Nomenclature for kidney function and disease: report of a Kidney Disease: Improving Global Outcomes (KDIGO) Consensus Conference

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See Appendix for a list of complete conference participants.

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The worldwide burden of kidney disease is rising, but public awareness remains limited, underscoring the need for more effective communication by stakeholders in the kidney health community. Despite this need for clarity, the nomenclature for describing kidney function and disease lacks uniformity. In June 2019, Kidney Disease: Improving Global Outcomes (KDIGO) convened a Consensus Conference with the goal of standardizing and refining the nomenclature used in the English language to describe kidney function and disease, and of developing a glossary that could be used in scientific publications. Guiding principles of the conference were that the revised nomenclature should be patient-centered, precise, and consistent with nomenclature used in the KDIGO guidelines. Conference attendees reached general consensus on the following recommendations: (i) to use "kidney" rather than "renal" or "nephro-" when referring to kidney disease and kidney function; (ii) to use "kidney failure" with appropriate descriptions of presence or absence of symptoms, signs, and treatment, rather than "end-stage kidney disease"; (iii) to use the KDIGO definition and classification of acute kidney diseases and disorders (AKD) and acute kidney injury (AKI), rather than alternative descriptions, to define and classify severity of AKD and AKI; (iv) to use the KDIGO definition and classification of chronic kidney disease (CKD) rather than alternative descriptions to define and classify severity of CKD; and (v) to use specific kidney measures, such as albuminuria or decreased glomerular filtration rate (GFR), rather than "abnormal" or "reduced" kidney function to describe alterations in kidney structure and function. A proposed 5-part glossary contains specific items for which there was general agreement. Conference attendees acknowledged limitations of the recommendations and glossary, but they considered standardization of scientific nomenclature to be essential for improving communication.

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The worldwide burden of kidney disease is rising, but public awareness remains limited, underscoring the need for effective communication by stakeholders in the kidney health community.[1–4] Despite this need for clarity, the nomenclature for describing kidney function and disease lacks uniformity. Two decades ago, a survey of hundreds of published articles and meeting abstracts reported a broad array of overlapping, confusing terms for chronic kidney disease (CKD) and advocated adoption of unambiguous terminology.[5] Nevertheless, terms flagged by that analysis as problematic, such as "chronic renal failure" and "pre-dialysis," still appear in current-day publications. A coherent, shared nomenclature could influence communication at all levels, including not only greater appreciation of the burden of disease, but also improved understanding about how patients feel about their disease, more effective communication between kidney disease specialists and other clinicians, more straightforward comparison and integration of datasets, better recognition of gaps in knowledge for future research, and more comprehensive public health policies for acute and chronic kidney disease.

The international organization Kidney Disease: Improving Global Outcomes (KDIGO) has developed guidelines promulgating definitions and classifications for acute kidney injury (AKI), acute kidney diseases and disorders (AKD), and CKD, and guidelines for their evaluation and management.[6,7] Developing consistent, patient-centered, and precise descriptions of kidney function and disease in the scientific literature is an important objective that KDIGO is now pursuing to align communication in clinical practice, research, and public health. Although some terms have been in use for decades, the increased exchange of information among stakeholders makes it timely to revisit nomenclature in order to ensure consistency. The goal is to facilitate communication within and across disciplines and between practitioner and patient communities, to ultimately improve outcomes through clarity and precision.

In June 2019, KDIGO convened a Consensus Conference with the goal of standardizing and refining the nomenclature used in English-language scientific articles to describe kidney function and disease, and developing a glossary that could be used by journals. Prior to the conference, KDIGO posted an announcement of the conference on its website, including the Scope of Work and requested public comment.[8] Attendees at the conference included editors of kidney subspecialty journals, kidney subspecialty editors at general medical journals and journals from other subspecialties, experienced authors of clinical kidney health research, and patients. Guiding principles of the conference were that the revised nomenclature should be patient-centered, precise, and consistent with nomenclature used in the KDIGO guidelines (Table 1). The discussion focused on general description of acute and chronic kidney disease and kidney measures, rather than specific kidney diseases and particular measures of function and structure. The Scope of Work developed prior to the conference contained a series of proposals for consideration (Supplementary Box S1). Classifications of causes of kidney disease and procedures, performance measures, and outcome metrics for dialysis and transplantation were considered beyond the planned scope of discussion.

Prior KDIGO conferences have been evidence based, but little is known about the impact of terms commonly used to describe kidney function and disease on people who have kidney disease. Thus, KDIGO commissioned a series of patient and caregiver focus groups on the topic prior to the conference of which the results are summarized here, and the details are reported separately.[9] Also, KDIGO commissioned a

Table 1 | Goals of the conference

Goals and guiding principles	Comments and examples
Goal: Revise and refine the nomenclature to describe kidney function and disease	Focus on general description of acute and chronic kidney disease and general kidney measures, rather than specific kidney diseases and specific measures of function and structure
Principles for nomenclature:	
• Patient-centered	• "Kidney" vs. "renal" or "nephro-" • "Failure" vs. "end-stage"
• Precise	• CKD and AKI definitions and stages vs. other descriptions of disease and disease severity • Specific kidney measures (GFR, tubular function, and markers of damage/injury vs. nonspecific "kidney function")
• Consistent with KDIGO guidelines	• To aid guideline implementation
Main questions to answer	Do you agree that articles in the English-language medical literature should generally use: 1. "kidney" rather than "renal" or "nephro-" when referring to kidney disease and kidney function? 2. "kidney failure" with appropriate descriptions of presence or absence of symptoms, signs, and treatment rather than "end-stage" disease"? 3. KDIGO definition and classification of AKD and AKI rather than alternative descriptions to define and classify severity of AKD and AKI? 4. KDIGO definition and classification of CKD rather than alternative descriptions to define and classify severity of CKD? 5. specific kidney measures (such as albuminuria or decreased GFR) rather than "abnormal" or "reduced" kidney function to describe alterations in kidney structure and function?

