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HSJ ACUTE KIDNEY INJURY

NHS Kidney Care

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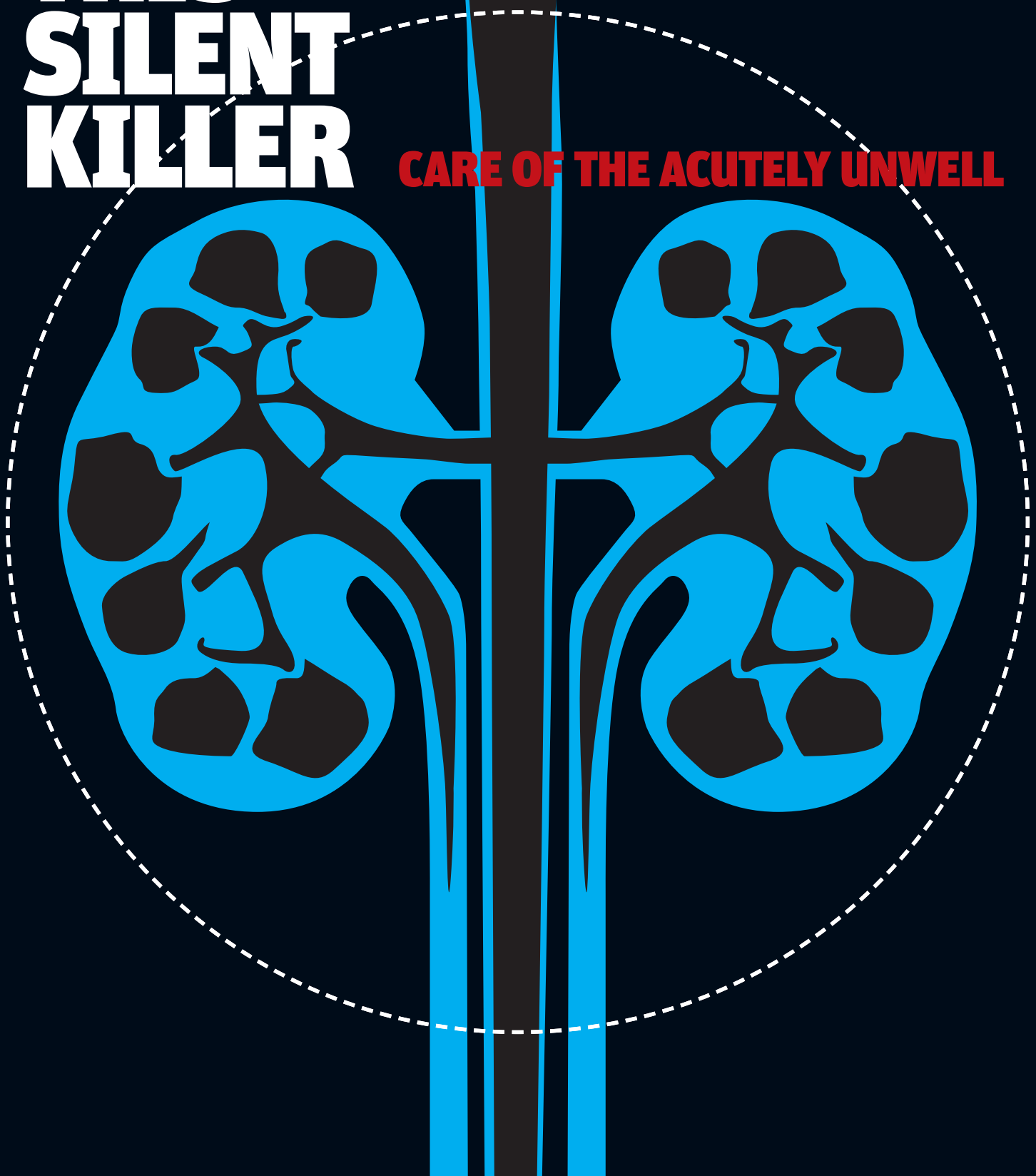
IN ASSOCIATION WITH NHS KIDNEY CARE

PREVENT THIS SILENT KILLER

CARE OF THE ACUTELY UNWELL



CONTENTS

Supplement editor
Jennifer Taylor
Subeditors
Alan Harris, Jess Moss
Design Jennifer van Schoor

FOREWORD

What are we waiting for?

Acute kidney injury is common and harmful. It is also treatable and avoidable. Around one in five people who are admitted to hospital as an emergency will get some degree of AKI. All AKI, even in its milder forms, results in prolonged lengths of stay, and increased morbidity and mortality. Older people and those with chronic kidney disease are more likely to be affected because they have more background illnesses and take more medications.

In common with hospital-acquired infections and venous thromboembolism, AKI does not have to be an inevitable consequence of being in hospital. In fact, somewhere between 20 and 30 per cent of AKI is both predictable and avoidable.

The high incidence is therefore unacceptable and it can be prevented when all clinicians get the basics of care right. That means reviewing medications, making sure patients are hydrated and treating infections and other illnesses promptly. In patients who do get AKI, if identified early it can be treated, again through good basic medical care.

It is a silent killer. It rarely occurs as a disease on its own but is often a complication of other illnesses such as pneumonia or heart attacks. But its management is not rocket science and very rarely requires dialysis. So although 20 per cent of acute hospital admissions will get AKI, very few of them will require specialist kidney services or dialysis.

It can be prevented by ensuring that every patient admitted as an emergency has their physiological parameters (including kidney function) measured and an early warning score calculated. Medicines should be reviewed, kidney function tests repeated and a consultant seen within 12 hours. Patients at risk can then be appropriately managed.

This is a safety issue on par with VTE. Given what we know – that 20 per cent of acute hospital admissions get AKI, 20 per cent of it is due to drug errors and 20 per cent of it is avoidable – it can be deduced that four per cent of all acute admissions needlessly come to harm from AKI, leading to worse outcomes and increased length of stay. For example the risk of death is at least double, even for the most minor forms.

