Acute kidney injury in hospitalized diabetic patients linked to chronic kidney disease

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Findings from a recent University of Cincinnati (UC) and Cincinnati Department of Veterans Affairs (VA) Medical Center study show that multiple episodes of acute kidney injury during hospital stays for patients with diabetes are associated with a risk for developing chronic kidney disease.

The study is published in the November issue of the *Clinical Journal of the American Society of Nephrology*.

Acute kidney injury is a rapid loss of kidney function, which is common in hospitalized patients. It has many causes that include low blood volume, exposure to substances or interventions harmful to the kidney and obstruction of the urinary tract. Patients suffering from acute kidney injury are at an increased risk of dying during the hospitalization, and the survivors may face long-lasting detrimental effects on their health.

"According to the National Diabetes Fact Sheet from the Centers for Disease Control, 23.1 percent of all adults in the United States who are 60 years or older have diabetes mellitus, often referred to as diabetes, a metabolic disease in which a person has high blood sugar," says Charuhas Thakar, MD, associate professor of medicine at UC and chief of nephrology at the Cincinnati VA. "Diabetes mellitus is the single largest contributor to the growing prevalence of chronic kidney disease. It leads to end-stage kidney disease, increases the risk for hospitalization and is one of the major risk factors for developing acute kidney injury.

"Diabetic patients can experience multiple hospitalizations due to variety of medical problems in the long-term. Given this background, we wanted to study the effect of multiple episodes of acute kidney injury on the risk of progressive kidney disease in a diabetic patient. We also wanted to establish that the link is independent of other known risk factors of diabetic kidney failure such as high blood pressure or presence of protein in the urine."

Researchers conducted follow-up care for 4,082 patients with diabetes mellitus from a VA health care system over 10 years (1999-2008).

Using a Cox Survival Model—a statistical technique for exploring the relationship between the study outcome and several explanatory variables, in this case acute kidney injury—researchers looked at the effect of the first injury episode and up to three additional episodes as time-dependent risk factors of Stage IV chronic kidney disease (pre-dialysis stage). Other variables included demographics, baseline level of renal function and other major risk factors that could lead to kidney failure in diabetes such as presence of hypertension and proteinuria, or excess protein in the urine.

"Of the 3,679 patients who were eligible to participate, over half of the diabetics required at least one hospitalization during the follow-up period," Thakar says. "Once hospitalized, 30 percent of them experienced at least one episode of acute kidney injury during hospitalization. Of those patients who developed injury and survived, 30 percent developed two or more episodes."

He adds that in other hazards models, any acute kidney injury versus no injury increased the risk of advanced chronic kidney disease by threefold, and each acute injury doubled that risk.

"These findings clearly show that in diabetic patients, who may face the

prospect of kidney failure or dialysis, episodes of acute kidney injury facilitate that risk," Thakar says. "We need effective strategies to prevent or treat acute kidney injury in hospitalized patients as one of the ways to curb the growing burden of end stage kidney disease in diabetics.

"It can be speculated that reducing the risk of kidney injury in hospitalized patients—for example, by strategies such as optimal and early resuscitation or reducing exposures that may be kidney-toxic—may have significant long-term benefits. Additionally, the findings emphasize the potential to improve follow-up medical care in diabetic patients discharged after suffering from acute kidney injury."

Provided by University of Cincinnati Academic Health Center