

# What happens to patients who survive kidney injury in ICU?

## What is the problem?

In severe illness, patients are admitted to intensive care units (ICUs). Kidney damage is a common occurrence in these patients. In a proportion, the kidneys fail altogether and a form of kidney dialysis is required. Kidney injury can be fatal and costs the NHS around £620 million per year – more than breast, skin and lung cancer combined!

There is currently little information available relating to the long-term consequences of kidney damage requiring dialysis in ICU survivors.

## What am I interested in?

I wanted to determine whether patients who suffer a kidney injury requiring dialysis in the ICU are more likely to have poorer outcomes than patients who do not. Specifically, I am interested to know if these patients are more likely to die or have an emergency hospital readmission within the first year after they have been discharged from the ICU.

## What did I do?

I used a 'big data' approach to investigate the association between the outcome of patients who received dialysis for a kidney injury in the ICU, compared to those who did not. 'Big data' research involves using databases (which contain vast amounts of information stored electronically in an organised and accessible way) and statistical computer software to look for trends in populations of patients with regards to health and disease.

In my study, several sources of information were linked, including a database with every patient admitted to all Scottish ICUs, Scottish death and prescribing records, and national hospital records. These were examined over a 5-year period and statistics were used to study associations between our 'exposure' (the thing that happened: kidney injury requiring dialysis) and the 'outcome' (the resulting consequence: emergency readmission and/or death).

Importantly, in this type of research, we must adjust for 'confounders' (factors that may influence the exposure

and the outcome which may interfere with a genuine association being identified) (see Figure 1). In this study, I corrected the results for factors such as age, number of other diseases, how ill a patient was on admission, and social deprivation to account for their effect.

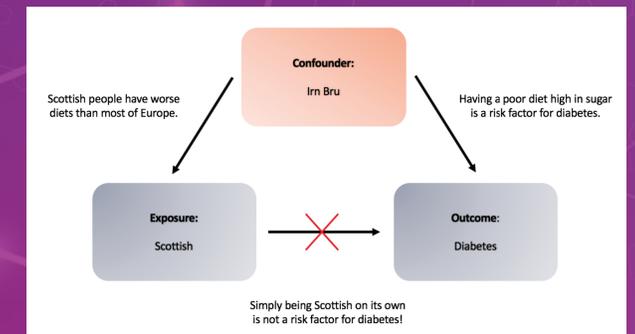


Figure 1 An example of a confounder

## What did I find?

Of the 33,764 patients whose data was analysed, before correction for confounders, the following results were found:

	Total	Death within 1 year after ICU discharge	Emergency Readmission within 1 year after ICU discharge
Patients who received dialysis for a kidney injury	2,137 (6.33%)	233 (10.90%)	1,005 (47.03%)
Patients who did not receive dialysis for a kidney injury	31,627 (93.67%)	2,637 (8.34%)	12,745 (40.30%)

After correction of the above results for confounders, I found that patients who had suffered kidney damage which required dialysis in the intensive care unit were 10% more likely to require an emergency readmission to hospital within one year of discharge compared with patients who did not suffer kidney damage.

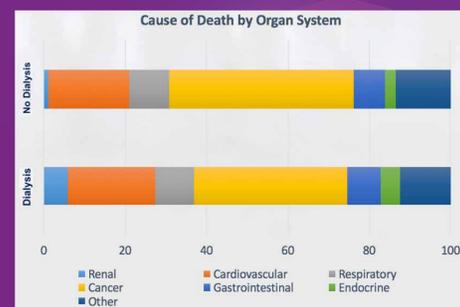


Figure 2 Cause of death by organ system within 1 year of discharge from the ICU for patients who did and did not require kidney dialysis while in the ICU. Renal is another term for the kidney system. Deaths due to diabetes fall in the endocrine system category.

Despite this, patients who had suffered kidney damage were no more likely to die during the year following discharge from ICU than patients who did not suffer kidney damage.

I also found that patients who suffered a kidney injury while in the ICU died of a variety of different reasons. These included complications of diabetes, kidney disease, as well as bladder, kidney, prostate and cervical cancer (see Figure 2).

As was seen for the cause of death, there were different reasons for emergency readmission for those who had a kidney injury while in the ICU. They were readmitted more often due to complications of diabetes or kidney disease, as well as gastrointestinal problems, such as diseases of the gall bladder or pancreas (see Figure 3).

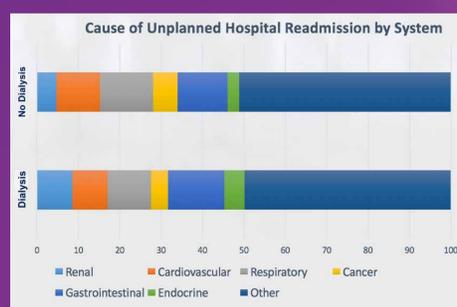


Figure 3 Cause of unplanned hospital readmission within 1 year of discharge from the ICU by organ system for patients who did and did not require kidney dialysis while in the ICU. Renal is another term for the kidney system. Diabetes falls in the endocrine system category.

## What does this mean?

My study provides new information regarding what happens to patients after they are discharged from the ICU after surviving a kidney injury and receiving dialysis, including details of the specific cause of any deaths and readmissions.

The increased risk of emergency hospital readmission may indicate that hospital discharge policies need to be enhanced to reduce the risk of emergency readmission in patients receiving dialysis. This may enable doctors to better target follow-up care for patients and improve overall outcomes.

## Who am I?

I am a 4th year medical student at the University of Edinburgh and completed my intercalated degree in Anaesthesia, Critical Care and Pain Medicine, where I had my first exposure to medical research. I undertook a Medical Research Scotland Vacation Scholarship in 2017, which allowed me to work alongside top academics and learn techniques in research methods, data science and epidemiology (the study of health and disease in populations). I hope to eventually progress to complete a PhD during my medical training and have a career as a clinician-scientist, which will enable me to carry out research alongside practising as a doctor.