In this time of driving up quality within a financially challenging environment, avoiding the costs associated with unnecessary AKI fits in with the quality, innovation, productivity and prevention principles. The costs span all specialties and sectors of healthcare and extend to social care, patients and the benefits system. That makes prevention twice as sensible.

'AKI is not just about kidneys, it is about good basic medical care. The numbers are high and the impacts are deep but the road to prevention is short'

NHS Kidney Care's work on AKI is driven by the Acute Kidney Injury Delivery Group, which was set up to respond to the recommendations of the National Confidential Enquiry into Patient Outcomes and Death *Adding Insult to Injury* report in 2009. The group includes kidney doctors, critical care doctors, acute medicine specialists and surgeons, as well as pharmacists, nurses and statisticians.

The membership illustrates that AKI is not just about kidneys, it is about providing good basic medical care to all patients. The numbers are high, the impacts deep, but the road to prevention is short. What are we waiting for? ●

Dr Donal O'Donoghue is national clinical director for kidney care, Department of Health. Beverley Matthews is director, NHS Kidney Care.

CALCULATING THE COST

Prevention and early detection and intervention in AKI could save the NHS millions of pounds a year

Acute kidney injury produces significant financial costs for the NHS. People with AKI have longer hospital stays, are more likely to receive critical care and are at increased risk of long term health problems.

In her report *The Economic Impact of Acute Kidney Injury*, NHS Kidney Care health economist Marion Kerr estimates how much the NHS in England spends on AKI in a year, using datasets like hospital episode statistics and reference costs.

AKI has traditionally been under recognised and under coded, and expert opinion suggests routine datasets are likely to miss some cases. So she also uses data from academic studies. The result is a range of estimates. The focus of her analysis is on acute sector costs, including admissions, critical care and renal replacement therapy.

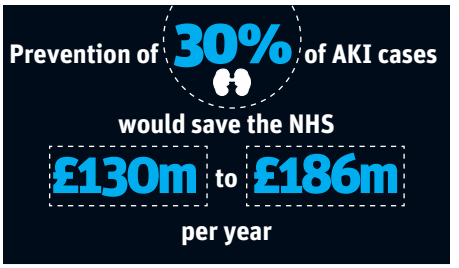
People with AKI are also likely to produce costs in primary care, community care, social care and the acute sector. The absence of routine datasets outside the acute sector makes it difficult to map primary, community and social care activity and so these costs have not been included.

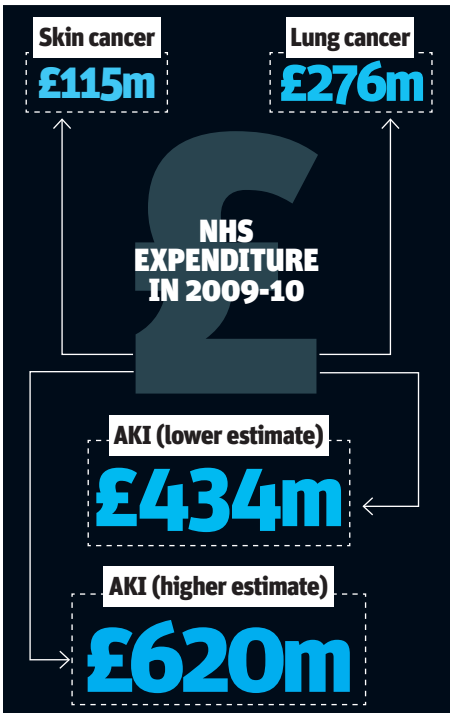
AKI produces heavy costs to individuals and to the public purse and these have also been left out. AKI can result in a permanent loss of mobility or inability to work which will have substantial costs for patients and carers. There will also be lost tax revenue; and possible benefit payments.

High cost to NHS

According to HES data for all hospital admissions with at least one night's stay in 2009-10, 120,000 admissions included a diagnosis of AKI. Extrapolations from academic studies suggest there may be as many as 360,000. The HES figure is likely to be an underestimate and may be skewed towards the severe end of AKI if such cases are more commonly recorded.

Of the 120,000 admissions which included a diagnosis of AKI, only 21,000 were grouped to a set of healthcare resource groups representing AKI with a cost of £62m. For the remaining 99,000 admissions, Ms Kerr calculated that patients with AKI stayed an average of 4.7 days longer in hospital than patients of the same age in the same HRG without AKI. The cost of these bed days was estimated at £90m. This may be an underestimate since AKI patients may cost more per day on average because of expensive medications and, in some cases, renal replacement therapy.





COSTS OF AKI TO THE NHS IN ENGLAND IN 2009-10

	Lower estimate	Upper estimate
Acute admissions	£151m	£203m
Critical care	£141m	£217m
Renal replacement therapy	£142m	£200m
TOTAL	**£434m**	**£620m**

Patients with AKI stay an average of 4.7 days longer in hospital

Spending on critical care was estimated separately at £141m a year. Taking all three costs together produces an inpatient spend of £292m in a year. This compares to an inpatient spend of £420m using calculations based on academic studies which include three times the number of patients.

"The estimates based on HES produce a higher per patient cost," says Ms Kerr. "This may be because HES is picking up only the more severe cases, supporting the view that AKI is under recognised and under recorded."

The paper estimates that between 1,000 and 1,400 people a year go on to long term renal replacement therapy as a result of AKI, around a fifth of all those starting RRT in a year. After adjusting for people who might have started RRT because of chronic kidney disease, and accounting for survivors of AKI who need RRT for many years, the yearly cost of RRT arising from AKI was estimated at between £142m and £200m.

Studies suggest that many AKI survivors who do not need long term RRT nonetheless have reduced renal function. Ms Kerr is now researching the costs of caring for them.

Total yearly costs of AKI (including acute admissions, critical care and RRT) range from £434m to £620m (see table). This represents 0.4 per cent to 0.6 per cent of the NHS budget for 2009-10.

Programme budgeting data shows expenditure of £1.64bn on renal problems in 2009-10. Estimated expenditure on AKI accounts for 26 to 38 per cent of all renal spend. Programme budgeting also shows spending of £276m for lung cancer and £115m for skin cancer in 2009-10. AKI is therefore estimated to cost the NHS more each year than lung and skin cancer combined (see figures).

