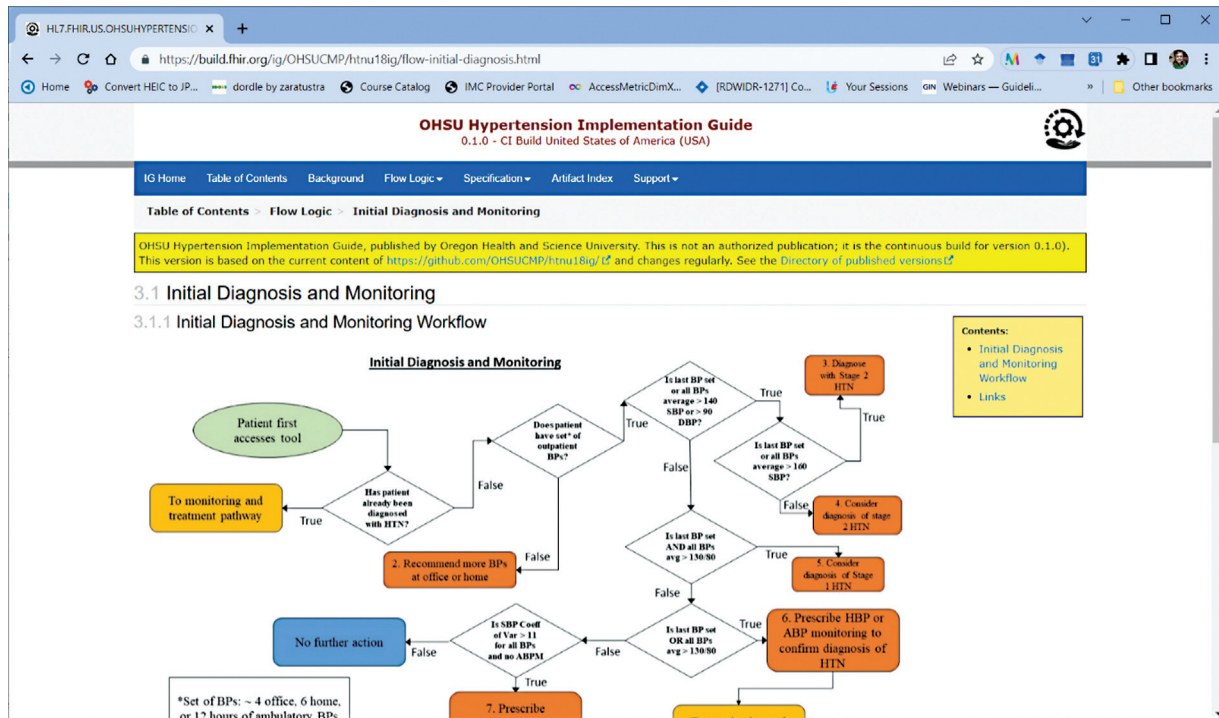
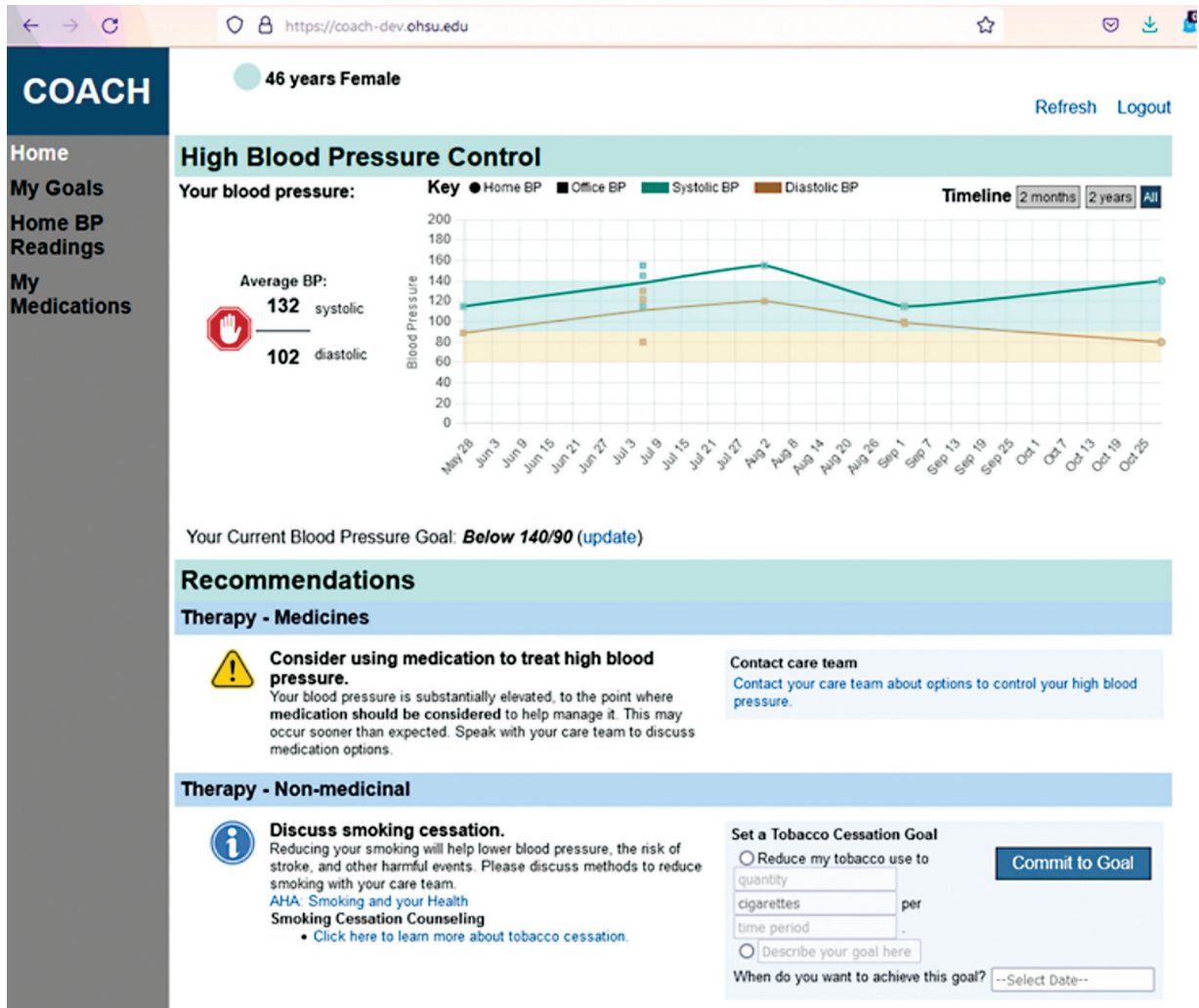


Supplementary Fig. S1 Hypertension implementation guide (The Content Implementation Guide is shown is available at: <https://build.fhir.org/ig/OHSUCMP/htnu18ig/flow-initial-diagnosis.html>).



