Issues in Chronic Kidney Disease (CKD) Terminology

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Aims

The aim of this review is to explore some of the terminology and contentions surrounding CKD classification and identification. The rationale for having a sixth CKD stage is explored as an alternative to stages 3A and 3B. In addition, some emphasis on the National Institute for Health and Care Excellence (NICE) guidelines are highlighted (1,2).

Background

Chronic kidney disease (CKD) is a long-term condition in which reduced renal function is evident and/or damaged kidneys are unable to filter blood to achieve normal physiology (3). With a growing ageing population, CKD is a major public health concern; it costs the UK £1.02 billion to prevent acute kidney injury (AKI), which results in a higher risk of death than myocardial infarction (MI), breast cancer, heart failure and diabetes.

Owing to increasing prevalence of 'primary diseases', there is a higher risk of developing CKD and there are also other factors that have an impact on disease state, including socioeconomic status, age, gender and Ethnicity(4).

The epidemiology of CKD in the UK has been outlined in various guidelines,3,4 and informed by primary data from the Health Survey for England (HSE) in 2009 and 2010 using eGFR and albuminuria.9 The prevalence of CKD has risen and there are several determinants that need to be challenged, particularly risk factors relating to type 2 diabetes, hypertension and obesity. One study has found that CKD is often undetectable and often asymptomatic (10); however, it is recognised with other pre-existing conditions such as diabetes and cardiovascular disease (CVD). As CKD progresses, although symptoms may go unnoticed, it can escalate to advanced CKD (established renal failure [ERF], CKD stage 4).

Issues in Brief

Some investigators describe acute renal failure (ARF) as acute kidney injury (AKI) and acute and/or chronic renal failure (CRF). These terms have been used interchangeably in studies that focused purely on ARF patients with an abnormal eGFR (5–7). Studies have recalled patients with a reduced baseline kidney function (normally eGFR <45 mL/min per 1.73 m2). Some of the many cases that required haemodialysis (HD) were called 'acute' (i.e. potentially CKD stages 3–5) and were associated with higher rates of morbidity and mortality. However, ESRD; (CKD stage 5) is at the severe end of the disease spectrum where patients require a form of renal replacement therapy (RRT; e.g. HD) until a kidney for transplantation becomes available.

The issue here is that terminology becomes confusing and there is too much 'overlap' for each CKD stage. This issue is not new and there needs to be more systematic review addressing this issue to provide transparency and justification between CKD stages.

Definitions and Classification

It is important to appreciate that there are different definitions in the literature for what separates acute from chronic disease in addition to what separates chronic disease and chronic illnesses (8). In relation to CKD terminology, this can cause confusion in classification and also identification. Chronic kidney disease is often 'silent', and an increasing issue in different populations, causing immense human morbidity and mortality (9).

An online calculator is available to check creatinine level (10), and eGFR can assess renal function to confirm an initial diagnosis. Despite variations in terminology, guidelines and frameworks (11) divide and endorse classification with a fixed renal impairment grading (mild, moderate and severe) (12). Other workers (13) recognise CKD by the prevalence of CKD stages 1–5 (including stage 3 separated into 3A and 3B, where stage 3A is categorised as an eGFR 54–59 mL/min/1.73 m2 and stage 3B as 30–44 mL/min/1.73 m2).

Modification of diet in renal disease is the most extensively used equation to calculate eGFR based on other variables; however, prevalence rises with age and is found to be more common in females than in males. The epidemiological importance of ethnicity has not been completely articulated, although a review (23) has studied a South Asian ethnic minority group and compared it to UK and US populations. Table 1 summarizes the traditional 5-stages of CKD by GFR.

Table 1: The 5 Stages of CKD

Table 1. Stages of chronic kidney disease.

	Classification	
Stage 1	Kidney damage with normal or raised GFR	(>90 mL/min/1.73 m²)
Stage 2	Kidney damage with normal or raised GFR	(60–89 mL/min/1.73 m²)
Stage 3	Moderately impaired GFR	(30–59 mL/min/1.73 m²)
Stage 4	Severely impaired GFR	(15–29 mL/min/1.73 m²)
Stage 5	End-stage renal failure or GFR	<15 mL/min/1.73 m²)

Acute Kidney Injury (AKI)

Over the past decade there have been efforts to improve the identification, management and monitoring of CKD. While there are five stages of CKD, one review (14) suggests that AKI also has four categories; i) *vascular*, a condition in which blood vessels are obstructed; ii) *glomerular*, a histological type involving an immune element normally associated with nephrotic syndrome (NS) and proteinuria >3 g/24 h, oedema and hypoalbuminaemia; iii) *tubular*, involving acute tubular nephrosis (ATN) with renal impairment; and iv) *interstitial*, which is not associated with the previous three categories. An example could be where there is presence of eosinophils, which may be drug-related and cause ARF. Nocturia, anaemia, long-standing hypertension and neuropathy are all associated with of CKD. Acute kidney injury is divided into four stages which are dependent on creatinine results within 48 hours and also urine output. Table 2 summarises the stages of AKI.