Expert opinion suggests that up to 30 per cent of AKI is preventable, and a significant proportion of further cases are remediable through simple interventions if symptoms are spotted early and prompt action is taken. Prevention of 30 per cent of cases would save the NHS £130m to £186m a year.

"That's enough to pay the staff costs at an NHS foundation trust for a year," says Ms Kerr. "Or it's enough to pay for all skin cancer treatment for a year, or to fund all England's burns units for a year."

Early detection and prompt intervention would produce further savings. ●

OVERVIEW

The incidence of acute kidney injury seems to be increasing yet it is predictable and avoidable and in many cases could be prevented or treated effectively before it demands a kidney specialist's attention. What more can be done across the healthcare sectors?

COMMON CAUSE

Acute kidney injury occurs in around 20 per cent of acute hospital admissions and is a safety issue on a par with venous thromboembolism and healthcare-associated infection. Some patients recover from AKI while others are left with chronic kidney disease.

AKI happens fast. Previously called acute renal failure, AKI refers to loss of kidney function over hours or days. The "injury" in its name does not refer to a physical traumatic injury but to injury at the cellular level, of which there are many causes. The most common causes are infections, dehydration and medications – and often there are many contributing causes. Most people with AKI are older, although it can affect all ages, and it is more common in people with long term conditions such as heart disease or chronic kidney disease.

When people develop any acute illness, they may be at risk of AKI – and it is typically the first organ to fail. AKI is a warning sign a patient could be on the road to developing multiorgan failure and ultimately dying.

"AKI is not really a diagnosis in itself," says Dr Vincent Connolly, a consultant physician and chief of service for medicine at South Tees Hospitals Foundation Trust. "It tells us that this patient is ill."

Up to 750,000 people in England are estimated to develop AKI every year. Most of these cases are mild and lead to the temporary loss of 20 to 30 per cent of the kidney function. In others the kidneys fail completely, emergency treatment with dialysis is needed and there is a 30 to 50 per cent chance of death. Even minor AKI is associated with a short and long term increased risk of death.

All AKI patients have increased lengths of stay in hospital, making it an expensive condition. According to the National Confidential Enquiry into Patient Outcomes and Death *Adding Insult to Injury* report in 2009, one-fifth of AKI that occurs after hospital admission is predictable and avoidable.

On the increase

But incidence appears to be rising. Hospital episode statistics show a greater than 10 per cent increase in AKI diagnoses each year for the past three years. The rise could be an artefact of better coding or might reflect a true increase. Studies in the US have shown increased rates of AKI (though not as high as 10 per cent) and a rise could be expected due to an ageing population with more background illnesses and medications.

More AKI translates into increased bed days and a greater cost to the health service (see graph, page 4).

People with severe AKI may need a period of prolonged rehabilitation which includes dialysis, physiotherapy and occupational therapy, plus a social care package when they go home – all at significant cost.

The NHS spent £1.64bn treating renal problems in 2009-10, an increase of 23 per cent on the previous year (*HSJ*, 27 January 2011). It was the largest year on year increase of all the major disease categories and accounted for £11m annual spending by each primary care trust. Part of the increase was attributed to improved data recording but the growth in AKI cases was also a factor. Given that a large chunk of AKI is avoidable, there is a massive opportunity for implementing the quality, innovation, productivity and prevention principles by getting the basics of care right.

'It's not really even an issue for kidney doctors because if we can get this right in the acute setting it doesn't come to the attention of kidney specialists at all'

Dr Mark Thomas, renal consultant at Heart of England Foundation Trust, has submitted a QIPP proposal to NHS Evidence which shows the substantial savings that could be achieved by using an outreach team of renal doctors and nurses to advise on more severe cases of AKI (see reducing AKI article, pages 6-8). He is also chairing a National Institute for Health and Clinical Excellence group that is developing AKI guidelines. It will start work in the summer and the document should be ready in 2013-14.

"The evidence within the UK is that non-specialist clinicians are not good at managing AKI," says Dr Thomas. "It's vital that all clinicians dealing with adults are capable of carrying out initial identification and management of AKI."

Getting the basics of care right is every clinician's responsibility. That means managing hydration, sepsis and medication correctly and promptly.

"It's not really even an issue for kidney doctors because if we can get this right in the acute setting it usually doesn't come to the attention of kidney specialists at all," says Dr Kevin Stewart, medical director of the QIPP safe care workstream. "So it's

NHS EXPENDITURE 2009-10

£1.64bn
treating renal problems

23%
increase on previous year

Largest
year on year increase of all the major disease categories

MOVING ACUTE KIDNEY INJURY UP THE AGENDA

The board of Central Manchester University Hospitals Foundation Trust got a shock when they discovered how high the trust's incidence of AKI was and the resulting impact on length of stay and critical care use.

Dr Rachael Challiner, locum consultant in critical care medicine and nephrology, audited all 420 acute emergency admissions to the trust during a single week in November 2009.

The entire hospital stay was reviewed to find out if patients had developed AKI at any time. They looked at morbidity, mortality, length of stay, critical care bed day usage and the need for renal replacement therapy.

Dr Challiner says: "[The main reasons for the audit were] wanting to know the true incidence of acute kidney injury within our trust and knowing whether we were delivering the NCEPOD recommendations."

Overall incidence of AKI was 23.5 per cent. Median length of stay was 17.8 days in the AKI group and 6.8 days in the non-AKI group. Just two per cent of the non-AKI group required critical care admission compared with 11.5 per cent of the AKI group. Overall hospital mortality was 2.33 per cent but was 5.6 per cent in the AKI group and 1.37 per cent in the non-AKI group.

Median length of stay in AKI group
17.8
days

'Reducing the incidence of AKI by 10 per cent would save the trust 5,000 bed days'

Dr Challiner used the data to explain to the board why she was developing AKI guidelines. Reducing the incidence of AKI by 10 per cent would save the trust 5,000 bed days.

