Routine lab test data predicts progression to kidney failure for chronic kidney disease patients

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A prediction model that included data on measures of several routinely obtained laboratory tests including blood levels of calcium, phosphate and albumin accurately predicted the short-term risk of kidney failure for patients with moderate to severe chronic kidney disease, according to a study that will appear in the April 20 issue of *JAMA*. The study is being published early online to coincide with its presentation at the World Congress of Nephrology.

"An estimated 23 million people in the United States (11.5 percent of the adult population) have chronic kidney disease (CKD) and are at increased risk for cardiovascular events and progression to kidney failure," according to background information in the article. "Accurate prediction of risk could facilitate individualized decision making, enabling early and appropriate patient care. Currently, there are no widely accepted predictive instruments for CKD progression; therefore, physicians must make ad hoc decisions about which patients to treat, risking delays in treatment in those who ultimately progress to kidney failure, or unnecessary treatment in those who do not progress."

Navdeep Tangri, M.D., F.R.C.P.C., of Tufts Medical Center, Boston, and colleagues conducted a study to develop and externally validate an accurate but simple prediction model for progression of CKD, with a goal being to use variables routinely measured in patients with CKD to create a model that could be easily implemented in clinical practice. The

researchers used demographic, clinical, and laboratory data from 2 independent Canadian groups of patients with CKD stages 3 to 5 (moderate to severe) who were referred to nephrologists between April 2001 and December 2008. The primary outcome measured was kidney failure, defined as need for dialysis or pre-emptive kidney transplantation.

The development and validation groups included 3,449 patients (386 with kidney failure [11 percent]) and 4,942 patients (1,177 with kidney failure [24 percent]), respectively. The researchers found that the most accurate model included age, sex, estimated glomerular filtration rate (GFR), albuminuria, serum calcium, serum phosphate, serum bicarbonate, and serum albumin. In the validation cohort, this model was more accurate than a simpler model that included age, sex, estimated GFR, and albuminuria.

"Our risk prediction models have important implications for clinical practice, research, and public health policy. For example, in CKD stage 3, the relative contribution of the nephrologist vs. the primary care physician to CKD care is uncertain. Using our models, lower-risk patients could be managed by the primary care physician without additional testing or treatment of CKD complications; whereas, higher-risk patients could receive more intensive testing, intervention, and early nephrology care. Similarly, in CKD stage 4, the timing of appropriate predialysis interventions remains uncertain. Using our models, different risk thresholds could be used to triage patients for decisions regarding dialysis modality education, vascular access creation, and pre-emptive transplantation. Furthermore, our models could be used to select higher-risk patients for enrollment in clinical trials and for evaluation of risk-treatment interactions. In addition, our models may also be useful for identifying high-risk patients with CKD stage 3 for public health interventions, thereby improving the cost-effectiveness of CKD care," the authors write.

"In conclusion, we have developed and validated highly accurate predictive models for progression of CKD to kidney failure. Our best model uses routinely available laboratory data and can predict the short-term risk of kidney failure with accuracy and could be easily implemented in a laboratory information system or an electronic health record. External validation in multiple diverse CKD cohorts and evaluation in clinical trials are needed."

More information: *JAMA*. 2011;305[15]:doi.10.1001/jama.2011.451