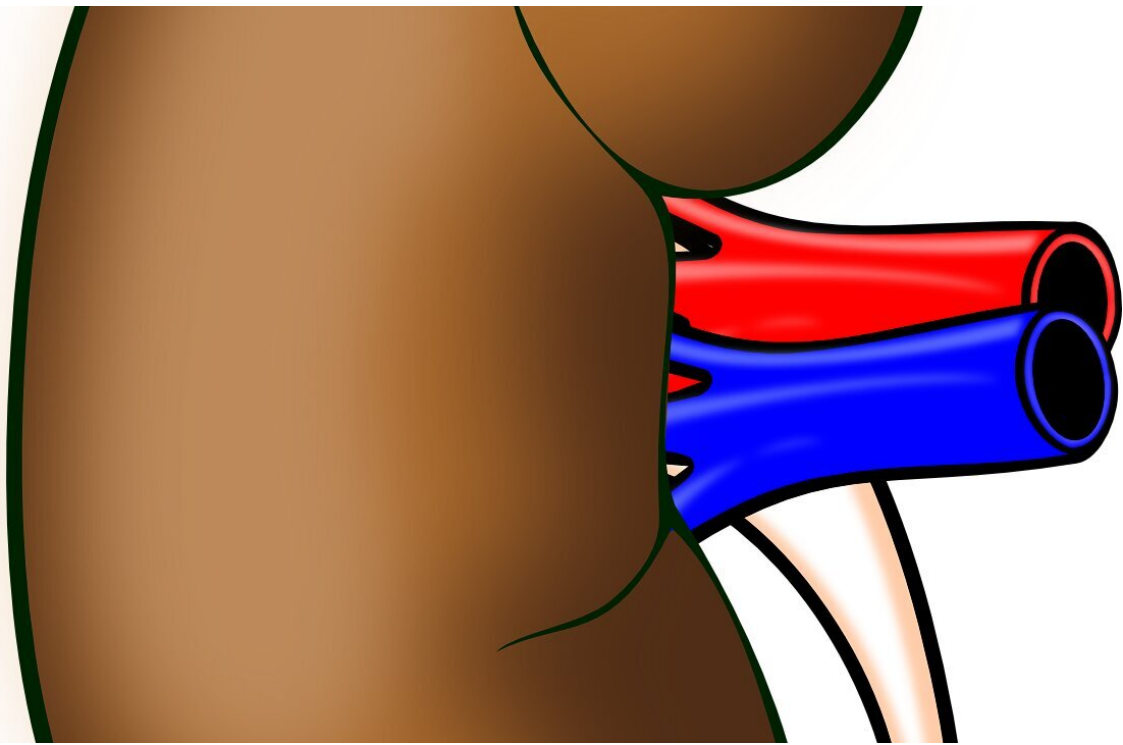


Study reveals kidney disease or injury is associated with much higher risk of mortality for COVID-19 patients in ICU

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New research published in *Anaesthesia* (a journal of the Association of Anaesthetists) reveals the much higher risk of mortality faced by COVID-19 patients in intensive care who have chronic kidney disease

(CKD) or, those who develop new (acute) kidney injury (AKI) as a result of developing COVID-19.

CKD is a type of kidney disease in which kidney function declines over a period of months to years, and is more common in older people. There are five stages of the disease, ranging from early stages (1 and 2) in which people initially have no symptoms, through to the more serious stages 3 to 5, which can be associated with complications such as [high blood pressure](#), type 2 diabetes and heart disease. CKD stage 5 is termed end stage kidney failure which must be treated with either dialysis (at home or in hospital), involving complex filtering machinery that takes over the blood-cleaning functions of the kidneys, or with a [kidney transplant](#).

AKI is an abrupt loss of kidney function that takes place over seven days or less, and can have several causes, including the damage and inflammation caused by the COVID-19 virus itself, loss of blood flow to the kidneys, damage from pharmaceutical drugs or other ingested/injected substances, or by anything obstructing the flow of urine in the urinary tract.