Supplementary Fig. S2 Hypertension implementation guide flow diagram (<https://build.fhir.org/ig/OHSUCMP/htnu18ig/flow-initial-diagnosis.html>).



Supplementary Fig. S3 COACH main screen (Note: fictional data).

**COACH** Fanny Mae Fhir 79 years Female Refresh Logout

Home Blood Pressure Entry Historical Readings

**Home Blood Pressure Readings**

Please enter your blood pressure measurements below. If your blood pressure device also measures your pulse rate, please enter those measurements as well.

**First Measurement**  
SBP:  mm Hg  
DBP:  mm Hg  
Pulse:  bpm

**Second Measurement**  
SBP:  mm Hg  
DBP:  mm Hg  
Pulse:  bpm

Please enter the date and approximate time of these measurements:  
Date:   
Time:

Did you follow the below instructions when measuring your blood pressure?  
Yes  No

**Save**

Supplementary Fig. S4 Home blood pressure entry (Note: fictional data).

The screenshot shows the COACH patient portal for Fanny Mae Fhir, a 79-year-old female. The interface includes a navigation menu on the left with options for Home, My Goals, Home BP Readings, and My Medications. The main content area is titled 'My Blood Pressure Goal' and shows a current goal of 120 / 80 with an 'Update' button. Below this is a section for 'My Other Goals' with a 'Physical Activity' goal: 'Exercise for 20 minutes, twice times per week'. The goal includes a target completion date of 12/30/2021 and a current status of 'In Progress'. There are buttons to 'Mark Achieved' and 'Mark Not Achieved'. A table tracks the goal's progress, showing an 'In Progress' status and a date of 12/22/2021 10:25:29.

Supplementary Fig. S5 Goal entry and tracking (Note: fictional data).

Supplementary Table S1 Providers’ written perspectives on shared decision-making and clinical decision support

Comment focus	Representative comment
Decision support tools	<ul style="list-style-type: none"> <li>• “I have found the online risk computers helpful. These can be viewed jointly with patients and “what if” scenarios can be entered into the calculator to help arrive at a mutually agreed upon approach.”</li> <li>• “Clear algorithm or threshold (a la ASCVD risk score), single page, all inclusive, with clear 3rd, 4th and 5th line options for folks with allergies or needing multiple agents.”</li> </ul>
Effective communication and education materials	<ul style="list-style-type: none"> <li>• “Pre-visit patient education to allow them to be informed prior to discussion with provider.”</li> <li>• “Handout/flowsheet of decision management steps for in person use with patient.”</li> <li>• “Having visuals (like the ASCVD risk calculator) that can show patients the risk of AMI or CVA as it relates to increments of uncontrolled BP (such as per every 10 mm Hg above 140, *% increased risk of CVA).</li> <li>• “Make reviewing the tool with your patients as quick, efficient, and graphically simple as possible.”</li> </ul>
Consensus among recommendations	<ul style="list-style-type: none"> <li>• “Clearer consensus around treatment targets for special groups.”</li> <li>• “Ensure consistently updated guidelines.”</li> <li>• “Should provide preferred agents when there is comparative effectiveness evidence supporting better outcomes for the individual patient.”</li> </ul>
Understanding of risk and benefit.	<ul style="list-style-type: none"> <li>• “Better risk/benefit materials (one pager) to use when discussing the different agents.”</li> <li>• “Depends, but a nuanced tool that accounts for fall risk, non-life-threatening side effects like ED, and how much lifestyle change is really possible (some of my farmers get plenty of activity, some folks have physical disabilities that prevent them from increasing exercise, and not everyone has control over their diet) semms like it would be useful.”</li> <li>• “It should play a role. Practitioners: evidence behind meds, side effects in relation to other comorbidities. Patients: why behind different medicines: side effects, benefits. And information about hypertension.”</li> </ul>

Abbreviations: AMI, acute myocardial infarction; ASCVD, atherosclerotic cardiovascular disease; BP, blood pressure; CVA, cerebrovascular accident; ED, emergency department.

# Supplementary Appendix A Draft Survey

## Hypertension Expert Survey

### Start of Block: Introduction

#### Hypertension Survey-Expert Opinions

This survey has been developed by the Care Management Plus Team at Oregon Health and Science University for the purpose of obtaining expert opinions regarding new and existing guidelines relating to the measurement, diagnosis, and treatment of high blood pressure. The survey is based on a review of eight hypertension guidelines and focuses on variability between the recommendations they support. Based on your feedback, we will understand how better to present these recommendations to primary care team members and to patients. Our goal is to develop an EHR-agnostic clinical decision support tool to aid patients and care team members in managing high blood pressure. In this survey, you will be presented with case studies and data regarding fictional patients and asked to recommend courses of treatment. Each case study is accompanied by questions relating to guidelines for the management of high blood pressure. Please answer the questions according to your expertise; the survey is not evaluated for right or wrong answers. This is a pilot version and your responses will only be used to edit future versions and to provide frequencies to non-experts.

### End of Block: Introduction

#### Start of Block: Case 1

A 35-year-old woman with no recorded history of hypertension comes to clinic and, including today, has the following history of office blood pressures. She is a nonsmoker, has a BMI of 31, and has pre-diabetes on her problem list.

Do you want to see a graph of these readings? The mean values?

- Display the graph (1)
- Display the mean values (2)

Display this question:

If A 35-year-old woman with no recorded history of hypertension comes to clinic and, including today... = display the graph

Display this question:

If A 35-year-old woman with no recorded history of hypertension comes to clinic and, including today... = display the mean values

Mean SBP: 128.98 mm Hg

Mean DBP: 81.11 mm Hg

Given these readings, what you do next?

- Order ambulatory BP monitoring (1)
- Suggest she self-monitor BP at home (2)
- Record a diagnosis of hypertension (3)
- See her back in 3 months for a re-check (4)
- Recheck BP per structured protocol (5)
- None of the above (6)

Why this step?

Optional

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Which recommendation(s) most influenced your response?