AKD, acute kidney diseases and disorders; AKI, acute kidney failure; CKD, chronic kidney disease; GFR, glomerular filtration rate; KDIGO, Kidney Disease: Improving Global Outcomes.

survey of attendees prior to the conference, of which and their replies are summarized here.

Nomenclature for kidney function and disease

Nomenclature is defined as "systematically formulated names for specific entities" and in the biomedical sciences has required the ongoing work of international groups.[10] The development of nomenclature requires the convergence of multiple names into an accepted set of terms, meaning some users must be willing to relinquish traditional words that may be more familiar or memorable. Nomenclature must be consistent with current knowledge and stable enough to remain relevant for the foreseeable future, but sufficiently flexible to accommodate new vocabulary arising with advances in the field.[10]

The KDIGO guidelines define kidney disease as structural or functional abnormalities of the kidneys that have implications for health, and classify kidney disease according to duration, cause, severity of structural and functional abnormalities, and prognosis (Figure 1).[11,12] A few other publications have proposed kidney-related nomenclature,[13–16] but these have been focused on specific diseases or treatments. Other standardization efforts have had a physiologic or ontologic focus.[17,18] The *American Medical Association (AMA) Manual of Style*, perhaps the most authoritative and widely used guide for medical writing in English, contained no recommendations regarding nomenclature for kidney disease and function in the edition (10th) available at the time of the conference.[19] Several kidney subspecialty journals have style guides listing nomenclature preferences, but these are not generally comprehensive, nor are they shared among journals. Conference attendees agreed that the KDIGO guideline criteria for definitions and classifications of acute and chronic kidney disease can provide the basis for nomenclature standardization (Supplementary Table S1).[6,7]

Patient-centeredness and precision

Patient-centeredness. The Health and Medicine Division of the US National Academies of Sciences defines patient-centered care as "Providing care that is respectful of, and responsive to, individual patient preferences, needs and values, and ensuring that patient values guide all clinical decisions."[20] One of the 10 general principles recommended for redesign of the health system is that "Knowledge is shared and information flows freely. Patients should have unfettered access to their own medical information and to clinical knowledge. Clinicians and patients should communicate effectively and share information." There is some evidence that patient-centeredness is being emphasized in medical journals.[21] In principle, the terms used to describe kidney function and disease should be understandable to all, with acknowledgement of variation in the level of health literacy. Use of multiple terms with similar meaning can lead to confusion, as can use of terms that forecast the future (such as "pre-dialysis") rather than describe the present.

Precision. A general definition of precision is "the fact, condition or quality of being precise: exactness, accuracy."[22] How medicine is defined and understood is changing rapidly from a descriptive, disease-based categorization in which multiple pathogenetic pathways may be conflated to a mechanism-based categorization that will promote more precise management of clinical problems. The latter approach, in which a molecular profile is added to the clinical and morphologic profile, has already revolutionized diagnosis and treatment in oncology. In nephrology, the ongoing Kidney Precision Medicine Project, funded by the US National Institutes of Health, seeks to ethically obtain and evaluate kidney biopsies from participants with AKI or CKD; create a kidney tissue atlas; define disease subgroups; and identify