"As you can imagine all of a sudden that gets people sitting up and listening," she says.

"Everybody, even [some of the] renal physicians, were shocked by just how high the incidence was," she adds.

But it was the fact that AKI affected patients across every specialty and was mainly a reflection of an acutely unwell patient that persuaded the trust to move AKI up the agenda. Part of her programme of work will be teaching nurses and junior doctors to recognise sick patients at an early stage.

"The biggest thing has been engaging the biochemistry department to develop a flagging system on our computer blood results to flag the change in creatinine, which we're not able do at the moment," she says.

The system should pick up AKI in the early stages so doctors can pay more attention to fluids, drugs and basic medical management. They will then evaluate whether incidence of AKI drops or there is a change in outcomes.

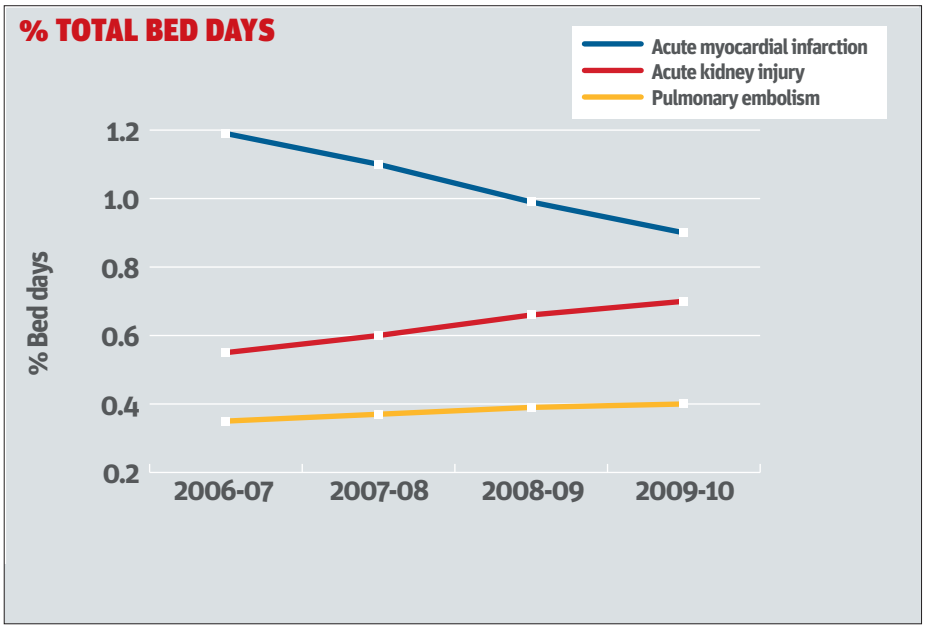
"It's all ongoing work but being able to engage the trust as a whole, with more senior management involvement, has enabled us as clinicians to move things faster," she says.

Dr Challiner has developed AKI guidelines for non-specialist clinicians, which are being rolled out to all hospitals in the Greater Manchester Kidney Care Network and the Greater Manchester Critical Care Network.

"We aim to get them into medical education programmes at junior doctors' induction," she says.

ALAMY

‘We know that a lot of AKI seen in the early days in hospital is usually an indicator that care at that stage has been sub-optimal’



really generalists and people in acute medicine.”

He adds: “We know that a lot of AKI seen in the early days in hospital is usually an indicator that care at that stage has been sub-optimal.”

Decreasing AKI reduces admission to intensive care, risk to patients and probably mortality in the long term. About one-fifth of AKI is due to poor management of medications. In primary care AKI can be prevented by careful prescribing of drugs which can cause kidney injury and by treating sepsis and dehydration.

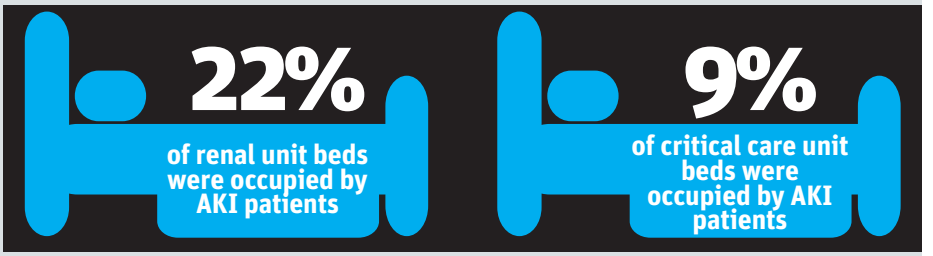
The safe care workstream’s safety programme Safety Express focuses on four specific areas: pressure sores, catheter associated urinary tract infections, venous thromboembolism and falls in care settings. Past safety programmes have tended to focus on one thing – MRSA, for example.

“Those are the things that tend to affect elderly people,” says Dr Stewart. “By looking at things which affect people across a range [of settings], both in hospital and before they come into hospital, we’re trying to get [healthcare staff] to address the things that underlie those conditions.”

The risk of falls in older people in hospital can be reduced by reviewing medication, ensuring proper hydration and treating illnesses like infections or cardiac problems appropriately and early. Attention to these same basic care issues will also reduce risks in the other three areas. If they are not addressed, the manifestation is often AKI.

As Dr Stewart says: “If we can get the basics right around medication, hydration, nutrition and recognising acute illness and treating it early and effectively then we’re all talking about the same thing aren’t we?” ●

CAN HOSPITALS COPE WITH THE VOLUME OF ACUTE KIDNEY INJURY PATIENTS?



In the 2009 National Confidential Enquiry into Patient Outcomes and Death report on AKI the expert group’s recommendation for the Department of Health was that there should be sufficient critical care and renal beds to allow rapid step up in care if appropriate. Care for such patients was suffering because of a deficiency in specialist beds.

“The first stage in ensuring sufficient beds is to work out how many there are,” says Dr Ben Bray, clinical adviser to NHS Kidney Care. There was no national data on the capacity of the NHS to care for patients with AKI beyond knowing the number of hospitals. That is when the Acute Kidney Injury Delivery Group, which was set up to respond to the NCEPOD recommendations, decided to conduct a capacity survey.

