

# New tool predicts five-year risk of chronic kidney disease

November 8 2019

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A new risk calculator tool that uses a mix of variables including age, hypertension, and diabetes status can be used to predict accurately whether someone is likely to develop chronic kidney disease within five years. The risk calculator tool was developed by the Chronic Kidney Disease Prognosis Consortium, a large global collaboration led by

researchers at the Johns Hopkins Bloomberg School of Public Health.

The risk calculator, described in a paper to be published November 8 in the *Journal of the American Medical Association (JAMA)*, is based on an analysis of clinical data from more than five million people around the world. The researchers found risk equations that identify with high-accuracy individuals who are at risk for developing [chronic kidney disease](#) within five years. This was also true for new clinical populations used to validate the results.

Chronic kidney [disease](#) is defined as having blood-filtering capacity by the kidneys below half of normal, and is diagnosed and monitored by measuring protein levels in the urine. The calculator enables health care providers to determine which patients are most at risk, and thus would benefit the most from preventive interventions.

"With the risk equations that we've developed, physicians should be able to determine with high accuracy who will or won't develop chronic kidney disease in the next few years—and our analyses suggest that they can maintain that accuracy in a variety of clinical settings globally," says Josef Coresh, MD, Chronic Kidney Disease Prognosis Consortium co-principal investigator and the George W. Comstock Professor in the Bloomberg School's Department of Epidemiology. The other co-principal investigator for the Consortium is Morgan Grams, MD, an associate professor in Nephrology at the Johns Hopkins School of Medicine.

Chronic kidney disease is one of the most common chronic diseases, affecting about 10 percent of the adult population globally. It is also a largely silent disease, detectable with lab tests of kidney function but otherwise, in its early stages, displaying no symptoms or only non-specific symptoms such as nausea and loss of appetite. Chronic kidney disease progresses if untreated, and causes a host of problems including

the buildup of harmful chemicals in the blood and elevated risk of heart disease and other conditions. In the advanced stage, known as end-stage kidney disease, artificial blood-filtering (dialysis) or a kidney transplant are the only lifesaving treatment options.

However, if caught early, kidney disease progression can be slowed or stopped with treatments that address kidney-harming disorders such as hypertension and diabetes, and by limiting the use of kidney-stressing substances such as certain antibiotics, NSAID painkillers, and imaging contrast agents.

Coresh and colleagues set up the Chronic Kidney Disease Prognosis Consortium ten years ago to enable data sharing and prevention research by scientists around the world. In the new study, they analyzed 34 of the cohorts gathered by the Consortium, including 5,222,711 people from 28 countries, with records going back to 1970.

Their aim was to develop an equation using known chronic kidney disease risk factors that physicians could use to predict which patients are likely to develop chronic kidney disease within five years. Chronic kidney disease with reduced kidney function was defined using accepted guidelines as kidney function that is half or less of a healthy young adult (estimated [glomerular filtration rate](#) (eGFR))

Ultimately, the researchers generated two equations, one for individuals without diabetes and one for individuals with diabetes. Individuals with diabetes typically have data in their medical records, such as results from blood tests and urinalyses, that individuals without diabetes don't have but are useful in estimating chronic kidney disease risk. However, the equations the researchers developed show that for both groups, the same small group of factors appear to determine much of the five-year risk for chronic kidney disease. These factors include older age, hypertension, protein in urine (albuminuria), a moderately diminished kidney function,

a history of heart disease, and being African American or female.

The researchers' analysis of the risk scores generated by the equations found that they were accurate enough to be useful clinically. A statistical measure of the risk scores' ability to discriminate between individuals with diabetes who do and do not develop chronic [kidney](#) disease in five years indicated accuracy in the "very good" range, Coresh says, while for individuals without diabetes the risk score calculator was in the "excellent" range.

These accuracy figures remained high when the [risk calculator](#) was applied to a completely new set of cohorts including 2,253,540 people. That suggests that it should be useful to physicians around the world.

"We'll be making our risk calculators available at our website, <http://www.ckdpcrisk.org>," Coresh says. In this way, patient advocacy organizations—such as the National Kidney Foundation, which helped sponsor the research—can also help disseminate these new risk-prediction tools.

**More information:** *Journal of the American Medical Association* (2019). [DOI: 10.1001/jama.2019.17379](https://doi.org/10.1001/jama.2019.17379)

Provided by Johns Hopkins University Bloomberg School of Public Health

Citation: New tool predicts five-year risk of chronic kidney disease (2019, November 8) retrieved 19 April 2024 from <https://medicalxpress.com/news/2019-11-tool-five-year-chronic-kidney-disease.html>

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