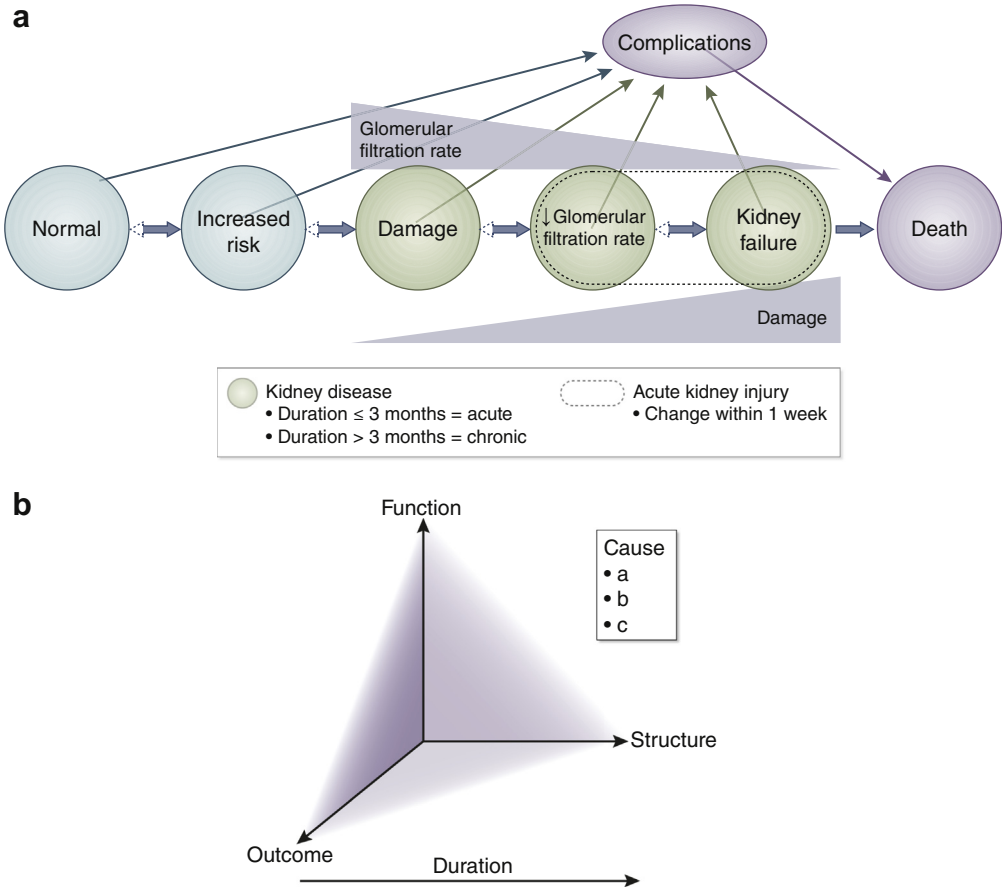

Figure 1 | Conceptual model and classification of kidney disease. (**a**) Factors associated with increased risk of kidney disease (blue), stages of disease (green), and complications (including death; purple). Horizontal arrows show transitions between stages (kidney outcomes). Solid arrows pointing from left to right show progression of kidney disease. Dashed arrowheads pointing from right to left show remission. Gray triangles show the continuous nature of changes in glomerular filtration rate and kidney damage. Reprinted from *The Lancet,* Volume 382, Eckardt KU, Coresh J, Devuyst O, et al. Evolving importance of kidney disease: from subspecialty to global health burden, Pages 158–169, Copyright 2013, with permission from Elsevier.[11] (**b**) Domains for classification in kidney disease. Reprinted from *American Journal of Kidney Diseases*, Volume 61, Levey AS, Levin A, Kellum JA. Definition and classification of kidney diseases, Pages 686–688, Copyright 2013, with permission from the National Kidney Foundation, Inc.[12]

cells, pathways, and targets that are critical for novel therapies.[23] As has occurred in oncology, it is anticipated that refinements that result in more-precise disease descriptions will be incorporated into current nomenclature for kidney function and disease, rather than replace it altogether.

Evidence gathered before the conference

Patient and caregiver focus groups. A total of 54 adults with CKD and 13 caregivers from the United States, United Kingdom, and Australia participated in 10 focus groups, initiated and funded by KDIGO, to discuss terms and concepts used for kidney health. The qualitative synthesis of thematic analysis from the focus groups revealed numerous shortcomings and concerns related to current nomenclature for CKD (Table 2).[9] Of direct relevance to the conference, focus group participants indicated a preference for use of the term "kidney" rather than "renal," because it is more familiar, and discontinuation of use of the term "end-stage," because it causes fear of the unknown, provokes undue trauma, implies impending death, and is obsolete. The term "kidney failure" appeared to be less objectionable, although it still prompted concerns. Participants wanted more clarity about the severity of disease and prognosis, including quantitative descriptions, with the understanding that they would need to learn the meaning of the descriptions. For future discussions, it is important to include people living in low- and middle-income countries, racial and ethnic minorities, children living with kidney disease and their parents, and patients with experience with acute kidney diseases.

Public comments and attendee survey. A review of the responses to the Scope of the Work and a survey of attendees prior to the conference revealed general agreement with the goal of standardizing nomenclature, acknowledging some challenges (Box 1). Most of the participating editors agreed that having a standardized nomenclature for kidney function and disease would help their journals, and that the language employed in scholarly journals should match that used when communicating with patients. However, important barriers to implementation were identified; in particular, several editors were concerned that they lacked the resources necessary to

Table 2 | Results from patient and caregiver focus groups[a]

Theme	Subthemes
Provoking and exacerbating undue trauma	• Fear of the unknown • Denoting impending death • Despair in having incurable or untreatable disease • Premature labeling and assumptions • Judgment • Stigma and failure of self
Frustrated by ambiguity	• Confused by medicalized language • Lacking personal relevance • Baffled by imprecision in meaning • Opposed to obsolete terms
Making sense of the prognostic enigma	• Conceptualizing level of kidney function • Correlating with symptoms and life impact • Predicting progression and need for intervention
Mobilizing self-management	• Confronting reality • Enabling planning and preparation • Taking ownership for change • Learning medical terms for self-advocacy • Educating others

[a]From a qualitative synthesis of thematic analysis of 10 focus groups comprising 54 patients with chronic kidney disease (CKD, across all severities) and 13 caregivers from the United States, United Kingdom, and Australia initiated and funded by Kidney Disease: Improving Global Outcomes from March to May 2019 to discuss terms and concepts used for kidney health.[9]

standardize nomenclature in accepted manuscripts owing to the time constraints of journal personnel.

Consensus and the proposed KDIGO glossary

Conference attendees reached general consensus for each of the 5 main questions posed (Table 1). Accordingly, a proposed glossary contains 5 corresponding sections and comprises specific items on which there was general agreement among conference participants (Table 3). For each section, the glossary includes preferred terms, abbreviations, descriptions, and terms to avoid, with acknowledgement that journals may choose which of the recommendations to implement, and that journal style will dictate when and how to abbreviate terms to be consistent with nomenclature for other diseases. Examples of the use of glossary terms are given in Supplementary Box S2. For each section, we briefly summarize the discussion at the conference and highlight areas of remaining uncertainty.

Kidney function and disease. Attendees agreed that it would be preferable to use the term "kidney" rather than either "renal" or the prefix "nephro-" for general descriptions of kidney disease and function (Table 3, Part 1). This practice would be in alignment with patient preferences obtained in the focus groups. The rationale is that for English-language readers, especially lay people, "kidney" is more familiar

Box 1 | Prevailing attitudes of medical professionals emerging from public review and participant survey

Agreement with goal of standardizing nomenclature, with acknowledgment of challenges

- Regarded multiplicity of terms and lack of adherence to established definitions as confusing and potentially leading to errors
- Anticipated that a standardized nomenclature would help foster consistency in trial design, execution, and reporting
- Judged consistency between terms used in scholarly and patient communities to be an important goal, but not one overriding the need for precision and efficiency
- Journal editors strongly agreed that having a more standardized nomenclature for kidney disease would be useful for their journals, but they anticipated time constraints of journal personnel to be the biggest barrier to implementation

Qualified endorsement of replacing "renal" with "kidney"

- Felt that foregrounding "kidney" would be easier for patients and their families
- Perceived a greater likelihood of raising awareness, attracting funding, and influencing public policy with consistent use of "kidney"
- Cautioned against a wholesale switch because "renal" may be less awkward in some contexts and may be necessary in others (e.g., ESRD as a CMS definition)

Dissatisfaction with "end-stage" as a descriptor of kidney disease

- Recognized that this wording can be demoralizing and stigmatizing for patients
- Considered the implication of imminent death to be outdated
- Frustrated by imprecision in its use (ranging from being a synonym for dialysis patients to a descriptor of patients with kidney failure with or without kidney replacement therapy)