The voluntary survey of renal units and critical care units (intensive care and high dependency units) in England was carried out on World Kidney Day (10 March). Responses were received from 38 renal units. On average, 22 per cent of renal unit beds were occupied with AKI patients. Average overall bed occupancy was 97 per cent. Six per cent of patients in renal beds were awaiting transfer for rehabilitation, social care or other specialist input.

The 41 replies from critical care units revealed that nine per cent of beds were occupied by patients receiving dialysis for severe AKI. One critical care unit said that 141 patients out of 1,150 admissions to the main 20-bed critical care

‘First stage in ensuring sufficient beds is to work out how many there are’

complex required renal replacement therapy.

“Some of these were patients who received RRT as part of their resuscitation from drugs overdose or sepsis for example, but who may not have ... renal failure,” it said. “In addition some were patients with chronic kidney disease who [missed] their dialysis or [before] dialysis [ended] up coming to our unit because of [a] lack of acute access to our tertiary centre facilities.”

“Many people commented on the issue of having to provide a tertiary referral service without having protected renal beds for patients,” says Dr Bray. “This leads to delays in transferring patients to the renal unit for specialist assessment and management.”

The survey also picked up on the diverse models of care being provided for patients with AKI. Many trusts had close working relationships between critical care and renal services in caring for patients with severe AKI.

The information gleaned from the survey will be compiled into a report. Individual units will be shown their own results and how they compare to others. Commissioners and managers will be able to use the data to develop services locally.

The Society of Acute Medicine did a snapshot audit on the same day of the prevalence of AKI in people admitted to hospital through medical assessment units. In the nine units which took part, 16 per cent of patients had evidence of AKI. Patients can stay in these units for up to 72 hours before going home or elsewhere in the hospital. Some will develop AKI later on, especially if they become sicker or have an operation.

Dr Bray says: “The question for managers is, if one in 10 of your admissions have got this problem, how does your service design address preventing and managing it?”

PATHWAY APPROACH

Defining a clinical pathway for AKI was deemed essential to commissioners in North Central London

Acute kidney injury is a common complex condition that occurs in all hospital sites and in all areas of the hospital. The National Confidential Enquiry into Patient Outcomes and Death *Adding Insult to Injury* report in 2009 found poor prevention and recognition, delays in appropriate management and referrals and delays in access to diagnostics and specialist care.

"It became clear that there wasn't a clinical framework for [AKI] nationally but, probably more importantly, regionally," says Dr Chris Laing, a consultant nephrologist at the Royal Free Hampstead Trust.

The North Central London AKI Network decided to define a clinical pathway that would outline preventive measures, risk assessment and an expectation of basic ward care. It would specify transfer criteria and set standards for how quickly patients should move down the pathways.

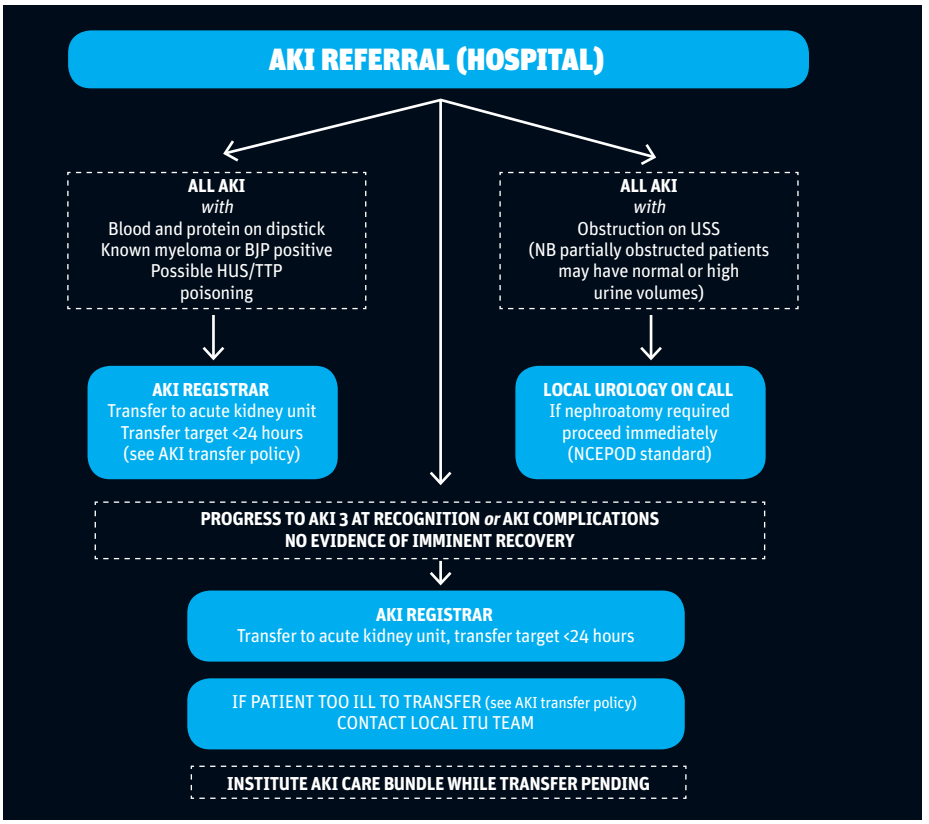
Because of the multiple specialties and sites, a committee was set up to develop the pathways. It included representatives from nephrology, acute medicine, critical care and primary care.

"We've needed input and advice in all areas, people who know how their hospitals work [and] what's deliverable on those sites," says Dr Laing.

An AKI care bundle was designed as a basic expectation of what a ward team should be able to deliver in a non-specialist area. AKI referral documents describe which patients should be referred to the renal registrar or urology or to the local intensive care unit for stabilisation (see chart). A transfer document outlines criteria for who can be transferred safely from ward to acute kidney unit and who should be managed on site. Now decisions are consistent and all doctors know what to expect.

Specialist commissioning arrangements for renal services have concentrated on dialysis and transplantation, so AKI is a relatively new condition for commissioners.

