# 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.

**Received 31 December 2019; revised 10 February 2020; accepted 14 February 2020; published online 9 March 2020**

**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.**

*Kidney International* (2020) **97,** 1117–1129; https://doi.org/10.1016/j.kint.2020.02.010

KEYWORDS: acute kidney diseases and disorders; acute kidney injury; chronic kidney disease; kidney disease; kidney failure; kidney function; kidney measures; nomenclature; patient-centeredness; precision medicine

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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-"<br>• "Failure" vs. "end-stage" |
| • Precise | • CKD and AKI definitions and stages vs. other descriptions of disease and disease severity<br>• 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:<br>1. "kidney" rather than "renal" or "nephro-" when referring to kidney disease and kidney function?<br>2. "kidney failure" with appropriate descriptions of presence or absence of symptoms, signs, and treatment rather than "end-stage" disease"?<br>3. KDIGO definition and classification of AKD and AKI rather than alternative descriptions to define and classify severity of AKD and AKI?<br>4. KDIGO definition and classification of CKD rather than alternative descriptions to define and classify severity of CKD?<br>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

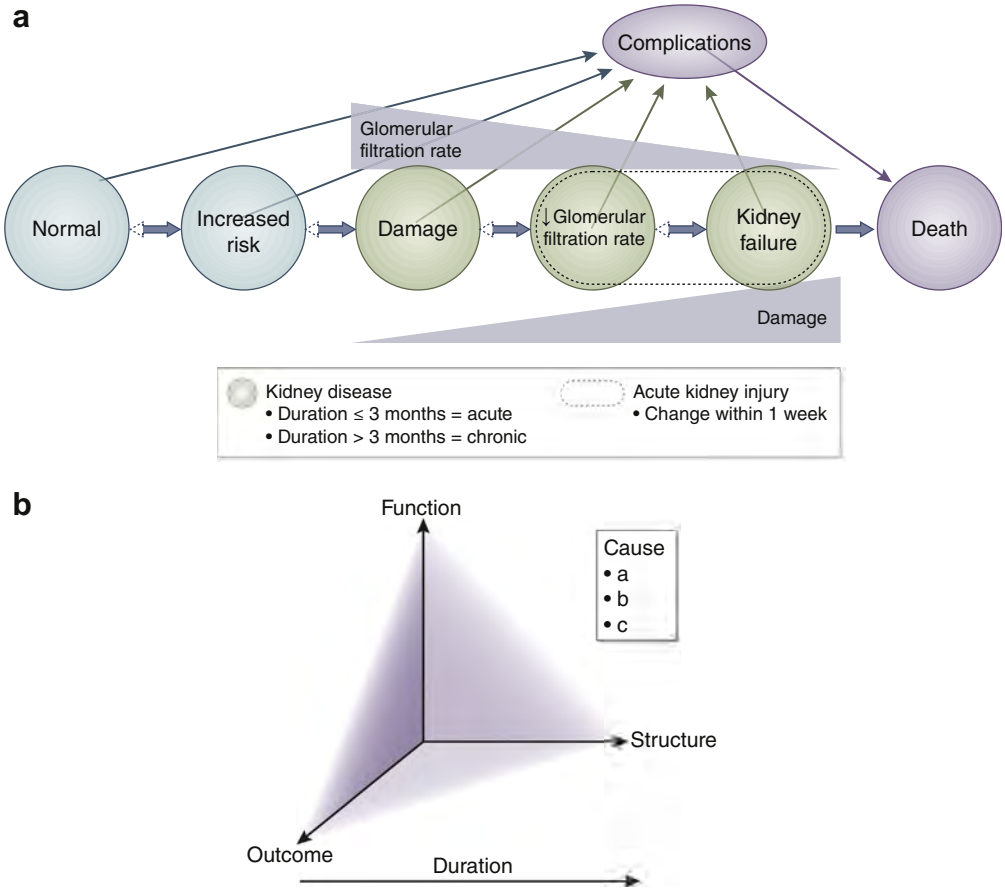


**Figure 1 | Conceptual model and classification of kidney disease.** (**a**) Factors associated with increased risk of kidney disease (blue), stages of disease (green), and complications (including death; purple). Horizontal arrows show transitions between stages (kidney outcomes). Solid arrows pointing 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<br>• Denoting impending death<br>• Despair in having incurable or untreatable disease<br>• Premature labeling and assumptions<br>• Judgment<br>• Stigma and failure of self |
| Frustrated by ambiguity | • Confused by medicalized language<br>• Lacking personal relevance<br>• Baffled by imprecision in meaning<br>• Opposed to obsolete terms |
| Making sense of the prognostic enigma | • Conceptualizing level of kidney function<br>• Correlating with symptoms and life impact<br>• Predicting progression and need for intervention |
| Mobilizing self-management | • Confronting reality<br>• Enabling planning and preparation<br>• Taking ownership for change<br>• Learning medical terms for self-advocacy<br>• 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 ≤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<br>• hemodialysis (HD)<br>• hemofiltration (HF)<br>• hemodiafiltration (HDF)<br>• peritoneal dialysis (PD, ambulatory or automated)<br>Frequency<br>• continuous<br>• 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** | AKI stage 1<br>AKI stage 2<br>AKI stage 3 | KDIGO definition (applicable only to people with AKI)<br>Serum creatinine and/or urine output criteria<br>Serum creatinine and/or urine output criteria<br>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.<br>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<br>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 | $eGFR_{cr}$<br>$eGFR_{cys}$<br>$eGFR_{cr\text{-}cys}$ | eGFR using creatinine<br>eGFR using cystatin C<br>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 | $mCl_{UN}$<br>$mCl_{cr}$<br>$mCl_{UN\text{-}cr}$ | mCl using urea nitrogen<br>mCl using creatinine<br>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<br>G3b | GFR 45–59 ml/min per 1.73 $m^2$<br>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**<br>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**<br>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)<br>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)<br>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