Check all that apply

- In adults with suspected hypertension and without diagnostic uncertainty or blood pressure variability, use ambulatory BP monitoring for diagnostic confirmation. [ACC, HTN Canada, NHFA, NICE] (1)
- In adults with suspected hypertension and without diagnostic uncertainty or blood pressure variability, use home BP monitoring for diagnostic confirmation. [ACC, HTN Canada, ESH, NHFA, NICE, VA] (2)

- In adults with suspected hypertension with diagnostic uncertainty, use ambulatory BP monitoring. [ACC, HTN Canada, ESH, NHFA, NICE] (3)
- In adults with suspected blood pressure variability, use ambulatory BP monitoring. [HTN Canada, ESH, NICE] (4)

For the selected recommendations, please rate the following:

1      2      3      4      5      6      7

<p>How important are these recommendations? 1 - Not important      7 = Extremely important ()</p>	
<p>How frequently do providers follow these recommendations? 1 = Never      7 = All the time ()</p>	
<p>Within the current health care system, how difficult would it be to follow these recommendations nearly all the time? 1 = Not difficult      7 = Extremely difficult ()</p>	
<p>How much patient input is required by these recommendations? 1 = None      7 = Patient-driven ()</p>	
<p>How much patient work is required to adhere to these recommendations? 1 = None      7 = Extensive, daily work ()</p>	

In what clinical circumstances would you vary from these recommendations?

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Do you have any comments on these recommendations?

Optional

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End of Block: Case 1

Start of Block: Case 2

A 40-year-old patient with hypertension presents to the clinic. Their most recent blood pressures are as follows:

Do you want to see a graph of these readings? The mean values?

- Display the graph (1)
- Display the mean values (2)

Display this question:

If A 40-year-old patient with hypertension presents to the clinic. Their most recent blood pressures... = display the graph

Display this question:

If A 40-year-old patient with hypertension presents to the clinic. Their most recent blood pressures... = display the mean values

Mean SBP: 144.5 mm Hg

Mean DBP: 86.93 mm Hg






This patient is not currently on antihypertensive medications. Relevant history is BMI 30, pulse of 90 bpm, binge drinking two to three times per week, and current smoker.

Please arrange the following interventions in order of priority for the purpose of lowering BP.

- \_\_\_\_\_ Recommend diet change, focused on fruit and vegetable intake and fat restriction (2)
- \_\_\_\_\_ Recommend weight loss (1)
- \_\_\_\_\_ Recommend salt restriction and sodium intake reduction (3)
- \_\_\_\_\_ Recommend moderating alcohol consumption (4)
- \_\_\_\_\_ Recommend increased physical activity (5)
- \_\_\_\_\_ Recommend smoking cessation (6)

Please rate the above nonpharmacological interventions according to the following categories:

1 2 3 4 5 6 7

<p>How important are these changes for the purpose of lowering BP? 1 = Not important 7 = Extremely important ()</p>	
<p>How frequently do providers recommend these changes? 1 = Never 7 = All the time ()</p>	
<p>Within the current health care system, how difficult would it be to provide the above counseling nearly all the time? 1 = Not difficult 7 = Extremely difficult ()</p>	
<p>How much patient input is required to recommend these lifestyle changes? 1 = None 7 = Patient-driven ()</p>	
<p>How much patient work is required for lifestyle change counseling to be beneficial? 1 = None 7 = Extensive, daily work ()</p>	

Under what clinical circumstances would you not consider recommending lifestyle changes?

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Do you have any comments on these interventions?  
Optional

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End of Block: Case 2

Start of Block: Case 3

A 55-year-old African-American man with hypertension presents with the following blood pressures taken at home.

Do you want to see a graph of these readings? The mean values?

- Display the graph (1)
- Display the mean values (2)

Display this question:

If A 55-year-old African-American man with hypertension presents with the following blood pressures... = display the graph

Display this question:

If A 55-year-old African-American man with hypertension presents with the following blood pressures... = display the mean values

Mean SBP: 137.07 mm Hg

Mean DBP: 86.07 mm Hg

This patient has no history of diabetes, heart disease, or stroke. He smokes half a pack of cigarettes per day. He does not currently take medication for any conditions. His most recent laboratories include:

Total cholesterol 180 mg/dL; HDL 50 mg/dL; LDL 120 mg/dL; Creatinine of 0.95 mg/dL; Urine albumin/creatinine ratio of 25 mg/mmol

What should his office BP goal be?

- $\leq 150/90$  mm Hg (1)
- $\leq 140/90$  mm Hg (2)
- $\leq 135/85$  mm Hg (3)
- $\leq 130/80$  mm Hg (4)
- $< 120/80$  mm Hg (5)

Why this goal?

Optional

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Which pharmacological intervention would you choose to implement?

- Add treatment with an ACE-inhibitor (1)
- Add treatment with an ARB (2)
- Add treatment with a thiazide diuretic (3)
- Add treatment with a calcium channel blocker (4)
- Add treatment with a  $\beta$ -blocker (5)
- Add treatment with another class of antihypertensive (6)
- None of the above (7)

Which recommendation(s) most influenced your responses?

Check all that apply

- In adults aged 18–60 years with hypertension, no diabetes, no coronary artery disease, and no chronic kidney disease, target a BP of  $\leq 140/90$  mm Hg. [HTN Canada, ESH, NHFA, NICE, JNC8, VA] (1)
- In adults aged 18–60 years with hypertension, no diabetes, no coronary artery disease, and no chronic kidney disease, target a BP of  $< 120/80$  mm Hg. [ACC] (2)
- In adults aged  $> 50$  years with  $> 10\%$  10-year ASCVD risk, target a systolic BP of  $< 120$  mm Hg. [HTN Canada, NHFA] (3)
- In the general black population, initial antihypertensive treatment should include a thiazide-type diuretic or CCB. [JNC8] (4)
- In adults aged  $> 55$  years with hypertension and no comorbidity requiring specific initial pharmacotherapy, consider a thiazide-type diuretic as a therapeutic option. [ACC, HTN Canada, ESH, NHFA, NICE, VA] (5)
- In adults aged  $> 55$  years with hypertension and no comorbidity requiring specific initial pharmacotherapy, consider an ACE-I as a therapeutic option. [ACC, HTN Canada, ESH, NHFA, NICE, VA] (6)
- In adults aged  $> 55$  years with hypertension and no comorbidity requiring specific initial pharmacotherapy, consider an ARB as a therapeutic option. [ACC, HTN Canada, ESH, NHFA, NICE, VA] (7)
- In adults aged  $> 55$  years with hypertension and no comorbidity requiring specific initial pharmacotherapy, consider a CCB as a therapeutic option. [ACC, HTN Canada, ESH, NHFA, VA] (8)



- In adults aged > 55 years with hypertension and no comorbidity requiring specific initial pharmacotherapy, do not consider a  $\beta$ -blocker as a therapeutic option. [JNC8, NICE, VA] (9)

If this patient also had diabetes, how would you change his office BP goal?

