

# Screening for Chronic Kidney Disease: U.S. Preventive Services Task Force Recommendation Statement

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**Description:** New U.S. Preventive Services Task Force (USPSTF) recommendation statement on screening for chronic kidney disease (CKD).

**Methods:** The USPSTF reviewed evidence on screening for CKD, including evidence on screening, accuracy of screening, early treatment, and harms of screening and early treatment.

**Population:** This recommendation applies to asymptomatic adults without diagnosed CKD. Testing for and monitoring CKD for the purpose of chronic disease management (including testing and

monitoring patients with diabetes or hypertension) are not covered by this recommendation.

**Recommendation:** The USPSTF concludes that the evidence is insufficient to assess the balance of benefits and harms of routine screening for CKD in asymptomatic adults (I statement).

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\* For a list of USPSTF members, see the **Appendix** (available at [www.annals.org](http://www.annals.org)).

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**T**he U.S. Preventive Services Task Force (USPSTF) makes recommendations about the effectiveness of specific clinical preventive services for patients without related signs or symptoms.

*It bases its recommendations on the evidence of both the benefits and harms of the service and an assessment of the balance. The USPSTF does not consider the costs of providing a service in this assessment.*

*The USPSTF recognizes that clinical decisions involve more considerations than evidence alone. Clinicians should understand the evidence but individualize decision making to the specific patient or situation. Similarly, the USPSTF notes that policy and coverage decisions involve considerations in addition to the evidence of clinical benefits and harms.*

## SUMMARY OF RECOMMENDATION AND EVIDENCE

The USPSTF concludes that the evidence is insufficient to assess the balance of benefits and harms of routine screening for chronic kidney disease (CKD) in asymptomatic adults (I statement).

Common tests considered for CKD screening include creatinine-derived estimates of glomerular filtration rate (GFR) and urine testing for albumin. Testing for and monitoring CKD for the purpose of chronic disease management (including testing and monitoring patients with diabetes or hypertension) are not covered by this recommendation.

See the Clinical Considerations section for suggestions for practice regarding the I statement. See the **Figure** for a summary of the recommendation and suggestions for clinical practice and **Appendix Tables 1 and 2** (available at

[www.annals.org](http://www.annals.org)) for the USPSTF grades and classification of levels of certainty about net benefit.

## RATIONALE

### Importance

Approximately 11% of U.S. adults have CKD, many of whom are elderly. The condition is usually asymptomatic until its advanced stages. Most cases of CKD are associated with diabetes or hypertension.

### Detection

Chronic kidney disease is defined as decreased kidney function or kidney damage that persists for at least 3 months. No studies have assessed the sensitivity and specificity of screening for CKD with tests for estimated GFR, microalbuminuria, or macroalbuminuria.

### Benefits of Detection and Early Intervention and Treatment

Evidence that routine screening for CKD improves clinical outcomes for asymptomatic adults is inadequate.

See also:

#### Print

Summary for Patients. . . . . I-50

#### Web-Only

Consumer Fact Sheet

CME quiz (preview on page I-30)

*Figure. Screening for chronic kidney disease: clinical summary of U.S. Preventive Services Task Force Recommendation.***Annals of Internal Medicine****SCREENING FOR CHRONIC KIDNEY DISEASE  
CLINICAL SUMMARY OF U.S. PREVENTIVE SERVICES TASK FORCE RECOMMENDATION**

Population	Asymptomatic adults without diagnosed chronic kidney disease (CKD)
Recommendation	No recommendation.
	Grade: I (Insufficient Evidence)
Risk Assessment	There is no generally accepted risk assessment tool for CKD or risk for complications of CKD. Diabetes and hypertension are well-established risk factors with strong links to CKD. Other risk factors for CKD include older age, cardiovascular disease, obesity, and family history.
Screening Tests	Although there is insufficient evidence to recommend routine screening, the tests often suggested for screening that are feasible in primary care include testing the urine for protein (microalbuminuria or macroalbuminuria) and testing the blood for serum creatinine to estimate glomerular filtration rate.
Balance of Harms and Benefits	The USPSTF could not determine the balance between the benefits and harms of screening for CKD in asymptomatic adults.
Other Relevant USPSTF Recommendations	The USPSTF has made recommendations on screening for diabetes, hypertension, and obesity, as well as aspirin use for the prevention of cardiovascular disease. These recommendations are available at <a href="http://www.uspreventiveservicestaskforce.org">www.uspreventiveservicestaskforce.org</a> .