Ewout J. Hoorn, The Netherlands; Julie R. Ingelfinger, USA (Deputy Editor, *New England Journal of Medicine*); Lesley A. Inker, USA; Adeera Levin, Canada; Rajnish Mehrotra, USA (Editor-in-Chief, *Clinical Journal of the American Society of Nephrology*); Paul M. Palevsky, USA (Deputy Editor, *Journal of the American Society of Nephrology*); Mark A. Perazella, USA (Deputy Editor, *Kidney360*); and Allison Tong, Australia.

### Other conference participants

Susan J. Allison, UK (Chief Editor, *Nature Reviews Nephrology*); Neil Bennet, UK; Detlef Bockenhauer, UK; Josephine P. Briggs, USA (Editor-in-Chief, *Journal of the American Society of Nephrology*); Jonathan S. Bromberg, USA (Executive Editor, *Transplantation*); Andrew Davenport, UK (Editorial Board Member, *Hemodialysis International*); Harold I. Feldman, USA (Editor-in-Chief, *American Journal of Kidney Diseases*); Denis Fouque, France (Editor-in-Chief, *Nephrology Dialysis Transplantation*); Ron T. Gansevoort, The Netherlands; Ali G. Gharavi, USA; John S. Gill, Canada (Deputy Editor, *American Journal of Transplantation*); Eddie L. Greene, USA (Associate Editor, *Diabetes Care*); Brenda R. Hemmelgarn, Canada; Matthias Kretzler, USA; Mark Lambie, UK (Editorial Board Member, *Peritoneal Dialysis International*); Pascale H. Lane, USA (Co-Chair, ASN Media and Communications Committee); Joseph Laycock, UK (Managing Editor, *Pediatric Nephrology*); Shari Leventhal, USA; Michael Mittelman, USA (International Patient Advisor, *The BMJ*); Patricia Morrissey, USA (Executive Managing Editor, *Kidney International*); Cynthia D. Mulrow, USA; Marlies Ostermann, UK (Section Editor, *Journal of Critical Care* & *Blood Purification*); Jaya K. Rao, USA; Lesley Rees, UK (Co-Editor, *Pediatric Nephrology*); Pierre Ronco, France (Editor, *Kidney International*); Franz Schaefer, Germany; Jennifer St. Clair Russell, USA; Caroline Vinck, Belgium (Managing Editor, *Nephrology Dialysis Transplantation*); Stephen B. Walsh, UK; and Daniel E. Weiner, USA (Editor-in-Chief, *Kidney Medicine*).

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Michael Cheung, John Davis, Amy Earley, and Tanya Green.

## DISCLOSURE

ASL declared having received research support from AstraZeneca, National Institute of Diabetes and Digestive and Kidney Diseases, and National Kidney Foundation. K-UE declared having received consultancy fees from Akebia, Bayer, and Genzyme; speaker honoraria from Bayer and Vifor; and research support from Amgen, AstraZeneca, Bayer, Fresenius Medical Care, and Genzyme. NMD declared having equity ownership/stock options from Eli Lilly & Co. RM declared having received consultancy fees from Baxter Healthcare. PMP declared having received consultancy fees from Baxter Healthcare and GE Healthcare. JPB declared having received consultancy fees from Verily Scientific Advisory Board. JSB declared having received consultancy fees from Natera and research support from Angion, CareDx, Natera, National Institutes of Health, and Novartis. HIF declared having received consultancy fees from National Kidney Foundation and research support from National Institutes of Health. DF declared having received consultancy fees from Fresenius Kabi, Sanofi, and Vifor; speaker honoraria from Fresenius Kabi, Sanofi, and Vifor; and research support from Fresenius Medical Care. JSG declared having received consultancy fees from Sanofi and research support from Astellas. BRH declared having received research support from Canadian Institutes of Health Research. MK declared having received consultancy fees from Boehringer Ingelheim and Certa; future consultancy fees from Gilead Sciences and Goldfinch Bio; and

