs. The average age of patients referred prior to April 2006 being 63.0 ± 18.1, which increased to 69.1 ± 18.5 after this date ($P < 0.0001$).

Impact of patient pathway quality of referrals

Prior to the launch of the patient pathway initiative, 23% of referrals were classified as having inadequate information and 13% were inappropriate

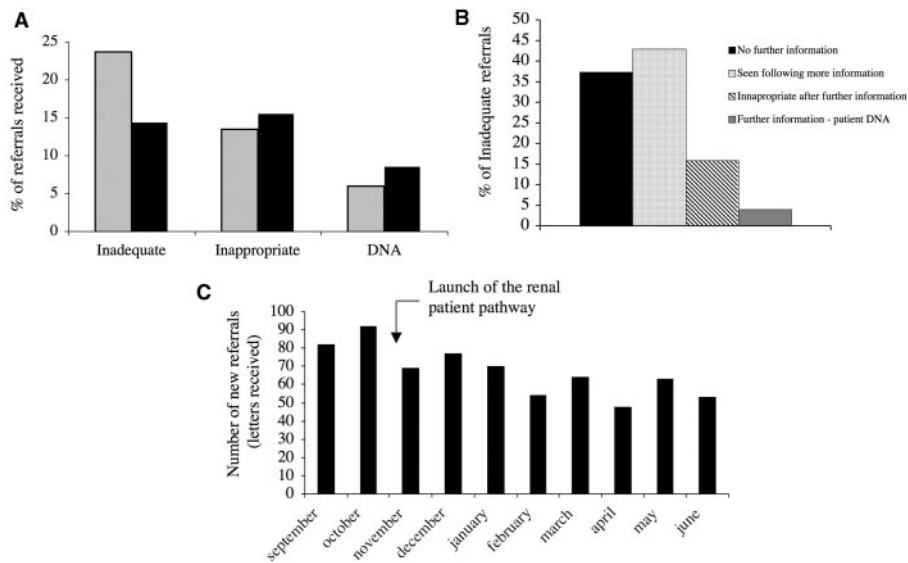


Figure 4. Classification of new referrals for the 6 months prior to (grey bars) and following (black bars) the launch of the renal patient care pathway on the Map of Medicine (A) in November 2007; (B) outcome of new referrals initially classified as inadequate following request for further information (DNA = Did Not Attend); and (C) changes in the number of new referral letters received following its launch.

(Figure 4A). For all inadequate referral letters, a request for further information was sent to the referring physician. The outcomes of the patient referrals initially classified as inadequate prior to the launch of the pathway are shown in Figure 4B. In 37.3% of cases no further information was obtained and the patients were removed from the waiting list (Figure 4B), and a further letter was sent informing the referring physician. In 15.9% of cases following receipt of further information the referral was reclassified as inappropriate. Overall 42.9% of those patients initially classified as inadequate following receipt of additional information, were seen in the outpatient department with a further 4% given an outpatient appointment but failed to attend. This rate of non-attendance (Did Not Attend/DNA) was consistent for all the new patients given outpatient appointments.

When comparing the referral patterns prior to and following the launch of the pathway, there was a marked reduction in the number of letters with inadequate clinical information (Figure 4A). Furthermore, the launch of the initiative was also associated with a fall in the total number of referral letters received (Figure 4C).

Relationship to registration with Map of Medicine

To further assess the impact of the launch of the care pathway, we retrospectively analysed practice registrations with the Map of Medicine and related this to patient referral patterns. Overall 62% of all

primary care practices registered with the Map of Medicine[®]. Interestingly, the LHB with the lowest QOF reported prevalence of renal disease (LHB A) was the one with the lowest number of practices registered for the use the Map (Figure 5A). Across the whole trust, referrals from the practices which were registered with the Map were more likely to require follow up in the nephrology clinic, suggesting a higher proportion of appropriate referrals. In addition, practices registered with the Map were less likely to generate referrals with inadequate information (Figure 5B).