Recognition of the need for ongoing attention to nomenclature issues

- Noted that standardization of nomenclature is dependent on uptake of consensus definitions
  - where definitions are in flux or are more contentious, standardization of that nomenclature set may be premature
  - enhancing adoption of definitions requires continued effort
- Highlighted the need for harmonization with ongoing, broader-scope ontology efforts
- Expected that improved understanding of molecular mechanisms will lead to more-precise definitions and nomenclature

CMS, Centers for Medicare & Medicaid Services; ESRD, end-stage renal disease.

than "renal" and "nephro-," which tend to be used in more technical contexts. In addition, it is simpler, and using a single term rather than multiple, redundant terms is less likely to cause confusion. For specific kidney functions, diseases, or syndromes, the established terms derived from Latin ("renal") or Greek ("nephro-") would continue to be used. Attendees acknowledged that English is not the native language for many authors of publications in the English-language literature; thus, editors should anticipate that discussion with authors may be necessary in implementing this recommendation, rather than simply substituting one word for another within a manuscript. Although classification of cause of kidney disease was not considered, attendees agreed that the cause of AKI, AKD, and CKD should be indicated whenever possible, either as known, presumed, or unknown, and that the method for ascertainment and attribution of cause should be specified. Cause should not be inferred only from the presence of comorbid conditions; for example, it should not be inferred that CKD in people with diabetes is always due to diabetes.

Kidney failure. Attendees were nearly unanimous in their agreement that use of the term "end-stage" should be avoided for describing a defined stage of kidney disease or people in that stage (Table 3, Part 2). The rationale is that the term is not well defined or consistently used, except for administrative purposes. For example, in the United States, end-stage renal disease (ESRD) is specified in federal statute as ". . . a medical condition in which a person's kidneys cease functioning on a permanent basis leading to the need for a regular course of long-term dialysis or a kidney transplant to maintain life. Beneficiaries may become entitled to Medicare based on ESRD. Benefits on the basis of ESRD are for all covered services, not only those related to the kidney failure condition."[24] In these circumstances, it refers to an entitlement to treatment for a condition, rather than the condition itself. Similarly, the term is frequently used to describe patients with CKD treated by dialysis or transplantation, and so does not apply to people with the same condition who do not receive treatment, whether by choice, lack of recognition of the disease, or unavailability of the treatment. Furthermore, as expressed in the patient and caregiver focus groups, it does not accurately define a group of people who can survive for years with treatment; it misleadingly implies that the end of life is near and it may be associated with a stigma even in people who are not at the end of life.

In the chronic setting, the term "kidney failure" was recommended, as defined in the KDIGO CKD guideline (glomerular filtration rate [GFR] <15 ml/min per 1.73 m^2 or treatment by dialysis), with further specification required based upon duration, symptoms, and treatment.[6,7] In the acute setting, conference attendees agreed with characterizing disease severity by stage and treatment, but they did not reach consensus on use of the term "kidney failure" rather than AKI stage 3 or use of "kidney replacement therapy (KRT)" for all modalities of treatment; it would be appropriate for these topics to be reconsidered in conjunction with the planned update of the KDIGO AKI guideline.[25]

Conference attendees noted that symptoms and signs of kidney failure (collectively termed uremia or the uremic syndrome) may be mild and nonspecific, and there are no generally accepted clinician-administered or patient-reported instruments to assess them. This topic was viewed as fruitful for research, with the idea that it may be possible in the future to classify kidney failure by the presence (and severity) or absence of symptoms and signs. The 2013 KDIGO Controversies Conference *Supportive Care in Chronic Kidney Disease* recommended use of the term "comprehensive conservative care" for people who elect not to undergo KRT but to receive treatment for symptoms of kidney failure.[26] Attendees also discussed an abbreviation that could be used instead of ESRD; KFRT (kidney failure with replacement therapy) was considered to be most consistent with the preferred nomenclature. Finally, attendees emphasized the importance that implementation of this change in nomenclature not jeopardize the long-standing entitlement to covered services in the United States and elsewhere (i.e., ESRD).

Acute kidney diseases and disorders (AKD) and acute kidney injury (AKI). Attendees agreed that the KDIGO definition and classification for AKI should be used rather than the previous definitions according to the Risk, Injury, Failure, Loss, End-stage (RIFLE) classification and the Acute Kidney Injury Network (AKIN) classification, which were harmonized by the 2012 KDIGO guideline (Table 3, Part 3).[6] Criteria for AKI include a sudden decrease in GFR manifested by an increase in serum creatinine or oliguria within 48 hours to 7 days, with the severity (stage) of AKI determined by the severity of increase in serum creatinine or oliguria. There are no criteria for markers of kidney damage for AKI, as defined for CKD (see below). It is generally accepted that the urine output criteria for AKI are applicable only in intensive-care settings, and ascertainment of AKI and its severity from the timing of changes in serum creatinine level alone is generally acceptable in other settings. Criteria for AKD were first proposed in the 2012 KDIGO AKI guideline; they include markers of kidney damage or GFR <60 ml/min per 1.73 m^2 for ≤ 3 months, without classification by severity. By definition, AKD includes AKI, but it also includes disorders characterized by markers of kidney damage, such as hematuria, pyuria, and urinary tract obstruction, in which the rate of decline in GFR is not as rapid as in AKI. It appears that AKD without AKI is more common than AKI.[27] Alternative definitions of AKI and AKD were proposed by the 16th Acute Dialysis Quality Initiative Conference in 2015.[28] Attendees agreed that harmonizing the AKD definition to be consistent with the definitions of AKI and CKD is a high priority, and this will be the topic for a future KDIGO Consensus Conference.