research support from Angion, AstraZeneca, Boehringer Ingelheim, Chan-Zuckerberg Initiative, Eli Lilly & Co, Elpidera, European Union Innovative Medicine Initiative, Foundation for the National Institutes of Health, Gilead, Goldfinch Bio, Janssen, JDRF, National Institutes of Health, and Novo Nordisk. ML declared having received speaker honoraria from Fresenius Medical Care and research support from Baxter Healthcare. MO declared having received consultancy fees from bioMérieux and NxStage; speaker honoraria from Baxter Healthcare and Fresenius Medical Care; and research support from Fresenius Medical Care and LaJolla Pharma. LR declared having received consultancy fees from GSK and speaker honoraria from Vitaflo. JSCR declared having received research support from Patient-Centered Outcomes Research Institute. DEW declared having received consultancy fees from Akebia, Janssen Biopharmaceuticals, and Tricida. MJ declared having received consultancy fees from Astellas, AstraZeneca, GSK, MSD, and Vifor Fresenius Medical Care Renal Pharma; speaker honoraria from Abbvie, Amgen, Menarini, MSD, and Vifor Fresenius Medical Care Renal Pharma; travel support from Amgen; and research support from Alexion, Amgen, Janssen-Cilag, Otsuka, and Roche. WCW declared having received consultancy fees from Akebia, AMAG, Amgen, AstraZeneca, Bayer, Daiichi-Sankyo, Relypsa, and ZS Pharma; speaker honoraria from FibroGen; and research support from National Institutes of Health. All the other authors declared no competing interests.

## ACKNOWLEDGMENTS

The conference was sponsored by Kidney Disease: Improving Global Outcomes (KDIGO) and supported in part by unrestricted educational grants from AstraZeneca, Bayer HealthCare, Boehringer Ingelheim, Fresenius Medical Care, Roche, and Sanofi. The content of this article does not necessarily reflect the views or opinions of the organizations or journals that were represented at the conference. Responsibility for the information and views expressed is limited to the coauthors.

The authors are grateful to Juhi Chaudhari, MPH, at Tufts Medical Center, Boston, MA, for assistance with manuscript preparation, and to Kidney Disease: Improving Global Outcomes (KDIGO) staff members John Davis, Amy Earley, Tanya Green, and Melissa Thompson for assistance with the meeting and manuscript.