The first step towards commissioning AKI in North Central London has been to develop the whole pathway approach. This will likely be put on a Map of Medicine layout. Local commissioners are hoping to base a specification for AKI on that pathway.



SOURCE: NORTH CENTRAL LONDON ACUTE KIDNEY INJURY NETWORK

"Acute kidney injury will involve intensive care, acute medicine, acute surgery [and] specialist renal [services]," says Dr John Connolly, clinical director for renal and renal transplantation at the Royal Free Hampstead Trust. "There are so many components that they feel developing the pathway is the right way to commission it."

Commissioners' role

Commissioners can then define outputs for each part of the pathway. A local district general hospital would know which part of the AKI pathway it was responsible for and could devise quality – CQUIN – payments or outcome measures to monitor progress.

As an interim arrangement local commissioners have agreed to fund, in a block contract, level two care for AKI requiring dialysis in the central unit.

Dr Connolly says: "In something like acute kidney injury, if they just commissioned the renal department or individual hospitals I don't think they would make a sector wide improvement.

"If the pathway is laid out and it's formally commissioned, it means that we have a responsibility to our referring hospitals to take the patient within 24 hours or within 48 hours.

"It puts a structure onto the service that allows people to put the resources in the right place."

Royal Free Hampstead Trust chief executive David Sloman says: "The mortality and the morbidity associated with managing acute kidney injury badly is quite profound."

The whole pathway approach builds in an improvement and quality mechanism because each component of the pathway is recognised as a separate entity. If an element of the pathway is not delivered to the specified standard commissioners can reasonably refuse to pay for it.

Dr Laing says: "That's the sort of incentivisation I need on the shop floor to deliver a good service for the patients." ●

FIND OUT MORE

How to guides

➔**www.kidneycare.nhs.uk/**

‘Reducing risk, early recognition and right response’ are guideline phrases for ensuring fewer patients develop AKI, while other initiatives include quality projects and introducing educational competencies

THREE Rs FOR R

As a quality improvement body NHS Kidney Care runs a number of initiatives to support change at the front line. The organisation is built on networks throughout the country and the work is based on collaboration rather than issuing mandates.

In acute kidney injury most work falls under the umbrella of the Acute Kidney Injury Delivery Group, which was set up to respond to the recommendations of the 2009 National Confidential Enquiry into Patient Outcomes and Death *Adding Insult to Injury* report. Chaired by national clinical director for kidney care Dr Donal O’Donoghue, the group is both multiprofessional (kidney doctors, critical care doctors, acute medicine specialists, surgeons) and multidisciplinary (pharmacy, nursing, data and analytics).

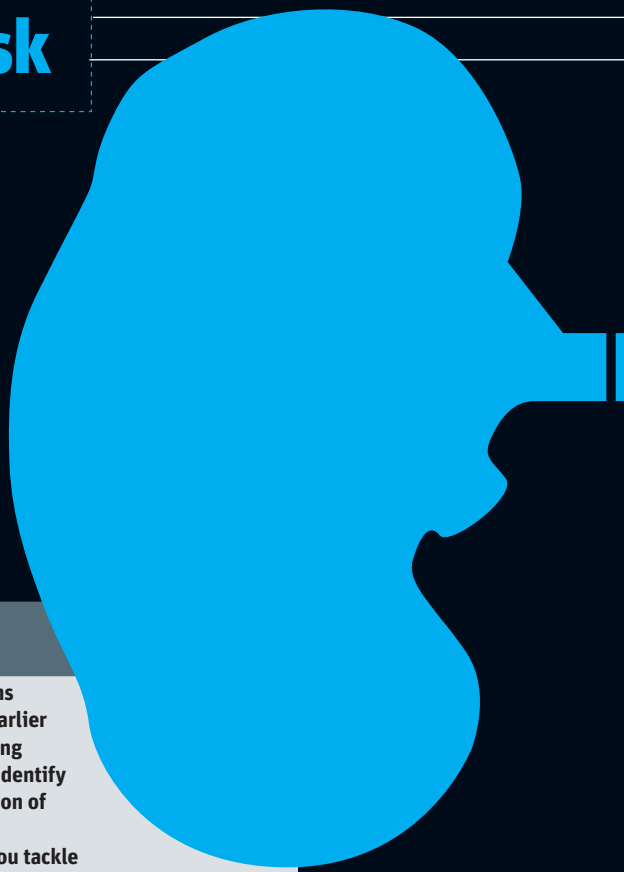
The group has been leading on specific projects. Acute medicine doctors have developed educational competencies for doctors and nurses in training on how to manage AKI. These have been endorsed by the professional bodies. A vascular surgeon is auditing repairs of abdominal aneurysms to see who gets AKI, which is a common complication after the procedure.

An example AKI CQUIN has been developed which illustrates how to ensure patients admitted as an emergency get the basic standard of good quality care. It includes checking blood pressure, heart rate and oxygen levels on admission to produce an early warning score and being seen by a consultant within 12 hours of admission. Patients at risk of AKI (with diabetes and heart disease for example) should have their medications reviewed and blood tests to rule out AKI.

A guide to coding has been published by NHS Kidney Care to help clinicians and coders improve the accuracy of their documentation. Accurate coding ensures that payments are appropriate and that audits reflect actual activity.

Practical steps can be taken to reduce and better manage AKI. The AKI Delivery Group’s projects in this area can be attached to the three Rs: reducing Risk, early Recognition and right Response. The three areas cover all the bases in quality improvement and designing and implementing services to improve care for patients with AKI. ●

Reducing Risk



ASSESSING EMERGENCY ADMISSIONS EARLY

Early assessment of emergency admissions enables specific problems to be tackled earlier and reduces the risk of a patient developing AKI. An experienced senior assessor can identify the need for replacement fluids or cessation of nephrotoxic medicines.

“It’s well established that the earlier you tackle these things the more likely the pressure on the kidneys [will] be relieved,” says Dr Mike Jones, acute physician at the Royal Infirmary of Edinburgh and vice president of the Royal College of Physicians of Edinburgh.