Impact of new patient growth

Across the whole Trust, for new patient referrals, although the absolute number of patients seen and subsequently followed up in the clinic increased (Figure 6A), the initiative led to a reduction in the proportion of those who required follow-up (Figure 6B). There was also an increase in the proportion of patients who did not require a consult and were never seen. Of the patients referred but not seen, 54% were classified as inappropriate following either review of the initial referral letter or receipt of further clinical information (Figure 6C) and management was handed back to primary care supported by our structured care pathway posted on the Map of Medicine. A further 21.9% were initially classified as 'inadequate', but no further information was forthcoming and, therefore, an assumption was made that the referring physician did not require further follow-up for the patient. The remaining

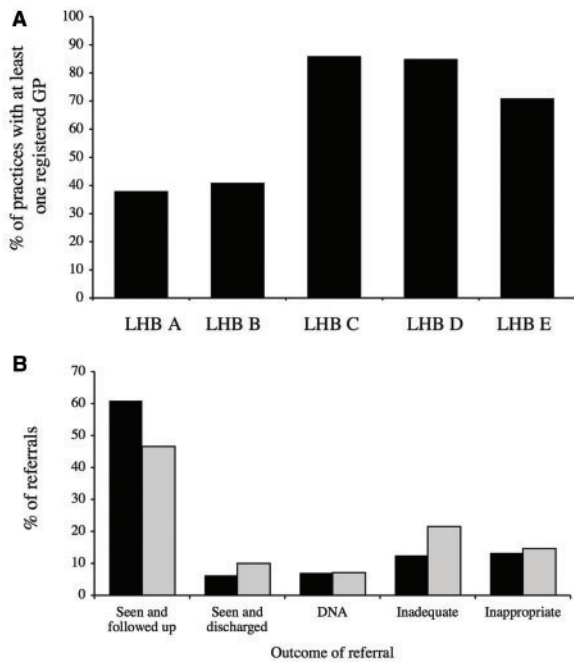


Figure 5. Relationship between registration with the Map of Medicine and referral patterns. The percentage of the practices in each LHB with active registration (A) and the outcome of new referrals (B) received from practices which were not registered (black bars) and those which were registered (grey bars). DNA = Did Not Attend.

24.2% were patients who were given an appointment, failed to attend and as the clinical priority was deemed low no further appointment was given. The referring physician was informed of the decision and reasoning and requested to re-REFER if they felt it clinically appropriate.

Impact on patient discharge

There was no change in the number of new patients discharged from the nephrology clinics reflecting the improvement of quality of the referrals resultant from the programme. However, the decision to discharge patients was made sooner—the mean number of outpatient visits after the first visit was reduced from 4.1 ± 4.4 to 1.5 ± 0.8). In addition, the emphasis on discharge of patients with stable renal impairment, and adoption of the care plan, led to an increase in the number of follow-up patients discharged per clinic from 4.6% to 8.4%. The overall effect was to free capacity to accommodate the increased demand for renal outpatient services. The end result was a reduction in the total waiting list together with a reduction in waiting times as seen by the elimination of any patients waiting beyond 5 months (Figure 2B).