- <150/90 mm Hg (1)
- <140/90 mm Hg (2)
- <135/85 mm Hg (3)
- <130/80 mm Hg (4)
- <120/80 mm Hg (5)
- No change (6)

Why this goal?

Optional

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If this patient had diabetes, which intervention would you implement?

- Add treatment with an ACE-inhibitor (1)
- Add treatment with an ARB (2)
- Add treatment with a thiazide diuretic (3)
- Add treatment with a calcium channel blocker (4)
- Add treatment with a  $\beta$ -blocker (5)
- Add treatment with another class of antihypertensive (6)
- No change (7)

Which recommendation(s) most influenced your responses?

Check all that apply

- In adults with hypertension and diabetes, target a BP of < 140/90 mm Hg. [HTN Canada, ESH, NHFA, NICE, VA] (1)
- In adults with hypertension and diabetes, target a BP of < 120/80 mm Hg. [ACC] (2)
- In adults with hypertension and diabetes, consider an ACE-I or ARB as a therapeutic option for first-line therapy. [ACC, HTN Canada, ESH, NHFA] (3)
- In the general black population, including those with diabetes, initial anti-hypertensive treatment should include a thiazide-type diuretic or CCB. [JNC8] (4)

For the selected recommendations, please rate the following:

1 2 3 4 5 6 7

<p>How important are these recommendations? 1 - Not important 7 = Extremely important ()</p>	
<p>How frequently do providers follow these recommendations? 1 = Never 7 = All the time ()</p>	
<p>Within the current health care system, how difficult would it be to follow these recommendations nearly all the time? 1 = Not difficult 7 = Extremely difficult ()</p>	
<p>How much patient input is required by these recommendations? 1 = None 7 = Patient-driven ()</p>	
<p>How much patient work is required to adhere to these recommendations? 1 = None 7 = Extensive, daily work ()</p>	

In what clinical circumstances would you vary from these recommendations?

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Do you have any comments on these recommendations?

Optional

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End of Block: Case 3

Start of Block: Case 4

A 76-year-old Caucasian woman with hypertension has the following readings over the last three months. She notes that she gets dizzy occasionally but does not fall. She is on HCTZ 25mg once daily. She has no history of diabetes, heart disease, or chronic kidney disease.

Do you want to see a graph of these readings? The mean values?

- Display the graph (1)
- Display the mean values (2)

Display this question:

If A 76-year-old Caucasian woman with hypertension has the following readings over the last three months... = display the graph

Display this question:

If A 76-year-old Caucasian woman with hypertension has the following readings over the last three mo... = Display the mean values

Mean SBP: 134.64 mm Hg

Mean DBP: 82.50 mm Hg

Relevant laboratories include the following:

Total cholesterol 180 mg/dL; HDL 50 mg/dL; LDL 120 mg/dL; creatinine of 0.95 mg/dL; urine albumin/creatinine ratio of 25 mg/mmol

What should her office BP goal be?

- ≤150/90 mm Hg (1)
- ≤140/90 mm Hg (2)
- ≤135/85 mm Hg (3)
- ≤130/80 mm Hg (4)
- <120/80 mm Hg (5)

Why this goal?

Optional

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Which pharmacological intervention would you choose to implement?

- Add treatment with an ACE-inhibitor (1)
- Add treatment with an ARB (2)
- Add treatment with a CCB (3)
- Add treatment with a  $\beta$ -blocker (4)
- Add treatment with another class of antihypertensive (5)
- Stop treatment with HCTZ (6)
- No change (7)

Which recommendation(s) most influenced your responses?

Check all that apply

- In adults aged 60–80 years with hypertension, no diabetes, no coronary artery disease, and no chronic kidney disease, target a BP of  $\leq 140/90$  mm Hg. [HTN Canada, NHFA, NICE] (1)
- In adults aged 60–80 years with hypertension, no diabetes, no coronary artery disease, and no chronic kidney disease, target a BP of  $< 120/80$  mm Hg. [ACC] (2)
- In adults aged  $> 75$ –80 years with hypertension, target a BP of  $\leq 150/90$  mm Hg. [ESH, JNC8, NICE, VA] (3)
- In adults aged  $> 55$  years with hypertension and no comorbidity requiring specific initial pharmacotherapy, consider a thiazide-type diuretic as a therapeutic option. [ACC, HTN Canada, ESH, NHFA, NICE, VA] (4)
- In adults aged  $> 55$  years with hypertension and no comorbidity requiring specific initial pharmacotherapy, consider an ACE-I as a therapeutic option. [ACC, HTN Canada, ESH, NHFA, NICE, VA] (5)
- In adults aged  $> 55$  years with hypertension and no comorbidity requiring specific initial pharmacotherapy, consider an ARB as a therapeutic option. [ACC, HTN Canada, ESH, NHFA, NICE, VA] (6)
- In adults aged  $> 55$  years with hypertension and no comorbidity requiring specific initial pharmacotherapy, consider a CCB as a therapeutic option. [ACC, HTN Canada, ESH, NHFA, VA] (7)

- In adults aged > 55 years with hypertension and no comorbidity requiring specific initial pharmacotherapy, do not consider a  $\beta$ -blocker as a therapeutic option. [JNC8, NICE, VA] (8)

If this patient had diabetes, how would you change her office BP goal?

- $\leq 150/90$  mm Hg (1)
- $< 140/90$  mm Hg (2)
- $\leq 135/85$  mm Hg (3)
- $\leq 130/80$  mm Hg (4)
- $< 120/80$  mm Hg (5)
- No change (6)

Why this goal?

Optional

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If this patient had diabetes, which intervention would you implement?

- Add treatment with an ACE-inhibitor (1)
- Add treatment with an ARB (2)
- Add treatment with a calcium channel blocker (3)
- Add treatment with a  $\beta$ -blocker (4)
- Add treatment with another class of hypertensive (5)
- No change (6)

Which recommendation(s) most influenced your responses?

Check all that apply

- In adults aged >75–80y with hypertension, target a BP of  $\leq 150/90$  mm Hg. [ESH, JNC8, NICE, VA] (1)
- In adults with hypertension and diabetes, target a BP of  $< 140/90$  mm Hg. [ESH, NHFA, NICE] (2)
- In adults aged >75–80y with hypertension, target a BP of  $< 120/80$  mm Hg. [ACC] (3)
- In adults with hypertension and diabetes, consider an ACE-I or ARB as a therapeutic option for first-line therapy. [ACC, HTN Canada, ESH, NHFA] (4)

For the selected recommendations, please rate the following:

1 2 3 4 5 6 7

<p>How important are these recommendations? 1 - Not important 7 = Extremely important ()</p>	
<p>How frequently do providers follow these recommendations? 1 = Never 7 = All the time ()</p>	
<p>Within the current health care system, how difficult would it be to follow these recommendations nearly all the time? 1 = Not difficult 7 = Extremely difficult ()</p>	
<p>How much patient input is required by these recommendations? 1 = None 7 = Patient-driven ()</p>	
<p>How much patient work is required to adhere to these recommendations? 1 = None 7 = Extensive, daily work ()</p>	

In what clinical circumstances would you vary from these recommendations?

