Technology has also advanced in diabetes care. In particular, continuous glucose monitoring is facilitating more intensive glycemic control, particularly in type 1 diabetes (6). New biomarkers, such as glycated albumin and fructosamine, have also been proposed to assess glycemia in CKD, because hemoglobin A1c may be biased or imprecise when red blood cell turnover increases with low eGFR and the use of erythropoietin-stimulating agents.

Of course, new drugs and technologies cannot treat diabetes and CKD on their own. These new treatments must be added to and integrated with established therapies, including lifestyle interventions and proven therapies, such as metformin and RAS inhibitors. Of lifestyle interventions, dietary sodium, dietary protein, and physical activity have been best studied. All treatments must be applied in a manner that engages and is acceptable to patients and is delivered in care models that acknowledge local patterns of care and local resources. Importantly, diabetes has grown most rapidly in low-income countries. Treatment paradigms must take into account the cultural values and resources of diverse contexts.

The care of people with diabetes and CKD makes large demands on patients and is necessarily multidisciplinary in nature. Effective guidelines must therefore reflect patient priorities and the perspectives of multiple approaches to care. Such guidelines must also acknowledge and account for the large range of care settings across the world. For these reasons, the KDIGO diabetes and CKD guideline writing group includes patients along with members from diverse professional backgrounds (nephrology, endocrinology, primary care, cardiology, pharmacology, nutrition) and from across the globe (United States, United Kingdom, Netherlands, Germany, India, Nigeria, Singapore, Hong Kong, and Brazil). It is anticipated that KDIGO and this writing group will release a draft set of recommendations for public commentary in December 2019, with a final guideline published in early 2020.

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KDIGO Hypertension Guideline

By Johannes F.E. Mann and Alfred K. Cheung

In 2012, KDIGO issued a clinical practice guideline for the management of blood pressure in chronic kidney disease (CKD) which excluded patients receiving maintenance dialysis. This guideline is now being revised on the basis of new clinical trial evidence, particularly from SPRINT, SPS3, and others. A multidisciplinary KDIGO guideline panel of clinical and scientific experts has convened in person and over teleconferences to discuss the excellent work of the Evidence Review Team with the aim to publish an update to the 2012 guideline in 2020. This revision will address several major subjects, such as optimal blood pressure (BP) measurement techniques, BP targets, antihypertensive agents, and the role of lifestyle and dietary interventions in CKD patients, including the special populations of pediatric patients and kidney transplant recipients.

A key issue of this new guideline will be a new chapter on how to measure BP properly. As a rule, casual office BP is 5 to 10 mm Hg higher than both standardized office and automated oscillometric office BP. Still, it is impossible to come up with conversion factors to adjust one measuring technique to another because that difference of 5 to 10 mm Hg refers to population means and those differences may vary vastly in each individual. The variabilities in BP obtained by the use of different techniques of measurements in CKD appear similar to those in the general population, although the available data are more limited. The utility of out-of-office BP is important in CKD because the prevalence of white-coat hypertension, masked hypertension, white-coat effect, and masked uncontrolled hypertension appears to be higher than in individuals without CKD. Nonetheless, there is insufficient literature to support guidelines on how to manage BP based on out-of-office measurements.

When BP targets are discussed, it is of utmost importance that BP measurement be performed in a highly standardized manner, probably using an automated oscillometric device that incorporates, by default, a five-minute rest period and averaging three measurements several minutes apart. This Work Group panel is considering a target systolic BP of less than 120 mm Hg as determined using standardized office BP measurement, based on the new evidence from the SPRINT and recent meta-analyses. Such a low target would obviate separate recommendations for different risk populations such as individuals with diabetes or variable degrees of proteinuria. The targets are mainly chosen based on their effects on cardiovascular events, which are rampant in CKD, and mortality. The effect of intensive BP lowering on kidney outcomes, GFR decline and end-stage kidney disease, is surprisingly small. In fact, in the intensive BP-lowering arms of the SPRINT, SPS3, and ACCORD studies, the decrease in GFR was consistently, albeit only slightly, greater than in the control arms.

In regard to preferred antihypertensive agents of choice, KDIGO will likely recommend, as before, angiotensin converting enzyme inhibitors (ACEi) or angiotensin receptor blockers (ARB) as first-line agents in those with very heavy albuminuria (>300 mg/g or >300 mg/24 h) and in those with diabetes. One unresolved issue is how best to handle an acute decrease in GFR in the first few weeks after antihypertensive therapy has been started, particularly with an ACEi or an ARB. Randomized intervention trials in this area are lacking, and more recent observational studies cast uncertainties on the predictive value of these acute early changes in GFR for long-term renoprotective effects. There is also no randomized trial to inform whether potassium binders would allow better control of hypertension in hyperkalemia-prone CKD by enabling the use of RAAS blockers and thus reduce cardiovascular and kidney complications.

What about the other special groups with CKD, namely older patients, children, or those with a kidney transplant? There is a large unmet need for studying the effects of antihypertensive therapy on cardiovascular and kidney outcomes in older patients with advanced CKD, given the increasing incidence of ESKD in this population. Because the aggregate benefits of antihypertensive therapy require at least one to two years to materialize, clinical judgment and shared decision-making is essential, and should take into consideration such factors as patient preferences, life expectancy, and potential adverse effects of therapy. We also note that the cardiovascular and apparent cognitive benefits of intensive BP lowering in the SPRINT trial persisted in the predefined subgroup above age 75 years and it was not associated with a higher risk of injurious falls or other serious adverse event than with standard BP goal.

Providing advice for the management of hypertension in pediatric CKD is a challenge for a number of reasons. Cardiovascular events, even over a 10-year time frame, are rare in this population. Thus, evidence is based primarily on the ESCAPE trial which examined kidney outcomes or surrogate outcomes such as left ventricular mass. Unfortunately, there is no good evidence to support the use of automated oscillometric BP devices in children with CKD, and normative values for ambulatory BP are available largely for Western populations only. Scientific societies do not agree on whether antihypertensive therapy should be initiated when BP is consistently above the 90th or 95th percentile for a child's age, sex, and height, but the target BP is consistently stated as < 50th percentile.

In kidney transplant recipients, there are no randomized trials to inform the optimal BP target with regard to cardiovascular or kidney allograft outcomes. ACEi, alpha-blockers, beta-blockers and mineralocorticoid receptor antagonists were compared with placebo with no differences in cardiovascular and kidney outcomes. ARBs and dihydropyridine calcium channel blockers (CCB) have been shown to reduce graft loss, compared to placebo. There are also several special aspects, such as renal artery stenosis and the use of vasoactive immunosuppressants (e.g., calcineurin inhibitors) that may complicate BP management in transplant recipients.

Finally, is there any role for nonpharmacologic treatment (e.g., dietary interventions, salt restriction, exercise, alcohol use) of hypertension in patients with CKD? There really is no evidence from randomized studies in CKD with patient-relevant outcomes to answer this question. However, most experts would agree that moderate salt restriction, physical activity, weight reduction in the obese, and attention to healthy diet, as recommended for the general population with the exception of high-potassium-containing food in advanced CKD, would likely to be helpful.

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