## 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.

## REFERENCES

1. Plantinga LC, Boulware LE, Coresh J, et al. Patient awareness of chronic kidney disease: trends and predictors. *Arch Intern Med*. 2008;168:2268–2275.
2. Saran R, Robinson B, Abbott KC, et al. US Renal Data System 2018 Annual Data Report: Epidemiology of Kidney Disease in the United States. *Am J Kidney Dis*. 2019;73:A7–A8.
3. James SL. Global, regional, and national incidence, prevalence, and years lived with disability for 354 diseases and injuries for 195 countries and territories, 1990-2017: a systematic analysis for the Global Burden of Disease Study 2017. *Lancet*. 2018;392:1789–1858.
4. Global Burden of Disease 2017 Causes of Death Collaborators. Global, regional, and national age-sex-specific mortality for 282 causes of death in 195 countries and territories, 1980-2017: a systematic analysis for the Global Burden of Disease Study 2017. *Lancet*. 2018;392:1736–1788.
5. Hsu CY, Chertow GM. Chronic renal confusion: insufficiency, failure, dysfunction, or disease. *Am J Kidney Dis*. 2000;36:415–418.
6. Kidney Disease: Improving Global Outcomes (KDIGO) Acute Kidney Injury Work Group. KDIGO clinical practice guideline for acute kidney injury. *Kidney Int Suppl*. 2012;2:1–138.
7. Kidney Disease: Improving Global Outcomes (KDIGO) CKD Work Group. KDIGO 2012 clinical practice guideline for the evaluation and management of chronic kidney disease. *Kidney Int Suppl*. 2013;3:1–150.
8. Kidney Disease: International Global Outcomes. Consensus Conference on Nomenclature for Kidney Function & Disease. Available at: https://kdigo.org/conferences/nomenclature/. Accessed April 15, 2020.
9. Tong A, Levey AS, Eckardt KU, et al. Patient and caregiver perspectives on terms used to describe kidney health [e-pub ahead of print]. *Clin J Am Soc Nephrol*. https://doi.org/10.2215/CJN.00900120. Accessed April 16, 2020.
10. Iverson C. Nomenclature. In: Christiansen S, Iverson C, Flanagin A, et al. *American Medical Association (AMA) Manual of Style: A Guide for Authors and Editors*. 11th ed. Oxford, UK: Oxford University Press; 2020:642–644.
11. Eckardt KU, Coresh J, Devuyst O, et al. Evolving importance of kidney disease: from subspecialty to global health burden. *Lancet*. 2013;382:158–169.
12. Levey AS, Levin A, Kellum JA. Definition and classification of kidney diseases. *Am J Kidney Dis*. 2013;61:686–688.
13. Fouque D, Kalantar-Zadeh K, Kopple J, et al. A proposed nomenclature and diagnostic criteria for protein-energy wasting in acute and chronic kidney disease. *Kidney Int*. 2008;73:391–398.
14. Neri M, Villa G, Garzotto F, et al. Nomenclature for renal replacement therapy in acute kidney injury: basic principles. *Crit Care*. 2016;20:318.
15. Glassberg KI, Stephens FD, Lebowitz RL, et al. Renal dysgenesis and cystic disease of the kidney: a report of the Committee on Terminology, Nomenclature and Classification, Section on Urology, American Academy of Pediatrics. *J Urol*. 1987;138:1085–1092.
16. Eckardt KU, Alper SL, Antignac C, et al. Autosomal dominant tubulointerstitial kidney disease: diagnosis, classification, and management—a KDIGO consensus report. *Kidney Int*. 2015;88:676–683.
17. Kriz W, Bankir L. A standard nomenclature for structures of the kidney. The Renal Commission of the International Union of Physiological Sciences (IUPS). *Kidney Int*. 1988;33:1–7.
18. Kidney Tissue Atlas Ontology. Available at: https://bioportal.bioontology.org/ontologies/KTAO. Accessed April 15, 2020.
19. American Medical Association. *American Medical Association (AMA) Manual of Style*. 10th ed. Oxford, UK: Oxford University Press; 2007.
20. Committee on the Quality of Healthcare in the United States. Institute of Medicine. *Crossing the Quality Chasm: A New Health System for the 21st Century*. Washington, DC: National Academy Press; 2001.
21. Chen GM, Pather SR, DeLisser HM. Trends in the use of common words and patient-centric language in the titles of medical journals, 1976-2015. *JAMA Netw Open*. 2019;2:e191083.
22. Oxford Dictionary of English. 3rd ed. Oxford, UK: Oxford University Press; 2010.
23. Kidney Precision Medicine Project. Available at: https://kpmp.org/. Accessed April 15, 2020.
24. Centers for Medicare and Medicaid Services. End-stage renal disease (ESRD). Available at: https://www.cms.gov/Medicare/Coordination-of-Benefits-and-Recovery/Coordination-of-Benefits-and-Recovery-Overview/End-Stage-Renal-Disease-ESRD/ESRD.html. Accessed April 15, 2020.
25. Kidney Disease: International Global Outcomes. KDIGO Controversies Conference on Acute Kidney Injury. April, 2019; Rome, Italy. Available at: https://kdigo.org/conferences/aki-conference/. Accessed April 15, 2020.
26. Davison SN, Levin A, Moss AH, et al. Executive summary of the KDIGO Controversies Conference on Supportive Care in Chronic Kidney Disease: developing a roadmap to improving quality care. *Kidney Int*. 2015;88:447–459.
27. James MT, Levey AS, Tonelli M, et al. Incidence and prognosis of acute kidney diseases and disorders using an integrated approach to laboratory measurements in a universal health care system. *JAMA Netw Open*. 2019;2:e191795.
28. Chawla LS, Bellomo R, Bihorac A, et al. Acute kidney disease and renal recovery: consensus report of the Acute Disease Quality Initiative (ADQI) 16 Workgroup. *Nat Rev Nephrol*. 2017;13:241–257.
29. National Kidney Foundation. K/DOQI clinical practice guidelines for chronic kidney disease: evaluation, classification, and stratification. *Am J Kidney Dis*. 2002;39(Suppl 1):S1–266.
30. Floege J, Barbour SJ, Cattran DC, et al. Management and treatment of glomerular diseases (part 1): conclusions from a Kidney Disease: Improving Global Outcomes (KDIGO) Controversies Conference. *Kidney Int*. 2019;95:268–280.
31. Christiansen S, Iverson C, Flanagin A, et al. *American Medical Association (AMA) Manual of Style: A Guide for Authors and Editors*. 11th ed. Oxford, UK: Oxford University Press; 2020.