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Do you have any comments on these recommendations?

Optional

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End of Block: Case 4

Start of Block: Case 5

A 65-year-old Latino man with hypertension and Stage 3 Chronic Kidney Disease on his problem list has the following BP history. He is on a diet for hypertension.

Do you want to see a graph of these readings? The mean values?

- Display the graph (1)
- Display the mean values (2)

Display this question:

If A 65-year-old Latino man with hypertension and Stage 3 Chronic Kidney Disease on his problem list... = display the graph

Display this question:

If A 65-year-old Latino man with hypertension and Stage 3 Chronic Kidney Disease on his problem list... = display the mean values

Mean SBP: 146.79 mm Hg

Mean DBP: 91.43 mm Hg

Relevant laboratories include:

Total cholesterol 180 mg/dL; HDL 50 mg/dL; LDL 120 mg/dL; creatinine of 1.4 mg/dL; urine albumin/creatinine ratio of 150 mg/mmol

What should his office BP goal be?

- <150/90 mm Hg (1)
- <140/90 mm Hg (2)
- <135/85 mm Hg (3)
- <130/80 mm Hg (4)
- <120/80 mm Hg (5)

Why this goal?

Optional

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Which pharmacological intervention would you choose to implement?

- Add treatment with an ACE-inhibitor (1)
- Add treatment with an ARB (2)
- Add treatment with a thiazide diuretic (3)
- Add treatment with a calcium channel blocker (4)
- Add treatment with a  $\beta$ -blocker (5)
- Add treatment with another class of antihypertensive (6)
- No change (7)

Which recommendation(s) most influenced your responses?

Check all that apply

- In adults with hypertension and chronic kidney disease without proteinuria and without diabetes, target a BP of < 140/90 mm Hg. [HTN Canada, ESH, NHFA, NICE, VA] (1)
- In adults with hypertension and chronic kidney disease without proteinuria and without diabetes, target a BP of < 120/80 mm Hg. [ACC] (2)
- In adults with hypertension and chronic kidney disease with proteinuria, target a BP of < 130/80 mm Hg. [ACC, NICE] (3)
- In adults with hypertension and chronic kidney disease, consider an ACE-I as a therapeutic option for first-line therapy. [HTN Canada, ESH, NHFA, NICE, VA, ACC] (4)
- In adults with hypertension and chronic kidney disease with microalbuminuria, use an ACE-I as the preferred therapeutic option. [ESH, NHFA, NICE, VA] (5)

If this patient also had diabetes, how would this change his office BP goal?

- <150/90 mm Hg (1)
- <140/90 mm Hg (2)
- <135/85 mm Hg (3)
- <130/80 mm Hg (4)
- <120/80 mm Hg (5)
- No change (6)

Why this goal?

Optional

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If this patient had diabetes, which intervention would you implement?

- Add treatment with an ACE-inhibitor (1)
- Add treatment with an ARB (2)
- Add treatment with a thiazide diuretic (3)
- Add treatment with a calcium channel blocker (4)
- Add treatment with a  $\beta$ -blocker (5)
- Add treatment with another class of antihypertensive (6)
- No change (7)






Which recommendations most influenced your responses?

Check all that apply

- In adults with hypertension, chronic kidney disease, and diabetes, target a blood pressure of < 130/80 mm Hg. [ACC, HTN Canada, NICE] (1)
- In adults with hypertension, chronic kidney disease, and diabetes, target a blood pressure of < 140/90 mm Hg. [NHFA] (2)
- In adults with hypertension and chronic kidney disease with proteinuria, target a blood pressure of < 130/80 mm Hg. [ACC, NICE] (3)
- In adults with hypertension and chronic kidney disease, consider an ACE-I as a therapeutic option for first-line therapy. [HTN Canada, ESH, NHFA, NICE, VA, ACC] (4)
- In adults with hypertension and chronic kidney disease with microalbuminuria, use an ACE-I as the preferred therapeutic option. [ESH, NHFA, NICE, VA] (5)

For the selected recommendations, please rate the following:

1 2 3 4 5 6 7

<p>How important are these recommendations? 1 - Not important 7 = Extremely important ()</p>	
<p>How frequently do providers follow these recommendations? 1 = Never 7 = All the time ()</p>	
<p>Within the current health care system, how difficult would it be to follow these recommendations nearly all the time? 1 = Not difficult 7 = Extremely difficult ()</p>	
<p>How much patient input is required by these recommendations? 1 = None 7 = Patient-driven ()</p>	
<p>How much patient work is required to adhere to these recommendations? 1 = None 7 = Extensive, daily work ()</p>	

In what clinical circumstances would you vary from these recommendations?

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Do you have any comments on these recommendations?  
Optional

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End of Block: Case 5



## Supplementary Appendix B Main Survey

### Hypertension Care Team Survey

#### Start of Block: Introduction

Hypertension Guidelines Survey This survey has been developed by the Care Management Plus Team at Oregon Health and Science University for the purpose of obtaining professional opinions regarding new and existing guidelines relating to the measurement, diagnosis, and treatment of high blood pressure. The survey is based on a review of current hypertension guidelines and focuses on variability between their recommendations. Based on your feedback, we will understand how better to present these recommendations to primary care team members and to patients. Our goal is to develop an EHR-agnostic clinical decision support tool to aid patients and care team members in managing high blood pressure. In this survey, you will be presented with case studies and data regarding fictional patients and asked to recommend courses of treatment. Each case study is accompanied by questions relating to guidelines for the management of high blood pressure. All mentions of race and ethnicity are derived from the guidelines on pharmacological interventions for hypertension control. Since there are several guidelines and the evidence varies, it is up to your clinical judgment on whether they are relevant to the case. We are not endorsing a particular guideline with this work, but only seek to understand how you interpret these recommendations in the care of your patients. Please answer the questions according to what you would do in practice; the survey is not evaluated for right or wrong answers.

#### End of Block: Introduction

Start of Block: Questions about Practices

What is your degree?

- MD (1)
- DO (2)
- NP (3)
- PA (4)
- Other (5) \_\_\_\_\_

How long has it been since you completed this degree?

- Fewer than five years (1)
- 5 to 10 years (2)
- 11 to 20 years (3)
- 21 to 30 years (4)
- More than 30 years (5)

Have you received any additional training or certification in treating hypertension (beyond your primary degree)?

