KDIGO 2021 Clinical Practice Guideline for the Management of Blood Pressure in Chronic Kidney Disease

Summary of recommendation statements and practice points
The term “high BP” is used throughout the document to denote BP above the target for a particular population under consideration. For most adult patients with CKD not receiving dialysis, the target is SBP <120 mm Hg (Chapter 3). For adult kidney transplant recipients, the target remains SBP <130 mm Hg/DBP <80 mm Hg (Chapter 4). For pediatric populations, MAP (calculated as DBP + 1/3 pulse pressure) targets are age-dependent (Chapter 5). Given that these targets vary according to the subpopulation of interest, we have avoided the term “hypertension” when referring to treatment decisions, as the term “hypertension” requires a single numerical definition and does not necessarily facilitate BP management.

### Chapter 1: Blood pressure measurement

<table>
<thead>
<tr>
<th>Recommendation 1.1</th>
<th>We recommend standardized office BP measurement in preference to routine office BP measurement for the management of high BP in adults (1B).</th>
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<tbody>
<tr>
<td></td>
<td>• Practice Point 1.1: An oscillometric BP device may be preferable to a manual BP device for standardized office BP measurement; however, standardization emphasizes adequate preparations for BP measurement, not the type of equipment.</td>
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<td>• Practice Point 1.2: Automated office BP (AOBP), either attended or unattended, may be the preferred method of standardized office BP measurement.</td>
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<td>• Practice Point 1.3: Oscillometric devices can be used to measure BP among patients with atrial fibrillation.</td>
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| Recommendation 1.2 | We suggest that out-of-office BP measurements with ambulatory BP monitoring (ABPM) or home BP monitoring (HBPM) be used to complement standardized office BP readings for the management of high BP (2B). |
### Chapter 2: Lifestyle interventions for lowering blood pressure in patients with CKD not receiving dialysis

#### 2.1. Sodium intake

We suggest targeting a sodium intake <2 g of sodium per day (or <90 mmol of sodium per day, or <5 g of sodium chloride per day) in patients with high BP and CKD (2C).

**Practice Point 2.1.1:** Dietary sodium restriction is usually not appropriate for patients with sodium-wasting nephropathy.

**Practice Point 2.1.2:** The Dietary Approaches to Stop Hypertension (DASH)–type diet or use of salt substitutes that are rich in potassium may not be appropriate for patients with advanced CKD or those with hyporeninemic hypoaldosteronism or other causes of impaired potassium excretion because of the potential for hyperkalemia.

#### 2.2. Physical activity

**Recommendation 2.2.1:** We suggest that patients with high BP and CKD be advised to undertake moderate intensity physical activity for a cumulative duration of at least 150 minutes per week, or to a level compatible with their cardiovascular and physical tolerance (2C).

**Practice Point 2.2.1:** Consider the cardiorespiratory fitness status, physical limitations, cognitive function, and risk of falls when deciding on the implementation and intensity of physical activity interventions in individual patients.

**Practice Point 2.2.2:** The form and intensity of physical activity should be considered and modified as necessary in individual patients. There may still be important health benefits even if physical activity falls below targets proposed for the general population.

### Chapter 3: Blood pressure management in patients with CKD, with or without diabetes, not receiving dialysis

#### 3.1. Blood pressure targets

**Recommendation 3.1.1:** We suggest that adults with high BP and CKD be treated with a target systolic blood pressure (SBP) of <120 mm Hg, when tolerated, using standardized office BP measurement (2B).

**Practice Point 3.1.1:** It is potentially hazardous to apply the recommended SBP target of <120 mm Hg to BP measurements obtained in a non-standardized manner.

**Practice Point 3.1.2:** Clinicians can reasonably offer less intensive BP-lowering therapy in patients with very limited life expectancy or symptomatic postural hypotension.

#### 3.2 Treatment with antihypertensive drugs, including RAS inhibitors (RASI)

**Recommendation 3.2.1:** We recommend starting renin-angiotensin-system inhibitors (RASI) (angiotensin-converting enzyme inhibitor [ACEi] or angiotensin II receptor blocker [ARB]) for people with high BP, CKD, and severely increased albuminuria (G1–G4, A3) without diabetes (1B).
Recommendation 3.2.2: We suggest starting RASi (ACEi or ARB) for people with high BP, CKD, and moderately increased albuminuria (G1–G4, A2) without diabetes (2C).

Recommendation 3.2.3: We recommend starting RASi (ACEi or ARB) for people with high BP, CKD, and moderately-to-severely increased albuminuria (G1–G4, A2 and A3) with diabetes (1B).

Practice Point 3.2.1: It may be reasonable to treat people with high BP, CKD, and no albuminuria, with or without diabetes, with RASi (ACEi or ARB).

Practice Point 3.2.2: RASi (ACEi or ARB) should be administered using the highest approved dose that is tolerated to achieve the benefits described because the proven benefits were achieved in trials using these doses.

Practice Point 3.2.3: Changes in BP, serum creatinine, and serum potassium should be checked within 2-4 weeks of initiation or increase in the dose of a RASi, depending on the current GFR and serum potassium.

Practice Point 3.2.4: Hyperkalemia associated with use of RASi can often be managed by measures to reduce the serum potassium levels rather than decreasing the dose or stopping RASi.

Practice Point 3.2.5: Continue ACEi or ARB therapy unless serum creatinine rises by more than 30% within 4 weeks following initiation of treatment or an increase in dose.

Practice Point 3.2.6: Consider reducing the dose or discontinuing ACEi or ARB in the setting of either symptomatic hypotension or uncontrolled hyperkalemia despite medical treatment, or to reduce uremic symptoms while treating kidney failure (estimated glomerular filtration rate [eGFR] <15 ml/min per 1.73 m2).

Practice Point 3.2.7: Mineralocorticoid receptor antagonists are effective for management of refractory hypertension but may cause hyperkalemia or a reversible decline in kidney function, particularly among patients with low eGFR.

Chapter 4: Blood pressure management in kidney transplant recipients (CKD G1T–G5T)

Recommendation 4.1: We recommend that a dihydropyridine calcium channel blocker (CCB) or an ARB be used as the first-line antihypertensive agent in adult kidney transplant recipients (1C).

Practice Point 4.1: Treat adult kidney transplant recipients with high BP to a target BP of <130 mm Hg systolic and <80 mm Hg diastolic using standardized office BP measurement (see Recommendation 1.1).
**Chapter 5: Blood pressure management in children with CKD**

<table>
<thead>
<tr>
<th>Recommendation 5.1: We suggest that in children with CKD, 24-hour mean arterial pressure (MAP) by ABPM should be lowered to £50th percentile for age, sex, and height (2C).</th>
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<tbody>
<tr>
<td>Practice Point 5.1: We suggest monitoring BP once a year with ABPM, and monitoring every 3–6 months with standardized auscultatory office BP in children with CKD.</td>
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<tr>
<td>Practice Point 5.2: In children with high BP and CKD, when ABPM is not available, manual auscultatory office BP obtained in a protocol-driven standardized setting targeting achieved SBP &lt;90th percentile for age, sex, and height of normal children is a reasonable approach.</td>
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<tr>
<td>Practice Point 5.3: Use ACEi or ARB as first-line therapy for high BP in children with CKD. These drugs lower proteinuria and are usually well tolerated, but they carry the risk of hyperkalemia and have adverse fetal risks for pregnant women.</td>
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