For a summary of the evidence systematically reviewed in making this recommendation, the full recommendation statement, and supporting documents, please go to [www.uspreventiveservicestaskforce.org](http://www.uspreventiveservicestaskforce.org).

**Harms of Detection and Early Intervention and Treatment**

Evidence on the harms of screening for CKD is inadequate. However, convincing evidence shows that medications used to treat early CKD may have adverse effects.

**USPSTF Assessment**

The USPSTF concludes that the evidence on routine screening for CKD in asymptomatic adults is lacking, and that the balance of benefits and harms cannot be determined.

**CLINICAL CONSIDERATIONS****Patient Population Under Consideration**

This recommendation applies to asymptomatic adults without diagnosed CKD. Testing for and monitoring CKD for the purpose of chronic disease management (including monitoring patients with diabetes or hypertension) are not covered by this recommendation.

**Suggestions for Practice Regarding the I Statement****Potential Preventable Burden and Benefits**

Chronic kidney disease is very prevalent; in 2011, 11% of the U.S. general population had the condition. However, most affected persons have risk factors for CKD, particularly older age, diabetes, and hypertension. It is usually asymptomatic until its advanced stages. Although there is no evidence on the benefits and harms of screening in the general population of asymptomatic adults, evidence

shows that specific treatments for patients with diabetes reduce risk for advanced CKD. The American Diabetes Association recommends screening for CKD in all patients with diabetes. The USPSTF found very limited evidence about whether knowledge of CKD status in patients with isolated hypertension (those who do not also have diabetes or cardiovascular disease) helps in making treatment decisions. However, several organizations recommend screening patients who are being treated for hypertension, including the National Institutes of Health's Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure.

**Potential Harms**

For adults without diabetes or hypertension, risk for CKD and subsequent adverse outcomes from it are small. How many persons with a positive screening test result who will be confirmed to have CKD is unknown. There are no studies on the benefits of early treatment in persons without diabetes or hypertension. Persons who have positive results on a screening test but do not have CKD may experience the harms associated with interventions and treatments without the potential for benefit.

**Current Practice**

Serum creatinine testing is widely done for various reasons in clinical practice, including chronic disease

management for patients with hypertension and diabetes. Many patients with CKD stages 1 to 3 seem to have at least some testing in usual clinical care, probably for other conditions or in response to guidelines from other organizations.

### Risk Assessment

No generally accepted risk assessment tool for CKD or risk for complications of CKD exists. Diabetes and hypertension are well-established risk factors with strong links to CKD. Other risk factors for CKD include older age, cardiovascular disease, obesity, and family history.

### Screening Tests

Although evidence to recommend routine screening is insufficient, the tests often suggested for screening that are feasible in primary care include testing the urine for protein (micro- or macroalbuminuria) and testing the blood for serum creatinine to estimate GFR. No studies have evaluated the sensitivity and specificity of 1-time testing with either or both tests for diagnosis of CKD, defined as decreased kidney function or kidney damage persisting for at least 3 months.

### Treatment

Treatment of early stages of CKD is generally targeted to comorbid conditions, such as diabetes, hypertension, and cardiovascular disease, to reduce the risk for complications and progression of CKD. Treatments include blood pressure medications (particularly angiotensin-converting enzyme inhibitors and angiotensin II-receptor blockers), lipid-lowering agents, and diet modification.

## OTHER CONSIDERATIONS

### Research Needs and Gaps

Future research to define the sensitivity and specificity of 1-time testing for CKD would help to clarify the usefulness of these tests and interpretation of their results. More research is needed to explore the reasons for and possible interventions to prevent the disproportionate progression to end-stage kidney disease in the African American population. More research is needed on the potential benefits and harms of screening and early treatment of CKD in persons without diabetes or hypertension. Studies that evaluate the effect of screening for CKD in patients with hypertension but not diabetes would help to define the benefits and harms of screening in this risk group.