- I completed a certification program in treating hypertension. (2)
- I received additional training in treating hypertension. (1)
- I have not received additional training in treating hypertension. (3)

Display this question:

If Have you received any additional training or certification in treating hypertension (beyond your... = I completed a certification program in treating hypertension.

What certification(s) did you complete?

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Display this question:

If Have you received any additional training or certification in treating hypertension (beyond your... = I received additional training in treating hypertension.

Please tell us about the training you received.

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How familiar are you with evidence-based medicine approaches?

- Extremely familiar (1)
- Very familiar (2)
- Moderately familiar (3)
- Slightly familiar (4)
- Not familiar at all (5)

Is your practice primarily rural or urban?

- Rural (1)
- Urban (2)
- Other (3) \_\_\_\_\_

How long have you been with your current practice?

- Fewer than five years (1)
- 5 to 10 years (2)
- 11 to 20 years (3)
- 21 to 30 years (4)
- Longer than 30 years (5)

Which set of guidelines does your practice primarily follow when diagnosing and treating hypertension?

- American College of Cardiology (ACC/AHA) (1)
- American College of Physicians (ACP/AAFP) (2)
- Eighth Joint National Committee (JNC 8) (3)
- Department of Veterans Affairs (VA/DoD) (4)
- My practice has instituted its own guidelines for hypertension (5)
- Other (6) \_\_\_\_\_
- Unsure (7)

Does your clinic support the use of shared decision making for treating hypertensive patients?

- Yes (1)
- No (2)
- Unsure (3)

How could the practice of shared decision making be improved for treating hypertension?

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What role should a clinical decision support tool play in the shared decision making process for hypertension? What information should it provide to practitioners? To patients?

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End of Block: Questions about Practices

Start of Block: Case 1

A 35-year-old Caucasian woman with no recorded history of hypertension comes to clinic with the following recent history of office blood pressures. She is a non-smoker, has a BMI of 31, and has pre-diabetes on her problem list.

Do you want to see a graph of these readings? The mean values?

- Display the graph (1)
- Display the mean values (2)

Display this question:

If A 35-year-old Caucasian woman with no recorded history of hypertension comes to clinic with the f... = display the graph

Display this question:

If A 35-year-old Caucasian woman with no recorded history of hypertension comes to clinic with the f... = Display the mean values

Mean SBP: 132.43 mm Hg

Mean DBP: 83.57 mm Hg

Given these readings, what step do you take next?

- Order ambulatory BP monitoring (1)
- Suggest she self-monitor BP at home with specific instructions (2)
- Record a diagnosis of hypertension (3)
- See her back in 3 months for a re-check (4)
- Recheck BP per structured protocol (5)
- Other (6) \_\_\_\_\_
- None of the above (7)

Why did you choose that as your next step?

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Which recommendation(s) were most closely aligned with your thinking?

Check all that apply

- In adults with suspected hypertension, use ambulatory BP monitoring for diagnostic confirmation. (1)
- In adults with suspected hypertension, use home BP monitoring for diagnostic confirmation. (2)
- In adults with suspected hypertension and diagnostic uncertainty, use ambulatory BP monitoring. (3)
- In adults with suspected blood pressure variability, use ambulatory BP monitoring. (4)

When would you deviate from the recommendation(s) you chose?

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Please answer the following questions by rating each item on a scale of 1 to 7:

1 2 3 4 5 6 7

<p>How important is it to obtain blood pressure measurements from outside the office? 1 - Not important 7 = Extremely important ()</p>	
<p>How frequently do other providers order home blood pressure monitoring? 1 = Never 7 = All the time ()</p>	
<p>Within the current health care system, how difficult is it to order home blood pressure monitoring? 1 = Not difficult 7 = Extremely difficult ()</p>	
<p>How frequently do other providers order ambulatory blood pressure monitoring? 1 = Never 7 = All the time ()</p>	
<p>Within the current health care system, how difficult is it to order ambulatory blood pressure monitoring? 1 = Not difficult 7 = Extremely difficult ()</p>	
<p>How much patient input is required before ordering ambulatory or home blood pressure monitoring? 1 = None 7 = Extensive input ()</p>	
<p>How much patient work is required to obtain useful results from home blood pressure monitoring? 1 = None 7 = Extensive, daily work ()</p>	
<p>How much patient work is required to obtain useful results from ambulatory blood pressure monitoring? 1 = None 7 = Extensive, daily work ()</p>	

Do you have any comments about choosing between using in-office blood pressure readings versus using home or ambulatory blood pressure monitoring?

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End of Block: Case 1

Start of Block: Case 2

A 40-year-old Asian patient with hypertension presents to the clinic. Their most recent blood pressures are as follows:

Do you want to see a graph of these readings? The mean values?

- Display the graph (1)
- Display the mean values (2)

Display this question:

If A 40-year-old Asian patient with hypertension presents to the clinic. Their most recent blood pre... = display the graph

Display this question:

If A 40-year-old Asian patient with hypertension presents to the clinic. Their most recent blood pre... = display the mean values

Mean SBP: 144.50 mm Hg

Mean DBP: 86.93 mm Hg

This patient is not currently on antihypertensive medications. Relevant history is BMI 30, pulse of 90 bpm, consuming two to three drinks per day, and current smoker.

Please drag and drop the following interventions into what you think should be the order of priority (with 1 the highest and 6 the lowest) for the purpose of lowering this patient's BP.

- \_\_\_\_\_ Recommend weight loss (1)
- \_\_\_\_\_ Recommend moderating alcohol consumption (2)
- \_\_\_\_\_ Recommend salt restriction and sodium intake reduction (3)
- \_\_\_\_\_ Recommend diet change, focused on fruit and vegetable intake and saturated fat restriction (4)
- \_\_\_\_\_ Recommend increased physical activity (5)
- \_\_\_\_\_ Recommend smoking cessation (6)

When would you not consider recommending lifestyle changes?

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Please rate the above non-pharmacological interventions for each of the following categories, as they relate to managing blood pressure on the whole.

1 2 3 4 5 6 7

<p>How important are these changes for the purpose of lowering BP? 1 = Not important 7 = Extremely important ()</p>	
<p>How frequently do other providers recommend that patients make these changes? 1 = Never 7 = All the time ()</p>	
<p>Within the current health care system, how difficult would it be to provide the above counseling nearly all the time? 1 = Not difficult 7 = Extremely difficult ()</p>	
<p>How much patient input is required to recommend these lifestyle changes? 1 = None 7 = Patient-driven ()</p>	
<p>How much patient work is required for lifestyle change counseling to be beneficial? 1 = None 7 = Extensive, daily work ()</p>	

Do you have any comments about these lifestyle changes as they relate to controlling high blood pressure? Are there other lifestyle changes that should be considered?