This new study, led by Dr. Sanooj Soni from Imperial College London, UK, and colleagues, examined the association between AKI and CKD with clinical outcomes in 372 patients with COVID-19 admitted to four regional intensive care units (ICUs) in the UK between 10 March 23 July 2020 (Hammersmith Hospital, London; St Mary's Hospital, London; Charing Cross Hospital, London; and Queen Elizabeth Hospital, Birmingham). The average age of the patients was around 60 years, and 72% of them were male. Also of note was the fact that the majority of patients were of Black, Asian or Ethnic Minority (BAME) background (281 patients, 76%).

A total of 216 (58%) patients had some form of kidney impairment

(45% developed AKI during their ICU stay, while 13% had pre-existing CKD), while 42% had no CKD or AKI. The patients who developed AKI had no history of serious kidney disease before their ICU admission (known from blood tests either at admission to hospital or from their medical records), suggesting that the AKI was directly related to their COVID-19 infection.

The authors found that patients with no kidney injury or disease had a [mortality](#) of 21% (32/156 patients). Those with new onset AKI caused by the COVID-19 virus had a mortality of 48% (81/168), whilst for those with pre-existing CKD (Stages 1-4) mortality was 50% (11 /22). In those patients with end-stage kidney failure (i.e. CKD stage 5), where they already required regular out-patient dialysis, mortality was 47% (9 of 19 patients). Mortality was greatest in those patients with kidney transplants, with 6 out of 7 patients (86%) dying, highlighting that these patients are an extremely vulnerable group.

The investigators also examined the rates of renal replacement therapy, a form of hospital dialysis, due to COVID-19 in these ICU patients with kidney injury. Out of 216 patients with any form of kidney impairment, 121 (56%) patients required renal replacement therapy (see Table 2 full paper). Of the 48 survivors who needed dialysis for the first time during their ICU stay, 9 patients (19%) had to continue with dialysis after discharge from ICU, suggesting COVID-19 may lead to chronic kidney problems.

"To the best of our knowledge, this is the first comprehensive analysis of outcomes in critically unwell COVID-19 patients in the UK with kidney failure, particularly in patients with pre-existing chronic kidney disease," say the authors.

The authors note their surprise that mortality in patients with end-stage kidney failure and on dialysis, who normally have worse outcomes in

many other diseases, was similar to that in patients with less severe kidney disease and COVID-19 associated AKI. This finding may suggest that such patients benefit equally from ICU admission and thus the threshold for admission should be calibrated accordingly in any future COVID-19 surge. Put another way, these results suggest that patients on dialysis with COVID-19 appear as likely to survive as patients with less serious CKD or AKI and can be considered for admission to an ICU bed.

However, the authors recommend caution interpreting these results due to selection bias—meaning that in this study only patients who were cared for in ICU during the peak of the last surge were included and other patients with end stage kidney failure, who may have been too unwell for admission to ICU, were not. This may have contributed to these findings of similar mortality in patients with end-stage kidney failure compared to those with less serious forms of CKD and AKI.

The reasons for the increased mortality in patients with kidney problems are not clearly understood. There are several theories, including that the COVID-19 virus causes endotheliitis, an inflammation of the blood vessels in the kidneys, which is similar to the problem COVID-19 is known to cause in the lungs. Other reports have suggested that there could be direct [kidney injury](#) from the cytokine-induced immune system inflammatory response (where the body is overwhelmed by its own immune response, the so-called cytokine storm), and also death of kidney tissue related to multi-organ failure caused by COVID-19.

The authors conclude: "Our data demonstrate that kidney disease and failure in critically ill patients with COVID-19 are common, and associated with high mortality. However, important differences exist between stages of acute and [chronic kidney disease](#) in how they affect mortality in patients with COVID-19 and patients who have had a kidney transplant are an extremely vulnerable group. In view of this, attention

needs to be paid to COVID-19 patients with any form of [kidney](#) disease or injury, and every effort made to prevent progression of this disease or injury to reduce mortality in this cohort of patients."

More information: M. Gasparini et al. Renal impairment and its impact on clinical outcomes in patients who are critically ill with COVID-19: a multicentre observational study, *Anaesthesia* (2020). [DOI: 10.1111/anae.15293](#)

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