## DISCUSSION

### Burden of Disease

Approximately 11% of Americans have an early form of CKD (1, 2). Most cases are asymptomatic; are identified in early stages; and are associated with diabetes, hypertension, or both. Medicare data show that 48% of patients with CKD (excluding end-stage renal disease) have diabetes, 91% have hypertension, and 46% have atherosclerotic heart disease (1, 2). Other reported risk factors include

older age, obesity, and family history. Chronic kidney disease is more prevalent in women (12.6%) than in men (9.7%) and is similar in white (11.6%) and African American (11.2%) adults (1, 2). African Americans are 3 to 5 times more likely to have end-stage renal disease than white Americans (3, 4). Chronic kidney disease is associated with several adverse health outcomes in several studies, including increased risk for death, cardiovascular disease, fractures, bone loss, infections, cognitive impairment, and frailty.

### Scope of Review

This is a new topic for the USPSTF and was nominated for consideration by several organizations. The USPSTF reviewed evidence on screening for CKD, including evidence on screening, accuracy of screening, early treatment, and harms of screening and early treatment.

### Accuracy of Screening Tests

Although a 1-time creatinine-derived estimate of GFR highly correlates to a 1-time direct measurement of GFR, the USPSTF could not find any studies on the accuracy of screening (with serum creatinine or urinary albumin) for CKD defined as impaired GFR or albuminuria that persists for at least 3 months (1, 2). A few studies provide some information about reliability and false-positive results. Intra-individual variability of urinary albumin is high; reported coefficients of variance estimates range from 30% to 50% (5). Body position, exercise, and fever can affect urinary albumin excretion (5). Although many groups recommend 1-time urinary albumin testing and calculation of a protein-creatinine ratio, no standard for collection and measurement of urinary albumin or creatinine exists. A study using NHANES (National Health and Nutrition Examination Survey) data reported that 37% of persons with microalbuminuria and a GFR of 60 mL/min per 1.73 m<sup>2</sup> or greater did not have micro- or macroalbuminuria on repeated testing 2 months later (6). Another study reported that 59% of participants with diabetes and persistent microalbuminuria (defined by repeated abnormal protein-creatinine ratios over a 2-year period) regressed to normal over a subsequent 6-year period (7).

### Effectiveness of Early Detection and Treatment

No studies directly evaluate the effectiveness of screening for CKD. Treatment of early stages of CKD is targeted to associated conditions, primarily using medications to control hypertension, diabetes, and cardiovascular disease. There are few studies on early treatment of CKD stages 1 to 3 in persons without chronic diseases (such as hypertension, diabetes, and cardiovascular disease). Evidence shows that identification and treatment of CKD may affect management decisions or health outcomes in patients with established chronic disease, including diabetes, cardiovascular disease, and hypertension, but there is insufficient evidence that identification and early treatment of CKD in asymptomatic adults without these conditions results in improved health outcomes.

## Potential Harms of Screening and Treatment

The USPSTF found no studies on the direct harms of screening for CKD. Potential harms of screening include adverse effects from venopuncture and psychological effects of labeling a person with CKD. The USPSTF found no studies on these potential harms. The most important potential for harm could occur because of false-positive test results. Patients could be falsely identified as having CKD and receive unnecessary treatment and diagnostic interventions, with their resultant harmful effects. The USPSTF found insufficient evidence to quantify the overall harms from false-positive test results. As discussed previously, several studies provide limited information about the potential frequency of false-positive test results.

Convincing evidence shows that some harm occurs from medications used to treat comorbid medical conditions associated with early CKD, such as diabetes, hypertension, and cardiovascular disease. Although studies inconsistently report withdrawals or adverse effects by treatment group, commonly reported adverse effects of medications reviewed include cough with angiotensin-converting enzyme inhibitors; hypotension with antihypertension medications; edema with calcium-channel blockers; and hyperkalemia with angiotensin-converting enzyme inhibitors, angiotensin II–receptor blockers, and aldosterone antagonists (1, 2).