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End of Block: Case 2

Start of Block: Case 3

A 55-year-old African-American man with hypertension presents with the following blood pressures taken at home.

Do you want to see a graph of these readings? The mean values?

- Display the graph (1)
- Display the mean values (2)

Display this question:

If A 55-year-old African-American man with hypertension presents with the following blood pressures... = display the graph

Display this question:

If A 55-year-old African-American man with hypertension presents with the following blood pressures... = display the mean values

Mean SBP: 137.07 mm Hg

Mean DBP: 86.07 mm Hg

This patient has no history of diabetes, heart disease, or stroke. He smokes half a pack of cigarettes per day. He does not currently take medication for any conditions. His most recent laboratories include:

Total cholesterol 180 mg/dL; HDL 50 mg/dL; LDL 120 mg/dL; creatinine of 0.95 mg/dL; urine albumin/creatinine ratio of 25 mg/mmol

What should his office BP goal be?

- ≤150/90 mm Hg (1)
- ≤140/90 mm Hg (2)
- ≤135/85 mm Hg (3)
- ≤130/80 mm Hg (4)
- <120/80 mm Hg (5)

How did you choose this goal?

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Which pharmacological intervention(s) might you choose to implement?

Check all treatments that you might use individually

- Add treatment with an ACE-inhibitor (1)
- Add treatment with an ARB (2)
- Add treatment with a thiazide-type diuretic (3)
- Add treatment with a CCB (4)
- Add treatment with a β-blocker (5)
- Add treatment with another class of antihypertensive (6)
- ☒None of the above (7)

Which recommendations were most aligned with your thinking?

Check all that apply

- In adults aged 18–60 years with hypertension, no DM, no CAD, and no CKD, target a BP of ≤ 140/90 mm Hg. (1)
- In adults aged 18–60 years with hypertension, no DM, no CAD, and no CKD, target a BP of < 120/80 mm Hg. (2)
- In adults aged > 50 years with >10% 10-year ASCVD risk, target a systolic BP of < 120 mm Hg. (3)
- In the general black population, initial anti-hypertensive treatment should include a thiazide-type diuretic or CCB. (4)
- In adults aged > 55 years with hypertension and no comorbidity requiring specific initial pharmacotherapy, consider a thiazide-type diuretic as a therapeutic option. (5)
- In adults aged > 55 years with hypertension and no comorbidity requiring specific initial pharmacotherapy, consider an ACE-inhibitor as a therapeutic option. (6)
- In adults aged > 55 years with hypertension and no comorbidity requiring specific initial pharmacotherapy, consider an ARB as a therapeutic option. (7)
- In adults aged > 55 years with hypertension and no comorbidity requiring specific initial pharmacotherapy, consider a CCB as a therapeutic option. (8)
- In adults aged > 55 years with hypertension and no comorbidity requiring specific initial pharmacotherapy, do not consider a β-blocker as a therapeutic option. (9)

If this patient also had DM, how would you change his office BP goal?

- <150/90 mm Hg (1)
- <140/90 mm Hg (2)
- <135/85 mm Hg (3)
- <130/80 mm Hg (4)
- <120/80 mm Hg (5)
- No change (6)

How did you choose this goal?

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If this patient had DM, which intervention(s) would you implement?

Check all treatments that you might use individually

- Add treatment with an ACE-inhibitor (1)
- Add treatment with an ARB (2)
- Add treatment with a thiazide-type diuretic (3)
- Add treatment with a CCB (4)
- Add treatment with a  $\beta$ -blocker (5)
- Add treatment with another class of antihypertensive (6)
- No change (7)

Which recommendations were most closely aligned with your thinking?

Check all that apply

- In adults with hypertension and DM, target a BP of < 140/90 mm Hg. (1)
- In adults with hypertension and DM, target a BP of < 120/80 mm Hg. (2)
- In adults with hypertension and DM, consider an ACE-inhibitor or ARB as a therapeutic option for first-line therapy. (3)
- In the general black population, including those with DM, initial anti-hypertensive treatment should include a thiazide-type diuretic or CCB. (4)



For the selected recommendations, please rate the following on a scale of 1 to 7 (with 1 being the least and 7 being the most):

1      2      3      4      5      6      7

<p>How important are these recommendations? 1 - Not important      7 = Extremely important ()</p>	
<p>How frequently do other providers follow these recommendations? 1 = Never      7 = All the time ()</p>	
<p>Within the current health care system, how difficult would it be to follow these recommendations nearly all the time? 1 = Not difficult      7 = Extremely difficult ()</p>	
<p>How much patient input is required by these recommendations? 1 = None      7 = Patient-driven ()</p>	
<p>How much patient work is required to adhere to these recommendations? 1 = None      7 = Extensive, daily work ()</p>	

When would you vary from these recommendations?

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Do you have any comments on these recommendations?  
Optional

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End of Block: Case 3

Start of Block: Case 4

A 65-year-old Latino man with hypertension and Stage 3 CKD has the following BP history. He is on a low-sodium diet for hypertension.

Do you want to see a graph of these readings? The mean values?

- Display the graph (1)
- Display the mean values (2)

Display this question:

If A 65-year-old Latino man with hypertension and Stage 3 CKD has the following BP history. He is on... = display the graph

Display this question:

If A 65-year-old Latino man with hypertension and Stage 3 CKD has the following BP history. He is on... = display the mean values

Mean SBP: 146.79 mm Hg

Mean DBP: 91.43 mm Hg

Relevant laboratories include:

Total cholesterol 180 mg/dL; HDL 50 mg/dL; LDL 120 mg/dL; creatinine of 1.4 mg/dL; urine albumin/creatinine ratio of 150 mg/mmol

What should his office BP goal be?

- <150/90 mm Hg (1)
- <140/90 mm Hg (2)
- <135/85 mm Hg (3)
- <130/80 mm Hg (4)
- <120/80 mm Hg (5)

How did you choose this goal?

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Which pharmacological intervention(s) would you choose to implement?

Check all that apply

- Add treatment with an ACE-inhibitor (1)
- Add treatment with an ARB (2)
- Add treatment with a thiazide-type diuretic (3)
- Add treatment with a CCB (4)
- Add treatment with a  $\beta$ -blocker (5)
- Add treatment with another class of antihypertensive (6)
- No change (7)

Display This Question:

If Which pharmacological intervention(s) would you choose to implement? Check all that apply = Add treatment with an ACE-inhibitor

Or Which pharmacological intervention(s) would you choose to implement? Check all that apply = Add treatment with an ARB

Or Which pharmacological intervention(s) would you choose to implement? Check all that apply = Add treatment with a thiazide-type diuretic

Or Which pharmacological intervention(s) would you choose to implement? Check all that apply = Add treatment with a CCB

Or Which pharmacological intervention(s) would you choose to implement? Check all that apply = Add treatment with a  $\beta$ -blocker

Or Which pharmacological intervention(s) would you choose to implement? Check all that apply = Add treatment with another class of antihypertensive

If this patient later reported that he had begun to experience occasional dizziness but did not fall, how would that change your treatment plan?

