



## **KDIGO Controversies Conference on Blood Pressure in CKD**

### **- Breakout Group Questions -**

#### **Group 1: Blood Pressure (BP) Measurement**

- 1a. How do measures of BP differ across the following four techniques or settings: 1) auscultatory office-based BP (OBP); 2) automated oscillometric BP at home (HBP); 3) automated oscillometric office-based BP (AOBP); 4) ambulatory BP monitoring (ABPM). In particular, what are the differences in systolic BP (SBP) and diastolic (DBP) in the same patient when the above methods are systematically compared?
- 1b. Current guidelines define hypertension as OBP SBP  $\geq 140$  mm Hg or DBP  $\geq 90$  mm Hg; mean awake ABPM SBP  $\geq 135$  mm Hg or DBP  $\geq 85$  mm Hg; mean 24-hour SBP  $\geq 130$  mm Hg or DBP  $\geq 80$  mm Hg; HBP SBP  $\geq 135$  mm Hg or DBP  $\geq 85$  mmHg. How strong is the evidence supporting the equivalence of these measurements? Can we provide equivalent values for AOBP? How does the presence or absence of an observer during BP measurement affect AOBP? Do we need to reexamine how hypertension should be defined?
- 1c. Do the differences in BP using these four techniques differ among persons with and without CKD? Should there be different thresholds to define hypertension in persons with CKD?
- 2a. Does the relation of BP with outcomes (e.g., death, cardiovascular events, kidney disease progression) differ depending on whether BP is measured using AOBP, OBP, HPB and ABPM and do these relationships vary in CKD?



- 2b. How does nocturnal / sleeping BP, dipping status and variability in BP associate with outcomes and do these relationships vary in CKD?
3. What are the essential preparations that should precede any BP measurement (e.g., duration of rest prior to measurement, dietary preparation, absence of medical personnel, body and arm positions, appropriate cuff size selection, ambient temperature)? Are these elements different depending on whether OBP, HBP or AOBP is used?
4. Based on the answers to questions 1-3, are we able to recommend any particular method(s) of BP measurement in CKD?
- 5a. How should we define white-coat hypertension, masked hypertension, and masked uncontrolled hypertension and when should we evaluate for these? How do white-coat hypertension, masked hypertension, and masked uncontrolled hypertension associate with outcomes? Are there differences in CKD?
- 5b. How should we define orthostatic hypotension or orthostatic hypertension and when should we evaluate for these? How do orthostatic hypotension and orthostatic hypertension relate to outcomes and are there differences in CKD?
6. Should other techniques of assessing blood vessels, such as pulse-wave velocity, central aortic BP measurements, and wearable BP monitors be used clinically?

**Group 2: Management of Hypertension in CKD Patients in General and in those with Diabetes**

1. What should the BP targets be for non-diabetes mellitus (non-DM) CKD? Is it sensible to have a single target for all hypertensive non-DM CKD patients?



2. Should the BP target in non-DM CKD be the same as for DM-CKD?
3. Which clinical outcome measures should drive the BP target value: Mortality? Kidney outcomes (e.g., estimated glomerular filtration rate (eGFR) or albuminuria or ESRD)? Quality of life?
4. Is there a lower limit for SBP? Is there a J-curve? If so, where is the nadir?
5. Should DBP be taken into consideration for initiation or target of anti-hypertensive therapy?
6. Are the decreases in eGFR and/or increased risks for kidney events observed with lower BP goals in ACCORD, SPS3 and SPRINT clinically important?
7. Should the degree of albuminuria affect BP targets?
8. Should the choice of antihypertensive agents (RAS inhibitors in particular) be determined by albuminuria level?
9. How should resistant hypertension be managed in CKD?

**Group 3: Management of Hypertension in CKD among Elderly and Individuals with Previous Stroke**

1. Should antihypertensive therapy be initiated in the elderly with CKD at the same BP level as in the younger CKD patients?
2. Should the BP goal be different in the elderly with CKD from that in younger CKD patients? How are BP targets affected by levels of proteinuria?
3. What is the role for frailty in determining the initiation of antihypertensive treatment and BP goal?



4. Are there preferred medications in the elderly population?
5. What role should life expectancy play in determining the initiation of antihypertensive treatment and BP goal?
6. How should patients' perspectives of side effects be considered in the definition of BP targets and medication choice?
7. How should elderly CKD patients in whom antihypertensive therapy has been initiated be monitored (i.e., symptoms, orthostatic BP, serum-creatinine, serum potassium, etc)?
8. Should history of stroke change the initiation and target of BP treatment?
9. Are there preferred medications in the population with stroke?
10. Does recent or remote stroke make a difference? What are the specific considerations?
11. Does the severity of CKD change BP goals or selection of antihypertensive drugs in elderly patients or those with prior stroke?

#### **Group 4: Management of Hypertension in CKD in Transplant and Pediatric Populations**

1. In pediatric CKD patients:
  - (a) Is there new evidence on BP targets?
  - (b) Is there new evidence in the choice of anti-hypertensive agents?
  - (c) Is there new evidence to guide the appropriate method and frequency of BP measurements?



- (d) Is there evidence to make dietary sodium and potassium recommendations?
  - (e) Is there new evidence to guide the surveillance of the systemic consequences of hypertension?
  - (f) Do BP guideline recommendations in the adult general CKD population apply to the pediatric CKD population?
  - (g) Which part of the 2012 KDIGO BP guidelines related to pediatric patients with CKD may need to be revised?
2. In kidney transplant recipients:
- (a) Is there new evidence on BP targets?
  - (b) Is there new evidence in the choice of anti-hypertensive agents?
  - (c) Do BP guidelines in the adult general CKD population apply to the kidney transplant recipients?
  - (d) Which part of the 2012 KDIGO BP guidelines related to the kidney transplant recipients may need to be revised?
3. Is there evidence to guide the frequency of BP measurement to monitor people who have previously donated a kidney?