

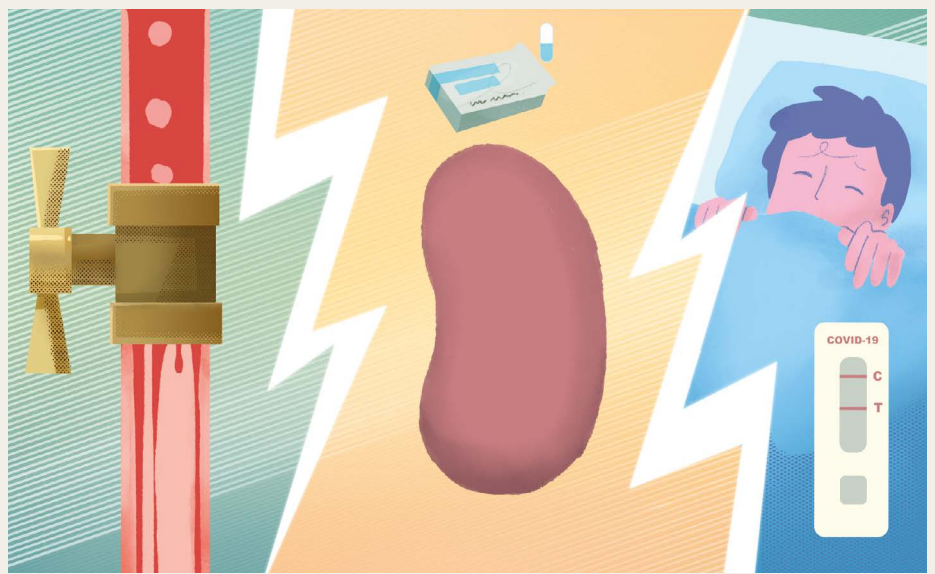
Acute kidney injury

The long-term health effects of kidney injuries acquired in hospital could one day be prevented by better treatments and diagnostic tools. **By Michael Eisenstein**

For most people who spend time in hospital, the hope is that they will leave healthier than when they arrived. But people undergoing surgery or treatment for severe injury or illness face the risk of acquiring covert damage to their kidneys that could have lifelong consequences, or even result in premature death.

Acute kidney injury (AKI) can arise for a number of reasons, including an interruption of blood flow to the kidneys and as a side effect of medications that can be toxic to these organs. The damage results in less blood being processed by the nephrons – structures in the kidneys that are responsible for filtering toxins, metabolic by-products and other unwanted molecules out of the blood and into the urine. By some estimates, as many as one in five people who are hospitalized will develop AKI.

AKI itself is a short-term state, lasting just one week. However, it can have far-reaching effects. Undetected or undertreated AKI can give rise to longer-term problems in the form of chronic kidney disease and, eventually, kidney failure. A 2017 study of nearly 17,000 people with AKI found that more than 40% would never recover full kidney function thereafter (J. A. Kellum *et al. Am. J. Respir. Crit. Care Med.* **195**, 784–791; 2017). AKI also increases the risk of cardiovascular issues: a meta-analysis found that the condition raises the risk of heart failure by 58% and the risk of heart attack by 40% (A. Odutayo *et al. J. Am. Soc. Nephrol.* **28**, 377–387; 2017). Even mild or moderate AKI can have a severe impact on health, and one estimate suggests that AKI-related mortality rates could be as high as 23.9% in adults and 13.8% in children (P. Susantitaphong *et al.*



Clin. J. Am. Soc. Nephrol. **8**, 1482–1493; 2013).

There are a variety of steps that clinicians can take to manage AKI and stop it getting worse, including careful control of physiological fluid levels and avoiding drugs that might be toxic to the kidneys. The range of treatments for active AKI, however, is poor – renal replacement therapy, which typically involves dialysis, is currently the only option for limiting the damage. Clinical trials are exploring the efficacy of a range of therapies that could help to protect people at risk of AKI, or even help to repair some of the tissue damage that might already have been done. But researchers are yet to identify a treatment strategy that is likely to deliver a major victory in controlling AKI.

There is also considerable effort going into developing better diagnostic and risk-assessment tools to detect AKI as

quickly as possible and give clinicians the opportunity to step in earlier. Researchers have identified biomarkers that can be spotted sooner than the physiological indicators currently relied on to diagnose AKI. Existing markers can take days to become clear and therefore leave a narrow window to act before the damage worsens.

Researchers are also using known AKI risk factors, such as advanced age, smoking history, diabetes and cardiovascular disease to develop scoring systems as well as train machine-learning algorithms to predict who is in greatest jeopardy, and to allow caregivers to take steps to prevent AKI from occurring in the first place. Until better treatment options come along, such approaches might be the best hope for reducing the massive – and largely underappreciated – public-health toll of AKI.

Produced with support from:

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AstraZeneca Rare Disease

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