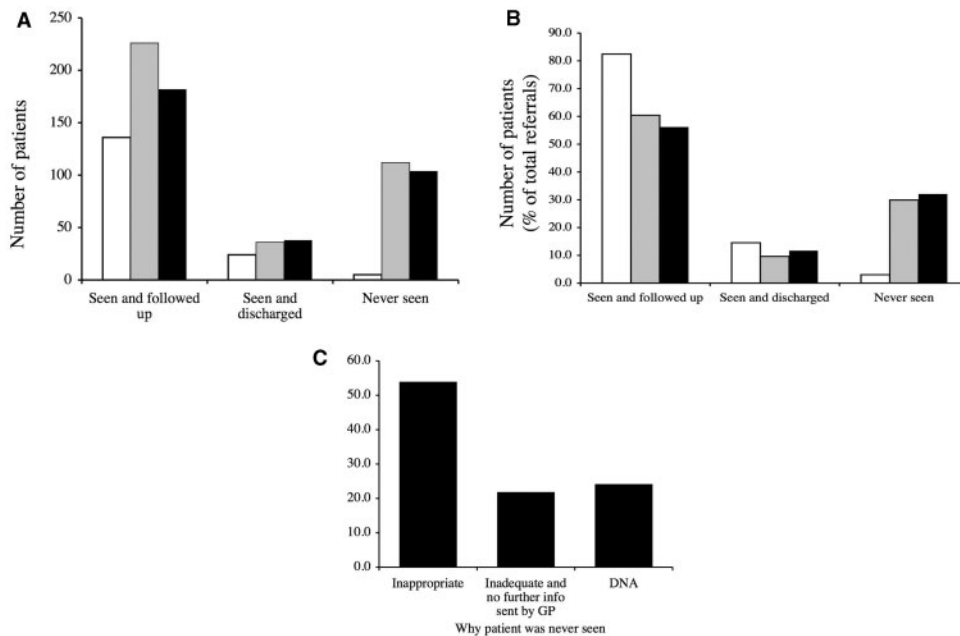


Figure 6. Clinical outcome of new referrals received during a 6-month period prior to eGFR reporting and CKD incorporation into QOF (white bars), for the 6 months prior to (grey bars) and 6 months following (black bars) launch of the renal patient care pathway expressed as absolute patient numbers (A) or as a percentage of the referrals received over the 6-month time period (B). Breakdown of the reasons for which patient which were referred were never seen during the 12-month period over which new referrals were classified (C). DNA = Did Not Attend.

Discussion

The reliable measurement of renal excretory function is of great importance in clinical practice and research. The methodological difficulties associated with accurate measurement of GFR has led to the widespread adoption of prediction formula based on factors such as the patient's age, sex and serum creatinine level. Adoption of the '4-variable MDRD' formula, which, with the exception of race, requires only information normally provided routinely when a sample is submitted to the laboratory provides a relatively easy means for laboratory reporting of eGFR.²⁰ Routine reporting of eGFR is now required by the NSF for Renal Disease in the United Kingdom, a change that was implemented in Wales in April of 2006.²¹ The publication of the KDOQI clinical practice guidelines based on the eGFR now forms the basis for the evaluation, classification and stratification of CKD. Furthermore, this classification of renal disease forms the basis for establishing registers of patients with stages 3, 4 and 5 renal disease equating to a eGFR of <60 ml/min/1.73 m² by General Practitioners in the United Kingdom, as part of the performance-related alterations in pay recently introduced into General Practice. Our first aim was to assess the impact of these changes on the workload in nephrology and subsequently to describe the development of an initiative to allow the change in workload to be better accommodated within the current resource allocation.

The introduction of eGFR reporting and the changes in the GP contract have been predicted to significantly increase referrals,¹⁶ however, few studies to date have quantified their impact. Our data demonstrate a doubling in the number of patients that were referred to the nephrology outpatient service following introduction of eGFR reporting, consistent with a 48% rise in the number of new attendances reported in a Scottish unit during the same time frame.²² Interestingly, our observations demonstrate a consistent pattern of increase in referral in all LHBs irrespective of differences in the QOF reported prevalence of CKD seen in the five areas studied. There was, however, a wide variation of QOF reported prevalence of CKD, which varied between 2% and 3.5%. It is of note that reported CKD prevalence was lowest in the most socially deprived areas unlike previous reported prevalence figures of chronic diseases such as cardiac disease which are more common. This suggests that for CKD detection and reporting the observation of Tudor Hart,²³ in which failure to align the delivery of health care to the needs of the community results in the poorest quality service

being delivered to the most socially deprived communities, may hold true. It is also consistent with previous analysis of QOF data that demonstrate an association between social deprivation and reduced quality of primary care in general terms.²⁴

The QOF reported prevalence of CKD is markedly less than the published prevalence of CKD stages 3–5 in the general population, which varies between 5% and 10% depending on the population of patients studied.^{25–27} In making this comparison, it is important to acknowledge that creating a register of patients with CKD does not equate to population screening but rather classification of those patients whose renal function is assessed due to other clinical indications. This marked discrepancy between population prevalence and QOF prevalence may therefore in part address some of the concerns raised that introduction of eGFR reporting constitutes *de facto* screening.²⁸ It is of note, however, that previous studies have suggested that the low rate of recording of renal disease in patients found to have CKD represents an opportunity for improving detection and early intervention.⁴