## Estimate of Magnitude of Net Benefit

Although undiagnosed CKD in its early stages is common and there are potential beneficial disease management interventions for persons with chronic diseases, the USPSTF found insufficient evidence on screening accuracy, benefits of early treatment in the general population (that is, persons without chronic disease), and harms of screening. Therefore, evidence to assess the balance of benefits and harms of screening for CKD in the general asymptomatic adult population is insufficient.

## Response to Public Comment

A draft version of this recommendation statement was posted for public comment on the USPSTF Web site from 30 April through 29 May 2012. Most commenters agreed with the USPSTF statement. Several comments requested clarification that this recommendation does not apply to persons with diabetes or hypertension. This information was provided in several places in the statement.

## RECOMMENDATIONS OF OTHER GROUPS

No guidelines from primary care organizations recommend screening all adults for CKD. The National Kidney Foundation recommends assessing risk for CKD in all patients and doing the following for those at increased risk: measure blood pressure, test serum creatinine levels, test urinary albumin levels, and examine urine for erythrocytes and leukocytes (8). The American Diabetes Association recommends annual screening of all persons with diabetes

using urinary albumin and serum creatinine testing (9). The National Institutes of Health's Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure recommends that all persons diagnosed with hypertension should have urinalysis and serum creatinine testing; urine testing for albumin is optional (10).

From the U.S. Preventive Services Task Force, Rockville, Maryland.

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**Potential Conflicts of Interest:** Disclosure forms from USPSTF members can be viewed at [www.acponline.org/authors/icmje/ConflictOfInterestForms.do?msNum=M12-1735](http://www.acponline.org/authors/icmje/ConflictOfInterestForms.do?msNum=M12-1735).

**Requests for Single Reprints:** Reprints are available from the USPSTF Web site ([www.uspreventiveservicestaskforce.org](http://www.uspreventiveservicestaskforce.org)).

## References

1. Fink HA, Ishani A, Taylor BC, Greer NL, MacDonald R, Rossini D, et al. Chronic Kidney Disease Stages 1–3: Screening, Monitoring, and Treatment. Comparative Effectiveness Review 37. AHRQ Publication 11(12)-EHC075-EF. Rockville, MD: Agency for Healthcare Research and Quality; 2012.
2. Fink HA, Ishani A, Taylor BC, Greer NL, MacDonald R, Rossini D, et al. Screening for, monitoring, and treatment of chronic kidney disease stages 1 to 3: a systematic review for the U.S. Preventive Services Task Force and for an American College of Physicians Clinical Practice Guideline. *Ann Intern Med*. 2012; 156:570–81. [PMID: 22508734]
3. Hsu CY, Lin F, Vittinghoff E, Shlipak MG. Racial differences in the progression from chronic renal insufficiency to end-stage renal disease in the United States. *J Am Soc Nephrol*. 2003;14:2902–7. [PMID: 14569100]
4. Xue JL, Eggers PW, Agodoa LY, Foley RN, Collins AJ. Longitudinal study of racial and ethnic differences in developing end-stage renal disease among aged medicare beneficiaries. *J Am Soc Nephrol*. 2007;18:1299–306. [PMID: 17329578]
5. Miller WG, Bruns DE, Hortin GL, Sandberg S, Aakre KM, McQueen MJ, et al; National Kidney Disease Education Program-IFCC Working Group on Standardization of Albumin in Urine. Current issues in measurement and reporting of urinary albumin excretion. *Clin Chem*. 2009;55:24–38. [PMID: 19028824]
6. Coresh J, Astor BC, Greene T, Eknoyan G, Levey AS. Prevalence of chronic kidney disease and decreased kidney function in the adult US population: Third National Health and Nutrition Examination Survey. *Am J Kidney Dis*. 2003;41: 1–12. [PMID: 12500213]
7. Perkins BA, Ficociello LH, Silva KH, Finkelstein DM, Warram JH, Krolewski AS. Regression of microalbuminuria in type 1 diabetes. *N Engl J Med*. 2003;348:2285–93. [PMID: 12788992]
8. National Kidney Foundation. KDOQI Clinical Practice Guidelines for Chronic Kidney Disease: Evaluation, Classification, and Stratification. 2002. Accessed at [www.kidney.org/professionals/KDOQI/guidelines\\_ckd/p9\\_approach.htm](http://www.kidney.org/professionals/KDOQI/guidelines_ckd/p9_approach.htm) on 27 June 2012.
9. American Diabetes Association. Executive summary: standards of medical care in diabetes—2012. *Diabetes Care*. 2012;35 Suppl 1:S4–S10. [PMID: 22187471]
10. Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL Jr, et al; Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. Seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. Hypertension. 2003;42:1206–52. [PMID: 14656957]