Chronic kidney disease (CKD). Attendees agreed that the KDIGO definition and classification for CKD should be used rather than other definitions (Table 3, Part 4). The criteria for CKD—markers of kidney damage or GFR <60 ml/min per 1.73 m^2 for >3 months, are unchanged since the 2002 KDOQI CKD guideline.[29] The classification of CKD was updated by the 2012 KDIGO CKD guideline to include

Table 3 (Parts 1–5)| Kidney Disease: Improving Global Outcomes (KDIGO) kidney function and disease glossary: suggested terms to describe kidney function and kidney disease and criteria and measures defining them

Preferred term	Suggested abbreviations[a]	Rationale/explanation	Terms to avoid
Part 1. Kidney function and disease		The term "kidney" should be used preferentially when describing kidney disease and kidney function, with exceptions	Renal; the prefix "nephro-" (except in the setting of specific functions, diseases, or syndromes, see below)
Kidney disease		Reflects the entirety of acute kidney diseases and disorders and chronic kidney disease	Renal disease; nephropathy (except in the setting of specific diseases, e.g., membranous nephropathy)
Kidney function		Reflects the entirety of different and complex physiological functions of the kidney; should not be equated with glomerular filtration rate (GFR) only	Renal function (except when describing specific functions, e.g., renal acidification, renal concentrating mechanism)
Normal kidney function		General term applicable to various aspects of kidney function, which should be specified	
Abnormal kidney function		General term applicable to various aspects of kidney function, which should be specified	Renal/kidney impairment, insufficiency, dysfunction; azotemia
Residual kidney function	RKF	Kidney function in people with kidney failure receiving KRT; further specification is required, e.g., urine flow rate, solute clearance. Although it is usually used in the setting of dialysis, this term could be used to refer to native kidney function in kidney transplant recipients.	Residual renal function (RRF)
Kidney structure		Reflects the entirety of different and complex structures of the kidney, ascertained by imaging and markers of injury and damage	Renal structure (except when describing specific structures within the kidney, such as artery, vein, capsule, parenchyma, cortex, medulla, glomeruli, tubules, interstitium, cysts, tumors)
Normal kidney structure		General term applicable to various aspects of kidney structure, which should be specified	
Abnormal kidney structure		General term applicable to various aspects of kidney structure, which should be specified	
Causes of kidney disease		Cause of AKI, AKD, and CKD should be indicated whenever possible. Cause may be known, presumed, or unknown. Method for ascertainment and attribution of cause should be specified.	Cause should not be inferred only from presence of comorbid condition (such as diabetes)

Preferred term	Suggested abbreviations[a]	Rationale/explanation	Terms to avoid
Part 2. Kidney failure		GFR $<$15 ml/min per 1.73 m^2 or treatment by dialysis; further specification is required, see below	Renal failure (RF); end-stage renal disease (ESRD); end-stage kidney disease (ESKD), renal disease; nephropathy; renal/kidney impairment, insufficiency, dysfunction; azotemia
Duration		Specification preferred	
Acute kidney injury stage 3[b]	AKI stage 3	Disease duration $\leq$3 mo	Acute renal failure; renal disease; nephropathy; renal/kidney impairment, insufficiency, dysfunction; azotemia; uremia
Kidney failure	KF	Disease duration $>$3 mo	Chronic renal failure; chronic renal disease; chronic nephropathy; chronic renal/kidney impairment, insufficiency, dysfunction; azotemia; uremia; irreversible kidney failure
Symptoms and signs		Specification preferred (with, without, or unknown symptoms and signs); with symptoms and signs would be synonymous with uremia	
Uremia/uremic syndrome		A syndrome consisting of symptoms and signs associated with kidney failure (does not indicate a causal role for urea)	
Treatment		Specification required	
Kidney replacement therapy[c]	KRT	Further specification is required, includes dialysis and transplantation	Renal replacement therapy (RRT)

(*Continued on next page*)

Table 3 (Parts 1–5) | (Continued) **Kidney Disease: Improving Global Outcomes (KDIGO) kidney function and disease glossary: suggested terms to describe kidney function and kidney disease and criteria and measures defining them**

Preferred term	Suggested abbreviations[a]	Rationale/explanation	Terms to avoid
Dialysis	AKI stage 3D	AKI stage 3 treated by dialysis	AKI-D, dialysis-dependent AKI
	CKD G5D	CKD G5 treated by dialysis	ESKD, ESKF, ESRD, ESRF, dialysis-dependent CKD
Duration		Long-term vs. short-term: Long-term refers to dialysis for CKD; may also be referred to as maintenance dialysis. Short-term refers to dialysis for AKD	Chronic dialysis, acute dialysis (the terms acute and chronic refer to duration of kidney disease rather than duration of dialysis treatment)
Modality and frequency		Modalities • hemodialysis (HD) • hemofiltration (HF) • hemodiafiltration (HDF) • peritoneal dialysis (PD, ambulatory or automated) Frequency • continuous • intermittent (short or prolonged)	
Kidney transplantation	CKD G1T–G5T	CKD G1–G5 after transplantation	ESKD, ESKF, ESRD, ESRF
Donor source		Specify living donor kidney transplant/transplantation (LDKT) or deceased donor kidney transplant/transplantation (DDKT)	
Kidney failure with replacement therapy	KFRT	CKD G5 treated by dialysis or CKD G1-G5 after transplantation; for epidemiologic studies, both should be included	ESKD, ESKF, ESRD, ESRF
Kidney failure without replacement therapy	CKD G5 without KRT	Further specification is preferred: specify whether KRT is not chosen vs. not available	ESKD, ESKF, ESRD, ESRF, untreated kidney failure
With comprehensive conservative care		Further specification is preferred; definition is evolving	
Without comprehensive conservative care		Further specification is preferred: specify whether comprehensive conservative care is not chosen vs. not available	

