



CKD EARLY IDENTIFICATION & INTERVENTION TOOLKIT

ISN-KDIGO EARLY SCREENING BOOKLET



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This booklet is intended to be a general reference guide for screening of individuals for early chronic kidney disease (CKD). It is based on previously published work by KDIGO in peer-reviewed journals. It provides basic information about screening, the rationale and benefits to screening, and the development of a process to screen. This booklet covers who should be screened and who should not, and details recommended tests and examples of treatments that have proven effective. It is global in scope, and there are some parts of the world where circumstances will require tailoring of this process. However, the central point remains the same: identifying and treating CKD is good for the community, good for the patients, and good for the physicians who care for them.

This booklet is based on KDIGO guidelines and controversies conference reports. The most relevant work in this area is the KDIGO Controversies Conference on Early Identification and Intervention in CKD held in October 2019 in Mexico, and the subsequent conference report published in *Kidney International* in 2021.¹ It also addresses issues raised in the earlier KDIGO Controversies Conference on Understanding Kidney Care Needs and Implementation Strategies in Low- and Middle-Income Countries (LMICs), held in June 2015 in Thailand.²

The basic conclusions of these controversies conferences were:

Early identification of CKD by targeted screening for kidney disease based on known risk factors, followed by risk stratification and treatment, offers the potential to substantially reduce morbidity and mortality from CKD and its related complications, such as cardiovascular disease.

Guideline-based screening for kidney disease should take into account local policies, resource limitations, payment systems, and care delivery models.

¹Shlipak, M.G. et al. *Kidney International* (2021) 99, 34–47

²Jha, V. et al. *Kidney International* (2016) 90, 1164–1174

WHY SCREEN?

Early kidney disease is usually asymptomatic, and clinicians do not always check for it. However, CKD is present in a substantial portion of the population. Decreased kidney function is closely connected with cardiovascular disease, diabetes, high blood pressure, and other adverse health conditions.

Targeted early identification offers the potential to substantially reduce the morbidity and mortality from CKD and its related complications, including increased incidence of cardiovascular disease, hyperlipidemia, anemia, and bone and mineral disease. The results of screening can inform treatment modifications, such as appropriate drug dosing and improved lifestyle changes. The benefits of screening extend beyond treatments that can slow or even halt the progression of CKD. Reducing cardiovascular risk is equally important, since cardiovascular diseases are a leading cause of death of men and women in most countries.

Early detection and management reduce the burden of CKD by improving the quality of care and quality of life for all patients. This is particularly relevant in socially disadvantaged and vulnerable populations who carry a disproportionate burden of CKD and are less likely to be diagnosed early.

Given the high healthcare costs of kidney failure, especially in LMICs, early screening offers economic benefits. The simple tests that KDIGO recommends are not expensive or invasive, and they can be administered in a variety of settings.

TARGETED SCREENING

Initial efforts for early CKD screening should target high-risk patients, such as those with:

- High blood pressure
- Diabetes
- Cardiovascular disease
- Family history of kidney disease
- History of acute kidney injury

In addition, CKD screening should be implemented in other high-risk groups, such as those with:

- Other medical conditions that impact kidney function (e.g., systemic lupus erythematosus (SLE), HIV, obesity, genetic risk factors)
- High-risk occupations and environmental exposure to nephrotoxins

Geographically targeted screening of unique at-risk populations should also be considered, especially in the setting of low socioeconomic status or poor access to healthcare.

CKD causes a global burden



CKD disproportionately affects socially disadvantaged populations

Determine At-Risk Individuals and Populations



Screen for CKD in individuals with hypertension, diabetes, and/or cardiovascular disease

Consider other factors including

Demographics, older age, race/ethnicity
Other systemic diseases that impact kidneys
Genetic risk factors
Environmental exposures

Screening and Diagnosis of CKD



Measure kidney function

Serum creatinine
Serum cystatin c if available for more accurate staging

Measure kidney injury

Urine albumin-to-creatinine ratio (UACR)
Urine dipstick if UACR not available

KDIGO HEAT MAP

The KDIGO Heat Map is a useful tool in assessing the risk of kidney disease in individuals. It uses basic results such as the estimated glomerular filtration rate (eGFR) and albuminuria (measured by albumin-to-creatinine ratio [ACR]) obtained from screening to evaluate the risk of kidney disease progression and kidney failure.