Table 2: Stages in AKI

Table 2. Stages of acute kidney injury.

	Serum creatinine
Stage 1	Increase ≥0.3 mg/dL (26.5 μmol or ≥1.5–2-fold from baseline.
Stage 2	Increase >2–3-fold from baseline <0.5 mL/kg/h for more than 12 h (urine output).
Stage 3	Increase >3-fold from baseline ≥4.0 mg/dL (353.6 μmol/L) with an acute rise of at least 0.5 mg p/dL.
Stage 4	<0.3 mL/kg/h for 24 h or anuria (reduced voiding) for 12 h – RRT required

What needs to be done/ is being proposed?

The 'new' classification for CKD stages proposed in a review (15) removes the subdivision of stage 3 (3A and 3B). Patients with stage 3B would require an earlier referral than those with stage 3A for special renal care. Earlier detection will prolong the CKD stage and therefore intervention will occur at an earlier stage, slowing down CKD progression. Furthermore, the methodological procedures to calculate the risks involved for treatment and diagnostic delay in CKD have been examined (16). Analytical data collected recently (28) looked at coded or uncoded CKD patients and their relationship to stages 3–5. The results broke down into 'confirmed CKD', 'labelled CKD', 'appropriately coded', 'uncoded CKD' and 'miscoded CKD'. Patients labelled 'miscoded CKD' received treatment at a much later stage, with a higher risk of co-morbidities. Table 3 summarizes a definition and terminology proposal.

Table 3: Definitions and Terminology Proposal

Table 3. Definition and terminology proposal.

Proposed stages	Proposed GFR/ classification	Definition/terminology
Stage 1	90 mL/min/1.73 m²	Community education and awareness
Stage 2	60–89 mL/min/1.73 m²	Prescreening and health check
Stage 3*	30–59 ml/min/1.73 m²	Acute renal failure (ARF),acute kidney injury (AKI) and albumin:creatinine ratio (ACR)/ protein:creatinine ratio (PCR) monitoring
Stage 4	15–29 mL/min/1.73 m²	ACKD with treatment plan/options
Stage 5	≤15 mL/min/1.73 m²	CRF, ESKD, ESRD with treatment plan/options
Stage 6	≤10 mL/min/1.73 m² Anuric	RRT preparation, and transplant options

*Stage should not be divided because the GFR margin is already narrow.

Discussion

- Stage 5 can also be termed ESRD and sometimes even end-stage renal failure (ESRF). While this means that terminology associated with CKD stages can be interchangeable, it also causes confusion when providing patients with advice and care.
- What defines advanced CKD (ACKD)? Should this be CKD stage 4? There is a need to develop plans to screen patients who are at risk earlier to minimise further complications.
- Stage 3 is subdivided (stages 3A and 3B), but 1) the eGFR ranges are quite narrow between the two, so is there a good reason for the division? 2) Both subdivisions need to be accompanied by the appropriate terminology if the present classification and identification system continues, even if revised.
- There is not always a consensus among health professionals and in the coding related terminology (eg AKI, ESRD and ARF). This is where there can be misinterpretation and confusion with respect to stage and classification.
- Clear definitions/terminology that relate to staging has been outlined in detail (17), but patients should know exactly what classification of CKD they have, and the appropriate terminology or definition, whereby they are empowered to gain wider resources and knowledge to support their healthcare requirements.

Conclusions

- Guidelines on the management of CKD indicate that patients should have frequent tests to monitor those at risk using eGFR and albumin: creatinine ratio (ACR) <3 mg/mmol, and look for any other indications of renal Disease (1). Another amendment to the guidelines involves not testing people with eGFR creatinine of 45–59 mL/min/1.73 m2 at stage 3A.
- However, if patients are not tested during the early stages of CKD then diagnosis will be delayed and the opportunity for early intervention to slow progression of the disease with be missed. Patients in stages 3A and 3B require six monthly checks of eGFR; however, this split classification can result in confusion, and it is suggested that a further stage (stage 6) be included and that stages 3A and 3B be replaced by a single stage 3 because the eGFR margin is already narrow.
- There should also be appropriate terms associated with all stages, and there should be wider screening opportunities and collaborations.
- In conclusion, this article aims to put CKD guidelines into context in terms of disease onset and progression to ESRD, AKF, ESKD, CRF and RRT, as currently there is no consensus on how these terms (with the exception of RRT) are being used.
- Scientists and renal teams who have knowledge of clinical parameters and specialist understanding should also be involved in future discussion, as more health promotion is required in this critical area.

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