Kidney injury linked to greater risk of death among pneumonia patients

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Patients hospitalized with even mild to moderate community-acquired pneumonia who develop acute kidney injury (AKI) are more likely to die after discharge than pneumonia patients whose kidneys remain healthy, according to a University of Pittsburgh School of Medicine study in the February issue of *Kidney International*. The study also found a strong relationship between AKI and levels of inflammatory biomarkers.

Doctors have long known that sepsis, a systemic response to severe infection, can trigger abnormalities in kidney function that contribute to higher mortality rates, but the impact of AKI in people with milder infections has not been well characterized, said lead author Raghavan Murugan, M.D., assistant professor in the Department of Critical Care Medicine at the University of Pittsburgh School of Medicine.

"Our study found that kidney injury was quite common among pneumonia patients whose illness course was otherwise uncomplicated," he said. "They also had a higher risk of dying that persisted even 50 to 100 days after admission, which is surprising because most appeared stable and ready for discharge after eight days in the hospital."

The data were gathered from more than 1,800 participants with community-acquired pneumonia in the multicenter Genetic and Inflammatory Markers of Sepsis (GenIMS) study. A third of all patients were diagnosed with AKI, identified by abnormal creatinine levels or urine output, either on the first day of admission or sometime during

their hospital stays, as were a quarter of those with mild or moderate pneumonia. Also, a third of all the pneumonia patients progressed to severe sepsis, and of that group more than half developed AKI. Compared to those without kidney injury, AKI patients had longer hospital stays and a higher risk of dying at hospital discharge (11 vs. 1.3 percent), 90 days later (24 vs. 9.8 percent), and one year (36.3 vs. 20.1 percent) later.

"The risk of kidney injury was lower in people with less severe infection," said senior author John Kellum, M.D., professor of critical care medicine at Pitt. "But they still had longer hospital stays and a greater likelihood of dying during admission and even after discharge."

Another key study finding is that pneumonia patients who also developed AKI had higher concentrations of biomarkers of inflammatory and blood coagulation pathways than those who did not have a kidney injury.

"This suggests that the immune response in pneumonia is different in patients with AKI," Dr. Murugan said. "It may be a bidirectional relationship. A stronger immune response might have caused AKI or the response was a consequence of AKI, or it worked both ways."

"We should try to develop prevention and treatment strategies aimed at mitigating the impact of AKI in all pneumonia patients," he said. "Further research is needed to understand the mechanisms involved, particularly because patients continue to be at risk long after AKI and pneumonia have resolved."

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