Check all that apply

- Stop current pharmacological treatment (1)
- Prescribe new medication (2)
- Re-evaluate patient (3)
- No change (4)

Display this question:

If this patient later reported that he had begun to experience occasional dizziness but did not f... = prescribe new medication

Which type of medication would you prescribe instead?

Check all that apply

- Add treatment with an ACE-inhibitor (1)
- Add treatment with an ARB (2)
- Add treatment with a thiazide-type diuretic (3)
- Add treatment with a CCB (4)
- Add treatment with a  $\beta$ -blocker (5)
- Add treatment with another type of medication (6)

Which recommendations were most closely aligned with your thinking?

Check all that apply

- In adults with hypertension and CKD without proteinuria and without DM, target a BP of < 140/90 mm Hg. (1)
- In adults with hypertension and CKD without proteinuria and without DM, target a BP of < 120/80 mm Hg. (2)
- In adults with hypertension and CKD with proteinuria, target a BP of < 130/80 mm Hg. (3)
- In adults with hypertension and CKD, consider an ACE-inhibitor as a therapeutic option for first-line therapy. (4)
- In adults with hypertension and CKD with microalbuminuria, use an ACE-inhibitor as the preferred therapeutic option. (5)

If this patient also had DM, how would this change his office BP goal?

- <150/90 mm Hg (1)
- <140/90 mm Hg (2)
- <135/85 mm Hg (3)
- <130/80 mm Hg (4)
- <120/80 mm Hg (5)
- No change (6)

How did you choose this goal?

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If this patient had DM, which intervention(s) would you implement?

Check all that apply

- Add treatment with an ACE-inhibitor (1)
- Add treatment with an ARB (2)
- Add treatment with a thiazide-type diuretic (3)
- Add treatment with a CCB (4)
- Add treatment with a  $\beta$ -blocker (5)
- Add treatment with another class of antihypertensive (6)
- No change (7)






Which recommendations were most closely aligned with your thinking?

Check all that apply

- In adults with hypertension, CKD, and DM, target a blood pressure of < 130/80 mm Hg. (1)
- In adults with hypertension, CKD, and DM, target a blood pressure of < 140/90 mm Hg. (2)
- In adults with hypertension and CKD with proteinuria, target a blood pressure of < 130/80 mm Hg. (3)
- In adults with hypertension and CKD, consider an ACE-inhibitor as a therapeutic option for first-line therapy. (4)
- In adults with hypertension and CKD with microalbuminuria, use an ACE-inhibitor as the preferred therapeutic option. (5)

For the selected recommendations, please rate the following on a scale of 1 to 7 (with 1 being the least and 7 being the most):

1 2 3 4 5 6 7

<p>How important are these recommendations? 1 - Not important 7 = Extremely important ()</p>	
<p>How frequently do other providers follow these recommendations? 1 = Never 7 = All the time ()</p>	
<p>Within the current health care system, how difficult would it be to follow these recommendations nearly all the time? 1 = Not difficult 7 = Extremely difficult ()</p>	
<p>How much patient input is required by these recommendations? 1 = None 7 = Patient-driven ()</p>	
<p>How much patient work is required to adhere to these recommendations? 1 = None 7 = Extensive, daily work ()</p>	

When would you vary from these recommendations?

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Do you have any comments on these recommendations?  
Optional

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End of Block: Case 4

Start of Block: Case 5

A 79-year-old African-American woman comes to see you in clinic. She has a history of proteinuric CKD stage 4 (eGFR 25–30 ml/min), controlled DM, hypertension, and a prior left MCA ischemic stroke with good functional recovery. She takes 50 mg atenolol for hypertension. Her BP history is as follows:

Do you want to see a graph of these readings? The mean values?

- Display the graph (1)
- Display the mean values (2)

Display this question:

If A 79-year-old African-American woman comes to see you in clinic. She has a history of proteinuric... = display the graph

Display this question:

If A 79-year-old African-American woman comes to see you in clinic. She has a history of proteinuric... = display the mean values

Mean SBP: 148.64 mm Hg

Mean DBP: 91.57 mm Hg

What should her office BP goal be?

- <150/90 mm Hg (1)
- <140/90 mm Hg (2)
- <135/85 mm Hg (3)
- <130/80 mm Hg (4)
- <120/80 mm Hg (5)

How did you choose this goal?

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Which pharmacological intervention(s) would you choose to implement?

Check all that apply

- Add treatment with an ACE-inhibitor (1)
- Add treatment with an ARB (2)
- Add treatment with a thiazide-type diuretic (3)
- Add treatment with a CCB (4)
- Add treatment with a  $\beta$ -blocker (5)
- Add treatment with another class of antihypertensive (6)
- Stop treatment with atenolol (7)
- No change (8)

Which recommendations were most closely aligned with your thinking?

Check all that apply

- In adults with hypertension and CKD with proteinuria, target a BP of < 130/80 mm Hg. (1)
- In adults with hypertension and CKD, consider an ACE-inhibitor as a therapeutic option for first-line therapy. (2)
- In adults with hypertension and CKD with microalbuminuria, use an ACE-inhibitor as the preferred therapeutic option. (3)
- In adults with hypertension, CKD, and DM, target a blood pressure of < 130/80 mm Hg. (4)
- In adults with hypertension, CKD, and DM, target a blood pressure of < 140/90 mm Hg. (5)

For the selected recommendations, please rate the following on a scale of 1 to 7 (with 1 being the least and 7 being the most):

1 2 3 4 5 6 7

<p>How important are these recommendations? 1 - Not important 7 = Extremely important ()</p>	
<p>How frequently do other providers follow these recommendations? 1 = Never 7 = All the time ()</p>	
<p>Within the current health care system, how difficult would it be to follow these recommendations nearly all the time? 1 = Not difficult 7 = Extremely difficult ()</p>	
<p>How much patient input is required by these recommendations? 1 = None 7 = Patient-driven ()</p>	
<p>How much patient work is required to adhere to these recommendations? 1 = None 7 = Extensive, daily work ()</p>	

When would you vary from these recommendations?

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Do you have any comments on these recommendations?

Optional

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End of Block: Case 5