## APPENDIX: U.S. PREVENTIVE SERVICES TASK FORCE

Members of the U.S. Preventive Services Task Force† at the time this recommendation was finalized are Virginia A. Moyer, MD, MPH, *Chair* (Baylor College of Medicine, Houston, Texas); Michael L. LeFevre, MD, MSPH, *Co-Vice Chair* (University of Missouri School of Medicine, Columbia, Missouri); Albert L. Siu, MD, MSPH, *Co-Vice Chair* (Mount Sinai School of Medicine, New York, and James J. Peters Veterans Affairs Medical Center, Bronx, New York); Linda Ciofu Baumann, PhD, RN (University of Wisconsin, Madison, Wisconsin); Kirsten Bibbins-Domingo, PhD, MD (University of California, San Francisco, San Francisco, California); Susan J. Curry, PhD (University of Iowa College of Public Health, Iowa City, Iowa); Mark Ebell, MD, MS (University of Georgia, Athens, Georgia); Glenn Flores, MD (University of Texas Southwestern, Dallas, Texas); Adelita Gonzales Cantu, RN, PhD (University of Texas Health

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† For a list of current USPSTF members, go to [www.uspreventiveservicestaskforce.org/members.htm](http://www.uspreventiveservicestaskforce.org/members.htm).

Appendix Table 1. What the USPSTF Grades Mean and Suggestions for Practice

Grade	Definition	Suggestions for Practice
A	The USPSTF recommends the service. There is high certainty that the net benefit is substantial.	Offer/provide this service.
B	The USPSTF recommends the service. There is high certainty that the net benefit is moderate or there is moderate certainty that the net benefit is moderate to substantial.	Offer/provide this service.
C	<i>Note: The following statement is undergoing revision.</i> Clinicians may provide this service to selected patients depending on individual circumstances. However, for most individuals without signs or symptoms, there is likely to be only a small benefit from this service.	Offer/provide this service only if other considerations support offering or providing the service in an individual patient.
D	The USPSTF recommends against the service. There is moderate or high certainty that the service has no net benefit or that the harms outweigh the benefits.	Discourage the use of this service.
I statement	The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of the service. Evidence is lacking, of poor quality, or conflicting, and the balance of benefits and harms cannot be determined.	Read the Clinical Considerations section of the USPSTF Recommendation Statement. If the service is offered, patients should understand the uncertainty about the balance of benefits and harms.

**Appendix Table 2. USPSTF Levels of Certainty Regarding Net Benefit**

Level of Certainty*	Description
High	The available evidence usually includes consistent results from well-designed, well-conducted studies in representative primary care populations. These studies assess the effects of the preventive service on health outcomes. This conclusion is therefore unlikely to be strongly affected by the results of future studies.
Moderate	The available evidence is sufficient to determine the effects of the preventive service on health outcomes, but confidence in the estimate is constrained by such factors as: the number, size, or quality of individual studies; inconsistency of findings across individual studies; limited generalizability of findings to routine primary care practice; and lack of coherence in the chain of evidence. As more information becomes available, the magnitude or direction of the observed effect could change, and this change may be large enough to alter the conclusion.
Low	The available evidence is insufficient to assess effects on health outcomes. Evidence is insufficient because of: the limited number or size of studies; important flaws in study design or methods; inconsistency of findings across individual studies; gaps in the chain of evidence; findings that are not generalizable to routine primary care practice; and a lack of information on important health outcomes. More information may allow an estimation of effects on health outcomes.

\* The USPSTF defines *certainty* as “likelihood that the USPSTF assessment of the net benefit of a preventive service is correct.” The net benefit is defined as benefit minus harm of the preventive service as implemented in a general primary care population. The USPSTF assigns a certainty level on the basis of the nature of the overall evidence available to assess the net benefit of a preventive service.