Prognosis of CKD by GFR and albuminuria categories: KDIGO 2012 Guide to frequency of assessment for CKD progression and timely referral to nephrology service				Persistent albuminuria categories		
				Description and range		
				A1	A2	A3
				Normal to mildly increased <30 mg/g <3 mg/mmol	Moderately increased 30-300 mg/g 3-30 mg/mmol	Severely increased >300 mg/g >30 mg/mmol
GFR categories (ml/min per 1.73 m ²) Description and range	G1	Normal or high	≥90	(1 if CKD)	Monitor (1)	Refer* (2)
	G2	Mildly decreased	60-89	(1 if CKD)	Monitor (1)	Refer* (2)
	G3a	Mildly to moderately decreased	45-59	Monitor (1)	Monitor (2)	Refer (3)
	G3b	Moderately to severely decreased	30-44	Monitor (2)	Monitor (3)	Refer (3)
	G4	Severely decreased	15-29	Refer* (3)	Refer* (3)	Refer (4+)
	G5	Kidney failure	<15	Refer (4+)	Refer (4+)	Refer (4+)

Clinicians should initiate appropriate management for patients at risk for CKD progression (e.g., blood pressure, diabetes, dyslipidemia, proteinuria, etc).

The numbers 1, 2, 3, and 4+ within parentheses suggest the measurement frequency for eGFR and albuminuria (number of times per year).

*Consultation with nephrology service should take place as needed depending on local arrangements regarding frequency of monitoring and timing of referral.

	Low Risk (if no other markers of kidney disease, no CKD)
	Moderately increased risk
	High risk
	Very high risk

THE SCREENING PROCESS

Screening should focus on patients with CKD risk factors: high blood pressure, diabetes, cardiovascular disease, and a family history of CKD. Generally, people without these factors do not need CKD screening. A first step in the screening program will likely be a simple blood pressure measurement, along with height and weight measurements.

Basic CKD screening tests assess the level of kidney function and any kidney injury. These tests follow a strict protocol. A blood sample must be drawn to measure serum creatinine and/or serum cystatin C. These values can be used to calculate an estimated glomerular filtration rate (eGFR), which is one of the basic components of assessing kidney function.

Any successful screening program requires a urine sample. The other basic component to assess kidney injury is urine albuminuria or proteinuria. The most helpful test is a urine albumin-to-creatinine ratio (ACR).

Together, blood pressure, eGFR, and urine ACR allow risk stratification, and monitor progress, and they are critical in guiding ongoing treatment for people who already have risk factors. It is important to consider the logistics of obtaining samples for these tests when choosing a site to provide CKD screening (see Opportunities for Screening, page 8).

Older individuals generally have a lower GFR. This factor does not exclude them from testing, since the risks of CKD and cardiovascular disease increase with age, and these test results should be known by clinicians. If there is any uncertainty whether the older patient has CKD or not, confirmatory tests with cystatin C measurements can be performed.

OPPORTUNITIES FOR SCREENING

A CKD screening program can be held in a variety of settings: at an individual practice, a hospital, or regional or national healthcare facilities. Screening can be introduced at any time when a high-risk individual has contact with the healthcare system. Depending on local regulations for collecting blood samples, the screening does not have to be conducted in a medical facility. It just needs to be appropriate to the task: clean, quiet, and large enough to handle the number of people being screened. Groups who organize screening programs can be medical, charitable, or governmental. These few simple principles should guide screening programs regardless of the setting or organizers.

Many screening programs include a brief consultation with a physician. In healthcare systems where this is not possible, especially in LMICs, other healthcare professionals, such as nurses, can discuss the screening results with the patient.

All screening participants should be encouraged to take the results with them and follow up directly with their own doctor. However, an opportunity to discuss the test results onsite, when available, is very helpful.

Screening is for high-risk individuals and not for the general public

At times, test results can indicate a serious problem, even though the patient may not have any symptoms, and immediate attention needs to be paid to them. In rare instances, referrals to an emergency room are required.

At other times, the tests may show totally normal results. This is also helpful information, because it assures the patient that while they may be at risk, at least the CKD test results are not worrying. High-risk individuals who have a negative result in the first round of screening should be rescreened for confirmation.

Physicians can easily test their existing patients during regular, routine visits. The CKD tests can be added to any lab panel requested by the physician, especially for patients with hypertension and diabetes.

The CKD test results should be incorporated into the patient’s health records. To track kidney health status, it is important to measure changes in values over time rather than focusing on isolated measurements.

Opportunistic screening of family members can be held in a dialysis unit, if the facility lends itself to the purpose. In these instances, it is an opportunity to test first-degree relatives of dialysis patients, since family history of kidney disease is a well-known risk factor for poor kidney health in the future. Family members of dialysis patients often provide transportation and other assistance, so testing them while their relative is on dialysis sends a clear message that if CKD is found, something needs to be done early to stop its progression.