All patients in emergency should have their physiological parameters assessed and an early warning score calculated that highlights abnormalities. A national early warning score system should be ready in the summer and will mean staff have to learn just one system.

Work is underway by acute medicine specialists to find out how acute medical units are identifying patients with AKI and modifying their risks. An audit was conducted on World Kidney Day (10 March) to find out the incidence of AKI during the first 72 hours in hospital in a selection of acute medical units across the country (see article, page 2-4).

AKI is increasingly getting into emergency doctors’ psyche, says Dr Jones. “I don’t think it has been up until now,” he adds. “Many people have dismissed small changes in biochemistry as simply that, small changes in the laboratory measurements of kidney function. The evidence that’s now available of seemingly small changes in the biochemistry being associated with poorer outcomes has highlighted that they need to respond aggressively.”

REDUCTION

ELECTRONIC PRESCRIBING

"Electronic prescribing [is] the main route towards driving safer prescribing in general but in particular in relationship to acute kidney injury," says Dr Simon Ball, nephrology consultant at University Hospitals Birmingham Foundation Trust.

What is needed is a system that links pathology reporting, pathology requesting, prescribing and patient co-morbidities. Rules (called clinical decision support) can be written to prevent drugs contributing to AKI and as many components as possible should be automated. Bloods will be requested in a timely fashion and results interpreted appropriately, leading to adjustment of medications where necessary.

It is less complicated than it sounds, says Dr Ball, as only three to four levels of advice are required ("don't prescribe this", etc) and the top 10 drugs that contribute to AKI in a general medical surgical environment are well known.

It is too early to say whether the few centres that have such systems in place also have fewer incidences of AKI. But Birmingham has shown that clinicians act on alerts about potential risks. If an alert says a patient has kidney disease and should not take a particular medication, for example, clinicians don't prescribe it. The point isn't simply to stop prescribing, but to put in safety nets so that when a certain medication is prescribed a patient's renal function is checked beforehand and a few days later.

Dr Ball says: "It's creating a robohouseman that does those things 100 per cent reliably – making sure the bloods are requested, the report comes back, and the report is acted on."

MEDICINES MANAGEMENT

Medicines are a significant cause of AKI and optimising patients' medicines can reduce their risk. Drugs that are commonly used for heart failure, blood pressure and type 2 diabetes can lead to kidney problems if they are not managed properly.

The AKI Delivery Group is working with the UK Renal Pharmacy Group on three projects to support prescribers and pharmacists. First, an audit of prescribing is being piloted at the Royal Derby Hospital to discover how many admitted patients are taking potentially nephrotoxic drugs, and of those how many could get AKI if their treatment was not modified.

"Hopefully we might get a view on how common this is and the level of awareness of doctors and pharmacists," says Tom Gray, chief pharmacist at Derby Hospitals Foundation Trust and pharmacy lead for NHS East Midlands.

Second, a trigger list of medicines associated with AKI is being compiled. It will be used to develop brief interventions for community pharmacists to advise for patients.

Third, prescribing tools are being designed to raise awareness of AKI and trigger a medicines review. AKI risk is noted on the front of patient charts in hospital, which alerts doctors, nurses and pharmacists that a medicines review is needed. Derby's electronic reporting system for blood test results calculates a patient's AKI risk and flags up a warning. Derby is piloting an electronic system that advises on AKI risks and what to prescribe.

'All patients in emergency should have their physiological parameters assessed and an early warning score calculated'

Early Recognition

DESIGNING LAB SYSTEMS TO IMPROVE RECOGNITION AND DIAGNOSIS

AKI can be diagnosed by measuring changes in serum creatinine levels. Healthy kidneys filter creatinine, a waste product, out of the blood. Rises in creatinine indicate impaired kidney function.

Most laboratory information management systems can flag up creatinine rises above a certain level. The difficulty is where to set the threshold. Data from Brighton shows that a threshold of 26µmol/L would pick up 1,350 patients in nine months.

"That may be so frequent that we get alert fatigue and people don't take any notice of it," says Dr Gifford Batstone, national clinical lead for pathology in the clinical division of the Department of Health informatics directorate, who works in Brighton part time.

A threshold of 52µmol/L identifies 500 people over nine months (about two people a day), a rate of alerting he believes can be coped with. He says Brighton is likely to use a threshold of 50µmol/L.

He adds: "Just flagging a high creatinine is not enough, there's got to be an educational programme that tells junior doctors what they need to do."

Brighton is developing P STOP, which stands for perfusion, sepsis, toxins, obstruction and peripheral damage to the kidney. Bloods that exceed the threshold will be marked "significant rise in serum creatinine, indicates acute kidney injury, invoke P STOP programme".

There are different ways of measuring creatinine, but pathologists are moving towards a consensus on which method to use.

AUDITING AKI RECOGNITION

Patients are admitted to hospital under acute physicians, general physicians or surgeons, rather than nephrologists. It means that people in general medical and surgical settings must be able to identifying AKI early on so that the correct clinical pathway can be deployed.

There are a number of suggested triggers for identifying AKI but research is needed to see how effective they are in clinical practice. Dr Vincent Connolly, a consultant physician and chief of service for medicine at South Tees Hospitals Foundation Trust, will be auditing a number of hospitals in the north east to see whether AKI has been recognised and acted on appropriately.

Depending on the results he will conduct education sessions or introduce an electronic trigger to alert clinicians that a patient has developed AKI, point them to the AKI bundle and monitor implementation.

The ultimate goal is to "have acute physicians who will be tuned into the diagnostic criteria for AKI", he says. "We'll have junior doctors tuned in too, and we'll have pathways of care for AKI in each trust."

USING AN ALERT SYSTEM TO IMPROVE AKI MANAGEMENT

All hospital clinicians should be capable of recognising and managing the early stages of AKI. But alert systems can be used to identify the more severe cases of AKI so they can be seen by a renal team, thus reducing problems of under referral or late referral.