Preferred term	Suggested abbreviations[a]	Rationale/explanation	Terms to avoid
Part 3. Acute kidney diseases and disorders (AKD) and acute kidney injury (AKI)		Disease duration ≤3 mo; conceptually different from initial recognition of CKD	Acute renal failure (ARF); acute renal insufficiency (ARI)
Acute kidney diseases	AKD[c]	KDIGO definition: AKI, or GFR <60 ml/min per 1.73 m^2, or markers of kidney damage for ≤3 mo, or decrease in GFR by ≥35% or increase in serum creatinine by >50% for ≤3 mo	ARF, ARI
Acute kidney injury	AKI	KDIGO definition (AKI is a subcategory of AKD): oliguria for >6 h, rise in SCr level by >0.3 mg/dl in 2 d or by > 50% in 1 wk	ARF, ARI
AKI classification		KDIGO classification by cause and stage preferred rather than stage alone; e.g., a patient with AKI stage 3 due to ATN; classification applies to all AKI stages	Previous classifications, including RIFLE and AKIN (the KDIGO classification harmonized these prior definitions)
AKI stages		KDIGO definition (applicable only to people with AKI)	
	AKI stage 1	Serum creatinine and/or urine output criteria	
	AKI stage 2	Serum creatinine and/or urine output criteria	
	AKI stage 3	Serum creatinine and/or urine output criteria	

Preferred term	Suggested abbreviations[a]	Rationale/explanation	Terms to avoid
Part 4. Chronic kidney disease (CKD)		Disease duration >3 mo	Chronic renal failure (CRF); ESRD; renal/kidney impairment, insufficiency, dysfunction
CKD		KDIGO definition: GFR <60 ml/min per 1.73 m^2 or markers of kidney damage for >3 mo	CRF; ESRD; renal/kidney impairment, insufficiency, dysfunction

Table 3 (Parts 1–5) | (Continued)

Preferred term	Suggested abbreviations[a]	Rationale/explanation	Terms to avoid
CKD classification		KDIGO CGA classification by cause, GFR category (G1–G5), and albuminuria category (A1–A3), see below for definitions of G and A categories. For example, a patient with CKD G1, A3 due to diabetes, or a cohort with CKD G4–G5, A1–A3 of any cause. Note that CKD classification is only applicable to people with CKD, so a patient could not be classified as "CKD G2, A1" if there was no other evidence of kidney damage.	Mild, moderate, severe, early, advanced CKD; CKD stage 1–5 (complete description preferred rather than G category alone)
CKD without KRT	CKD without KRT	CKD G1–G5, A1–A3 of any cause, not receiving dialysis or transplantation	ND-CKD (non-dialysis CKD), NDD-CKD (non–dialysis-dependent CKD), predialysis CKD, pre-ESRD CKD
CKD risk categories		KDIGO definitions (colors refer to heat map, Supplementary Figure S1) unless otherwise defined; risk depends on the outcome being considered	Mild, moderate, severe, early, advanced CKD
CKD risk category—low	Low risk	Refers to G1A1, G2A1 (green)	
CKD risk category—moderately high	Moderate risk	Refers to G1A2, G2A2, G3aA1 (yellow)	
CKD risk category–high	High risk	Refers to G1A3, G2A3, G3aA2, G3bA1 (orange)	
CKD risk category–very high	Very high risk	Refers to G3aA3, G3bA2, G3bA3, G4A1, G4A2, G4A3, G5A1, G5A2, G5A3 (red)	
CKD progression		Refers to worsening GFR or albuminuria. Other biomarkers not included. There is not yet consensus on use of specific terms to describe the timing (e.g., early, late) or rate (fast, slow) of progression. Use of specific terms should be defined in methods. Further specification may be required: GFR decline may occur during therapy for other conditions, which may not be considered as CKD progression.	
CKD remission		Refers to improving GFR or albuminuria. Criteria depend on disease. Use of specific terms should be defined in methods.	
Preferred term	**Suggested abbreviations[a]**	**Rationale/explanation**	**Terms to avoid**
Part 5. Kidney measures		Applies to people with or without kidney disease Consider measurement issues (methods) and variability (multiple measures may improve classification)	
Glomerular filtration rate and clearance		GFR and creatinine clearance are not synonymous	
Glomerular filtration rate	GFR	Units must be specified (ml/min per 1.73 m^2 or ml/min)	
Measured glomerular filtration rate	mGFR	Clearance methods and exogenous filtration markers should be noted separately in methods	
Estimated glomerular filtration rate	eGFR	Estimating equations (e.g., CKD-EPI and MDRD Study) and filtration markers (e.g., creatinine and cystatin C) should be noted separately in methods	
Estimated glomerular filtration rate; marker	$eGFR_{cr}$ $eGFR_{cys}$ $eGFR_{cr-cys}$	eGFR using creatinine eGFR using cystatin C eGFR using creatinine and cystatin C	
Clearance	Cl	Solute must be specified; units must be specified (ml/min per 1.73 m^2 or ml/min)	
Measured clearance	mCl	Clearance methods and markers should be noted separately in methods	
Measured clearance; marker	mCl_{UN} mCl_{cr} mCl_{UN-cr}	mCl using urea nitrogen mCl using creatinine mCl using urea nitrogen and creatinine	
Estimated clearance	eCl	Estimating equations (e.g., Cockcroft-Gault) and markers should be noted separately in methods	
Estimated clearance; marker	eCl_{cr}	eCl using creatinine	

(*Continued on next page*)

Table 3 (Parts 1–5) | (Continued) **Kidney Disease: Improving Global Outcomes (KDIGO) kidney function and disease glossary: suggested terms to describe kidney function and kidney disease and criteria and measures defining them**