Our data also demonstrates that following introduction of eGFR reporting that there was a shift in the characteristics of the patients referred. The mean eGFR of those patients referred was unchanged. It is of note that adoption of eGFR reporting resulted in referral of a more elderly population. It is, however, likely that GFR declines naturally with advancing age. A large population-based study showed that a substantial proportion of elderly individuals will fall into stage 3 CKD based on eGFR alone. Only a small fraction of these individuals will have another manifestation of kidney injury such as proteinuria or show a progressive decline in eGFR thus questioning the value of age specific reference values of Egfr.²⁹ There has been a recent attempt to re classify stage 3 CKD to try and obviate the tendency to over interpret an isolated abnormal eGFR. Our data would suggest that the main effect of introduction of eGFR reporting has been the greater appreciation of the degree of impaired renal function in the elderly rather than a general earlier detection and referral of patients with renal disease to nephrologists.

Alterations in the working patterns of General Practitioner, together with the realization of the potential difficulties resultant from an eGFR-based trigger for referral, led us to analyse the quality of the referrals that we received. Our initial analysis highlighted a large number of referral letters that contained inadequate clinical information to allow clinical prioritization of the referral. This suggested that a programme of physician education might allow the eGFR to be placed into its clinical context

and that this may subsequently improve clinical appropriateness of patient referral. The overall aim of this was to regulate the influx of patients into the nephrology service whilst ensuring that the appropriate patients were seen in a timely fashion. The data presented demonstrate in partnership with the Map of Medicine and primary care physicians that the programme launched in Gwent in November 2007 was associated with a significant fall in the number of referrals containing inadequate clinical information and also a slight fall in the total number of new referral numbers. In addition the data suggest that an awareness of the initiative, as assessed by registration with the Map of Medicine, was also associated with a greater proportion of clinically appropriate and complete referrals. This would suggest that provision of an easily accessible patient pathway provides an effect tool for the dissemination of clinical guidelines to facilitate physician education and improve the exchange of clinical information.

In addition to regulating patient 'entry' into the nephrology outpatient service, the pathway was designed to facilitate discharge of patients with stable renal impairment to primary care. The introduction of the renal 'domain' into QOF has clearly established that CKD is a primary care disease. Since the introduction of quality indicators, and the associated link to doctors pay, chronic disease management has become a key component of the clinical workload of physicians in primary care. It is also evident that the vast majority of patients identified as having CKD also have other chronic illnesses such as diabetes, cardiac disease, hypertension and cerebrovascular disease for which they are registered and receiving chronic disease management aimed principally at the amelioration of cardiac risk factors.

The launch of the care pathway with the appropriate support, was associated with the discharge of a substantial number of patients who currently attend renal clinics back to into primary care. Since, the vast majority of these patients are already being managed for cardiovascular risk, the mainstay of CKD stages 3–5 management, this has gone some way to helping provide care nearer to home and the avoidance of duplication of testing and advice. Discharging large groups of patients with renal impairment may seem like an anathema and raise anxiety in the nephrology and primary care communities, but available evidence suggests that the strategy is low risk and should benefit patients. How it impacts on the clinical outcome is key and subject to ongoing monitoring.

In summary, we report the increase in workload in nephrology outpatients, since the introduction of

eGFR reporting and changes in the primary care contract structure. Introduction of a vigorous process of assessing referrals together with an education programme dependent on an internet-based patient care pathway was associated with limitation the impact of these changes within the current resource allocation of the nephrology service. Whilst accepting that the limitations of the work in that the study does not provide attribution of causation, the model does, however, provide a strategy to help manage the increasing demand for renal services. We acknowledge that whilst we have changed our practice and altered our working patterns in response to the increasing demand we must ensure that we continue to work closely with primary care and monitor the outcomes of all discharged patients, and continue to monitor the longer term effect of the initiatives on patient referral patterns.

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Conflict of interest: None declared.

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