"The challenge for all the alert systems is to identify patients that will develop severe AKI but it's such a common problem in hospital you've got to [avoid] overwhelming the team that's looking at the alerts," says Dr Mark Thomas, renal consultant at Heart of England Foundation Trust.

The trust has developed an alert system using percentage rise in creatinine and is working out what threshold to use. The next step is to find the best way to intervene after an alert. They are analysing the results of a pilot study in which an outreach team of renal doctors and nurses gave telephone advice to physicians responsible for patients who had been picked up by the alert system. The physicians were generally supportive of a phone call.

Dr Thomas has submitted a quality, innovation, productivity and prevention proposal to NHS Evidence which is currently under consideration. It shows that even using very conservative estimates an outreach team can make substantial savings. Their data suggests that AKI costs £40m per year per million population.

"We estimate that an outreach team could save £100,000 per million population per year," he says. "Put another way, you only have to save a very small number of patients going onto dialysis to justify the cost of an outreach team."

Right Response

RENAL ASSOCIATION AKI GUIDELINES

The Renal Association is set to launch its fifth set of AKI guidelines, which have been developed with the Intensive Care Society and, for the first time, the Society for Acute Medicine. They will be published as part of a set of guidelines in *Nephron* to recognise the association's 60th anniversary, which was last year. They will also be published on NHS Evidence.

An attempt has been made to harmonise them with the Kidney Diseases Improving Global Outcomes guidelines that will be published in *Kidney International* this year. AKI has suffered from the lack of a common definition and staging system and KDIGO will propose a universal definition.

"[It will] allow us to speak a common language between different specialties and build up data on patients with AKI," says Dr Andrew Lewington, consultant renal physician at Leeds Teaching Hospitals Trust.

A series of audit measures are included within the guidelines so that the more severe forms of AKI can be captured initially, followed by the less severe forms.

Dr Lewington says: "As we develop a collection of data, ultimately it may become a marker for medical directors of the quality of care provided for patients with acute kidney injury."

AUDITING CAPACITY

Dr Ben Bray has taken a year out of his training in kidney disease to work as a clinical adviser to NHS Kidney Care, as part of the chief medical officer's clinical adviser scheme. As part of his role he conducted a survey on World Kidney Day (10 March) to find out how many beds and resources were available for patients with AKI (see article, page 2-4). The National Confidential Enquiry report flagged up insufficient capacity in intensive care and specialised renal units for severe AKI patients.

"Not everyone with AKI needs to go to intensive care or a renal unit but there are a proportion of patients who do and we need to make sure there are sufficient beds and capacity," says Dr Bray.

ON ALERT FOR ACUTE EPISODES

Treatment of acute kidney injury can lead to a full recovery, or a lifetime on dialysis, so sharing best practice is vital

Physicians can take a number of steps, including monitoring fluid balance, to give AKI patients the best chance of recovery

After the risk of acute kidney injury has been assessed and a patient is deemed at high risk or in the early stages of AKI, physicians can take a number of steps to give them the best chance of recovery.

These include avoiding nephrotoxic drugs, paying close attention to fluid balance and aggressive treatment of the underlying problem, which could be severe pneumonia or underlying kidney disease.

Patients with severe AKI will need rehabilitation support from primary and social care that is similar to patients recovering from stroke.

And around 10 per cent of severe AKI episodes result in significant long term kidney injury.

But Dr Donal O'Donoghue, national clinical director for kidney care, says: "We know that in fit, young people the kidney can recover completely."

AKI was first recognised in earthquake situations. It was also well described during the Blitz. It then became clear that the same syndrome was being observed in people with significant blood loss, when the kidneys shut down. Around that time, most of the significant blood loss was happening in young people in war situations.

"In the Second World War more soldiers died as a result of AKI complicating their blood loss than directly from their wounds," says Dr O'Donoghue.

By the Korean War, fluid was carried into theatre and by the Vietnam War there were massive dialysis units.

These conflicts drove the treatment of AKI. Today, the Royal Air Force and British Army no longer use dialysis, because they monitor fluid balance carefully. It meant that none of the recent injuries in Afghanistan required dialysis.

The fact that AKI can now be avoided altogether in the very setting where high levels used to occur suggests that if an appropriate care bundle is put in place in the NHS, then AKI can be significantly reduced in the general population.

Some AKI patients will require dialysis.

"They can be on dialysis for a few months before their kidney function comes back [but] some of them never recover," says Chit Herman, chronic dialysis network matron for North Central London.

Patients whose kidney function does not return will need long term dialysis three times a week. They will receive care from a psychologist, social workers, dieticians and renal nurses. ●

KEY QUESTIONS TO EVALUATE AKI SERVICE QUALITY

Given that between one in five and one in 10 patients admitted to hospital develop AKI, can your trust answer these questions:

- How many people in your hospital have AKI today?
- What systems do you have in place to prevent AKI?
- How can we improve the detection and recognition of AKI?

CASE STUDIES

Michael Wise was taking his grandson to football when he started to feel unwell. Four days later he was in a coma with group A streptococcal infection, septicaemia, toxic shock and multiple organ failure. Dr Wise was fit, worked as a specialist in oral surgery and restorative dentistry, and was a visiting professor at the Eastman Dental Institute, University College London.

The cause of his illness remains a mystery, but what he does know is that the intensive care staff at University College London Hospital were "phenomenal". Despite the care he received, Dr Wise's kidney function unfortunately did not recover and he now requires long term dialysis.

The National Confidential Enquiry into Patient Outcome and Death's report into AKI, Adding Insult to Injury, highlights many cases of substandard care: "An elderly patient was admitted with a fractured neck of femur. The patient was known to have chronic kidney disease, but the electrolytes on admission showed no evidence of recent deterioration. The patient was noted to be taking two diuretics. Hemi-arthroplasty was undertaken but post-operatively the patient developed worsening renal function consistent with pre-renal failure. While this was noted and recorded, the diuretics were not discontinued and the patient was given inadequate intravenous fluids. Renal function continued to the point where significant acidosis developed. After a prolonged hospital stay, the patient ultimately died of AKI secondary to hypovolaemia."