Preferred term	Suggested abbreviations[a]	Rationale/explanation	Terms to avoid
GFR categories		For use in describing GFR level irrespective of the presence or absence of kidney disease; GFR units are ml/min per 1.73 m^2 for these categories; multiple categories can be collapsed (e.g., G3–G5)	
Normal to increased GFR	G1	GFR ≥90 ml/min per 1.73 m^2	
Mildly reduced GFR	G2	GFR 60–89 ml/min per 1.73 m^2	
Moderately reduced GFR	G3a G3b	GFR 45–59 ml/min per 1.73 m^2 GFR 30–44 ml/min per 1.73 m^2	
Severely reduced GFR	G4	GFR 15–29 ml/min per 1.73 m^2	
Kidney failure	G5	GFR <15 ml/min per 1.73 m^2 or treated by dialysis	
Hyperfiltration		The concept of hyperfiltration is generally accepted but not consistently defined. If this term is used as an exposure, outcome, or covariate, the GFR threshold must be defined (e.g., >120 ml/min per 1.73 m^2).	Renal hyperfiltration
GFR reserve		The concept of GFR reserve is generally accepted as the difference between stimulated and basal GFR	Renal function reserve
Albuminuria and proteinuria		Specify measurement conditions (spot vs. timed samples; quantitative vs. dipstick); differentiate non-albumin proteins as clinically indicated	
Albuminuria Urinary albumin concentration			Microalbuminuria, macroalbuminuria
Urinary albumin excretion rate	AER	Requires timed urine collection; interval for urine collection should be noted separately in methods; unit of time may vary (h or d)	
Urinary albumin-creatinine ratio	ACR	From timed urine collection or spot urine collection; interval for timed urine collection, or time of day for spot urine collection, should be noted separately in methods	
Proteinuria Urinary protein concentration			Clinical proteinuria, overt proteinuria
Urinary protein excretion rate	PER	Requires timed urine collection; interval for urine collection should be noted separately in methods; unit of time may vary (h or d)	
Urinary protein-creatinine ratio	PCR	From timed urine collection or spot urine collection; interval for timed urine collection, or time of day for spot urine collection, should be noted separately in methods	
Albuminuria and proteinuria categories		For use in describing albuminuria or proteinuria level irrespective of the presence or absence of kidney disease	
Normal		AER <10 mg/d; ACR <10 mg/g (<1 mg/mmol)	Normoalbuminuria
Mildly increased (mild)		AER 10–29 mg/d; ACR 10–29 mg/g (1.0–2.9 mg/mmol)	
Normal to mildly increased (normal to mild)	A1	AER <30 mg/d; ACR <30 mg/g (<3 mg/mmol) PER <150 mg/d; PCR <150 mg/g (<15 mg/mmol)	
Moderately increased (moderate)	A2	AER 30–300 mg/d; ACR 30–300 mg/g (3–30 mg/mmol) PER 150–500 mg/d; PCR 150–500 mg/g (15–50 mg/mmol)	Microalbuminuria

cause of disease, level of GFR (6 categories), and level of albuminuria (3 categories), collectively known as the CGA classification, rather than GFR alone (5 stages used in the KDOQI guideline).[7,29] The albuminuria and GFR categories have been grouped into 4 risk categories according to their associations with risks for various outcomes (all-cause and cardiovascular mortality, kidney failure requiring replacement therapy, AKI and CKD progression), usually portrayed as a heat map (Supplementary Figure S1).[7] The guideline suggests specific terms for description of albuminuria, GFR, and risk categories. Ascertainment of CKD, its severity, and prognosis from GFR alone, without albuminuria, is generally not acceptable. The terms "progression" and "remission," although frequently used, are not well defined, and their use is not standardized; thus, they should be specifically defined in the context of each study.

Table 3 (Parts 1–5) | (Continued)

Preferred term	Suggested abbreviations[a]	Rationale/explanation	Terms to avoid
Severely increased (severe)	A3	AER >300 mg/d; ACR >300 mg/g (>30 mg/mmol) PER >500 mg/d; PCR >500 mg/g (>50 mg/mmol)	Macroalbuminuria, clinical proteinuria, overt proteinuria
Nephrotic-range/ syndrome[d]		AER >2200 mg/d; ACR >2200 mg/g (>220 mg/mmol) PER >3500 mg/d; PCR >3500 mg/g (>350 mg/mmol) Specify with or without nephrotic syndrome, as noted by the presence of hypoalbuminemia (with edema and hyperlipidemia in most cases)	
Tubular function			
Tubular secretion	TS	Further specification is required to distinguish rate, clearance, or fraction (compared to filtered load)	
Tubular reabsorption	TR	Further specification is required to distinguish rate, clearance, or fraction (compared to filtered load)	
Fractional excretion, marker	FE_{Na}	FE of sodium	
Fractional reabsorption, marker	FR_{Na}	FR of sodium	

ACR, albumin-creatinine ratio; AER, albumin excretion rate; AKD, acute kidney diseases and disorders; AKI, acute kidney injury; AKIN, Acute Kidney Injury Network; ARF, acute renal failure; ARI, acute renal insufficiency; ATN, acute tubular necrosis; CKD, chronic kidney disease; CKD-EPI, CKD Epidemiology Collaboration; DDKT, deceased donor kidney transplant/transplantation; eGFR, estimated glomerular filtration rate; ESKD, end-stage kidney disease; ESKF, end-stage kidney failure; ESRD, end-stage renal disease; ESRF, end-stage renal failure; FE_{Na}, fractional excretion, sodium; FR_{Na}, fractional reabsorption, sodium; GFR, glomerular filtration rate; HD, hemodialysis; HDF, hemodiafiltration; HF, hemofiltration; KDIGO, Kidney Disease: Improving Global Outcomes; KFRT, kidney failure with replacement therapy; KRT, kidney replacement therapy; LDKT, living-donor kidney transplant/transplantation; MDRD, Modification of Diet in Renal Disease; mGFR, measured GFR; ND-CKD, non-dialysis CKD; NDD-CKD, non–dialysis-dependent CKD; PCR, protein-creatinine ratio; PD, peritoneal dialysis; PER, protein excretion rate; pre-ESRD, pre–end-stage renal disease; RF, renal failure; RIFLE, Risk, Injury, Failure, Loss of kidney function, and End-stage kidney disease; SCr, serum creatinine; TR, tubular reabsorption; TS, tubular secretion.
[a]Journal style will dictate whether and when to abbreviate terms.
[b]Ongoing discussion; may be revised by KDIGO AKI guideline update.
[c]Ongoing discussion; may be revised by KDIGO AKD consensus conference.
[d]Ongoing discussion; may be revised by KDIGO glomerulonephritis guideline update.