 No CKD Continue to monitor routinely as an at-risk patient	 CKD Complete full clinical assessment and adjust treatments as directed by local guidelines	 High Risk CKD Perform clinical assessment at greater frequency to ascertain CKD progression and complications, including CVD risk	 Very High Risk CKD Refer to a nephrologist and report adverse events as appropriate, and as indicated by local guidelines
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TREATMENT FOR EARLY CKD

Treatment for CKD must be determined by the physician, using their own judgment, as well as recommendations from KDIGO guidelines, national and regional guidelines, current medical literature, and everyday experience. Patient characteristics, including personal values and preferences, attitudes toward adherence, often determine specific treatment decisions.

There are some basic management strategies that are usually considered, including:

LIFESTYLE CHANGES:

- Smoking cessation
- Maintaining a well-balanced diet (fruit, vegetables, legumes, and whole grains) and limiting dietary salt intake
- Maintaining a healthy weight
- Regular exercise
- Advise patients to consult with their physician or pharmacist before taking over-the-counter drugs, herbal medications, and naturopathic supplements to avoid agents that may worsen kidney function, hypertension and/or diabetes (eg, nonsteroidal antiinflammatory drugs (NSAIDs), proton pump inhibitors, decongestants).

MEDICAL INTERVENTIONS:

- Blood pressure and diabetes control
- Angiotensin-converting enzyme inhibitor (ACEi) and angiotensin receptor blocker (ARB) therapy to lower blood pressure and/or protect the kidneys
- SGLT2 inhibition to manage diabetes, and protect the kidneys and heart
- Statins for lipid control

In many instances, great improvement in outcomes can be achieved with inexpensive and easy tests, coupled with proven treatments. Recognizing the importance of decreasing kidney function with cardiovascular risk factors is an important connection that should be recognized by every clinician and patient. Physicians should also conduct regular follow-up and emphasize adherence to treatment.

Although ACEi and ARB therapies are recognized treatments in patients with kidney disease, they can result in a decrease in eGFR and an increase in serum creatinine. As a result, some clinicians withdraw ACEi or ARB therapy due to this concern. A condition commonly referred to as hyperkalemia can also ensue but this serious condition can be treated, allowing ACEi or ARB therapy to be continued. Accordingly, the risk for hyperkalemia can be mitigated while high blood pressure is being managed and the kidneys are being protected. However, ACEi or ARB doses may be reduced or discontinued altogether in the setting of either symptomatic hypotension or uncontrolled hyperkalemia despite medical treatment.

Individualized Re-screening

Based on individualized risk of progression

Risk reduction for CKD & CVD progression and complications



✓ Lifestyle modification (e.g., physical activity; lower sodium intake)



✓ Smoking cessation

✓ Optimize blood pressure control



✓ Optimize glycemic control

✓ SGLT2 inhibitors in diabetic

kidney disease



✓ RAAS inhibition



✓ Statins

✓ Treat metabolic acidosis



✓ Treat underlying cause of CKD

✓ Avoid nephrotoxins (e.g., NSAIDs)



✓ Adjust dosing of medications based on eGFR

REFERRAL TO A NEPHROLOGIST

Most of the individuals who are targets for this type of screening will not be under the care of a nephrologist. They may be seen by a primary care physician or a specialist who manages their diabetes or high blood pressure. Knowing the status of their kidney function will aid their physician as decisions are made about care. It is always helpful to keep kidney function in mind when evaluating other conditions.

Some patients may benefit from a referral to a nephrologist. Exactly at what point in the course of their treatment this becomes optimal or necessary varies greatly. It is clear that, when kidney function decreases to a substantial extent, nephrology consultation is advisable. However, nephrology referral may begin as early as CKD stage 3A (see the KDIGO Heat Map on page 6), depending on the patient's circumstances. According to the KDIGO Guideline for the Evaluation and Management of CKD, if patients are experiencing the following signs, there is a clear need to involve a nephrologist in the patient's care:

- Sudden decline in eGFR
- Significant amounts of protein in the urine
- Blood in the urine
- Hyperkalemia or resistant hypertension
- Recurring kidney stones
- Hereditary kidney diseases

Balance is obviously important to avoid over-referral or premature referral. While KDIGO has no guideline statement on the precise point of referral, careful monitoring should be part of a general patient care plan whenever CKD is found in high-risk individuals.

RESOURCES FOR ADDITIONAL INFORMATION

- *KDIGO Controversies Conference Report on Early Detection and Intervention of CKD (2021)*
- *KDIGO Controversies Conference Report on Dyskalemia in Kidney Diseases (2020)*
- *KDIGO Controversies Conference Report on Understanding Kidney Care Needs and Implementation Strategies in LMICs (2016)*
- *KDIGO Guideline for the Evaluation and Management of CKD (2012)*
- *KDIGO Guideline for Diabetes Management in CKD (2020)*
- *KDIGO Guideline for Lipid Management in CKD (2013)*

SCREENING ALGORITHM FOR KIDNEY DISEASE