Kidney measures. Attendees agreed that specific kidney measures (such as albuminuria or proteinuria and decreased GFR), rather than "abnormal" or "reduced" kidney function, should be used to describe alterations in kidney structure and function (Table 3, Part 5). For all measures, it is important to consider strengths and weaknesses of measurement methods and their variability; the 2012 CKD guideline describes preferred methods.[7] Measurement of albumin is often preferred to that of total urine protein because it can be standardized and is more accurate in the lower range, but both are in widespread use. For both albuminuria and proteinuria, it is important to describe the methods of urine collection (timed collections for albumin and protein excretion rates [AER and PER] vs. non-timed "spot" collections for albumin-creatinine ratio [ACR] and protein-creatinine ratio [PCR]), as well as assay methods. The terms "GFR" and "clearance" should not be used as synonyms. For measured GFR (mGFR), it is important to specify the exogenous filtration marker, assay method, and clearance procedure. For estimated GFR (eGFR), it is important to specify the endogenous filtration marker, assay method, and estimating equation. Both mGFR and eGFR should generally be indexed to body surface area of 1.73 m^2. Assays for creatinine and cystatin C should be traceable to reference methods. Other excretory functions, such as tubular reabsorption and tubular secretion, and the determination of filtration fraction can be assessed by urinary clearances. The albuminuria and GFR categories described in the 2012 CKD guideline can be applied to people with or without CKD, but it is necessary to be explicit as to whether or not people with albuminuria category A1 or GFR categories G1 and G2 have CKD. Attendees agreed that the designation of nephrotic-range albuminuria or proteinuria is important, but further specification is required based on presence or absence of the nephrotic syndrome. The ongoing update of the 2012 KDIGO glomerulonephritis guideline update may recommend an alternative term for "nephrotic-range."[30]

Application to children. The 2012 AKI and CKD KDIGO guidelines contained commentary about application of the definitions and classifications to children.[6,7] For example, duration >3 months does not apply to infants with CKD due to hypoplastic or dysplastic kidneys, and thresholds for albuminuria, proteinuria, and GFR differ in infants compared to adults. For studies in infants, further specification is required regarding use of terms to describe acute and chronic kidney disease and kidney disease measures (Table 3, Parts 3–5).

Conclusion

Conference attendees agreed with the goal of standardizing and refining the nomenclature used in English to describe kidney function and disease, and of developing a glossary that could be used by journals for publication of scientific articles. Attendees reached general consensus on the 5 major recommendations (Table 1) and on a glossary (Table 3) that reflects the recommendations to be disseminated and implemented by medical journals.

Strengths and limitations. A central strength of the proposed glossary is that it was based on existing KDIGO definitions, classifications, and nomenclature for acute and chronic kidney disease. In addition, it was developed using a systematic process, including articulation of a clear and transparent rationale (patient-centeredness and precision); capture of stakeholder viewpoints via focus groups, a survey, and a period of public comment; and attainment of consensus among attendees at the conference. Although the recommendations are not likely to answer all concerns, the consensus among conference attendees was that standardizing scientific nomenclature is a necessary first step to improving communications among clinicians and allied health professionals, researchers, and public health officials, and with patients, their families and caregivers, and the public.

Limitations of the proposed glossary are that it is restricted to English and that nuances may be difficult to translate; only a limited number of stakeholders could participate due to practical reasons; it is not comprehensive (it does not include disease classification, dialysis, transplantation); and further specification may be required for studies in children. For these and other reasons, we consider the current recommendations for a glossary to be an important starting point, and they will require future expansion and updating.

Implementation. Achieving consensus among conference attendees and publication of the conference report and glossary are only the first steps in implementation of a revised nomenclature. The glossary will be freely available on the KDIGO website (https://kdigo.org/conferences/nomenclature/). To foster awareness, an Executive Summary highlighting the conference and its outputs will be simultaneously published in many journals represented at the meeting. In addition, elements of the glossary will be included in online updates to the newly released edition (11th) of the *AMA Manual of Style*.[31] Medical journals adopting the recommendations will need to determine how to implement them; this process will require education of editorial staff as well as proactive communication with authors, generally and with regard to specific manuscripts. If successful, further implementation in clinical practice, research, and public health will require more widespread dissemination and professional education. Improving communication with patients and the public will require efforts to improve patient education and health literacy for the public and guides to communication with patients. Professional societies, industry, and patient advocacy organizations will be critical to these efforts.

Advances in research, particularly in precision medicine, will introduce myriad new terms and novel concepts, requiring incorporation into disease definitions and classifications. Although the recommendations are intended for clinical research, we anticipate that greater precision is also preferable for reporting of experimental studies. In addition, the increasing prominence and participation of patient and caregiver communities in defining research objectives and best practices in clinical care will further elucidate the characteristics of patient-centered terminology. Expanding and updating the KDIGO glossary on a continual basis can be accomplished as part of the activities of future KDIGO guideline Work Groups and conferences.

APPENDIX: LIST OF PARTICIPANTS

KDIGO Co-Chairs

Michel Jadoul, Belgium and Wolfgang C. Winkelmayer, USA (Associate Editor, *Journal of the American Medical Association*).

Conference Co-Chairs

Andrew S. Levey, USA; Kai-Uwe Eckardt, Germany; Nijsje M. Dorman, USA (Managing Editor, *American Journal of Kidney Diseases*); and Stacy L. Christiansen, USA (Managing Editor, *Journal of the American Medical Association*).

Breakout group Chairs

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Other conference participants

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SUPPLEMENTARY MATERIAL

Supplementary File (PDF)

Table S1. KDIGO definitions and classifications of kidney diseases.

Box S1. Topics proposed in the Scope of Work to be considered at the conference.

Box S2. Examples of use of glossary-consistent text edits.

Supplementary References.

Figure S1. Chronic kidney disease Nomenclature used by KDIGO.

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