

Prevention, detection and management of acute kidney injury: concise guideline

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ABSTRACT

Acute kidney injury (AKI) is considered a silent disease that commonly occurs in patients with acute illness; however, given that it has few specific symptoms and signs in its early stages, detection can be delayed. AKI can also occur in patients with no obvious acute illness or secondary to more rare causes. In both these scenarios, patients are often under the care of specialists outside of nephrology, who might fail to detect that AKI is developing and might not be familiar with its optimum management. Therefore, there is a need to increase the awareness of AKI among many different healthcare specialists. In this article, we summarise the key recommendations from the National Institute for Health and Care Excellence (NICE) AKI guideline. The guideline provides recommendations for adult and paediatric patients on the prevention, early detection and management of AKI, as well as information on AKI and sources of support. Implementation of this guideline will contribute to improving patient safety and saving lives.

KEYWORDS: Acute kidney injury (AKI), NICE, NCEPOD, risk, prevention, definition, management, referral, patient safety, research

Introduction

Acute kidney injury (AKI) is a syndrome with many different causes that represents an independent risk factor associated with worse patient outcomes.¹ It is a common condition that occurs in up to 18% of patients admitted to acute medical units,² but has few specific symptoms and signs, which can delay detection.³ In most cases, AKI occurs in an at-risk population of patients secondary to reduced perfusion of the kidneys resulting from hypovolaemia and/or sepsis exacerbated by exposure to nephrotoxins.⁴ AKI can also occur in patients with risk factors following major surgery⁵ or might have a more rare cause (eg vasculitis) that requires urgent referral to nephrology for specific therapy.

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The definition of AKI is based upon increases in serum creatinine or reductions in urine output, both of which are relatively poor biomarkers; therefore, there is a need to develop more sensitive and specific biomarkers.⁶ The treatment of AKI is largely supportive, with no specific therapy available other than renal replacement therapy (RRT). Patients who develop AKI are now recognised as being at risk of subsequent chronic kidney disease (CKD). In 2009, the National Confidential Enquiry into Patient Outcomes and Death (NCEPOD) report *Acute kidney injury; adding insult to injury* found that less than 50% of patients who died from a diagnosis of AKI received good care.⁷ It has also been estimated that up to 30% of cases of AKI are preventable⁸ and, therefore, 12,000 lives could potentially be saved annually. Since then, there has been a coordinated effort across the UK to raise awareness about AKI. The NCEPOD report informed a referral from the Department of Health for the National Institute for Health and Care Excellence (NICE) to develop its first national guideline on AKI.

Scope and purpose

NICE published a guideline on AKI in August 2013.⁹ The guideline is based on systematic reviews of the best available evidence and explicit consideration of cost effectiveness. It is primarily aimed at non-specialist clinicians, who will care for most patients with AKI. The guideline addresses known and unacceptable variations in the prevention, detection and management of AKI in both adult and paediatric patients. Given the predetermined scope of the guideline, it does not cover every aspect of the management of AKI but does provide recommendations on particularly crucial elements, such as:

- > risk factors for developing AKI
- > the principles of preventing AKI
- > the management of AKI (restricted to the relief of urological obstruction, pharmacological management and referral criteria to nephrology)
- > essential information and support required for patients and carers.

The aim of this concise guideline is to emphasise and highlight the core content of the guidance that is relevant to non-specialist physicians in both adult medicine and child health (Box 1), thus supporting a wider improvement in the care of patients with AKI, which in turn could save lives. The

Box 1. Core content of the clinical guideline for acute kidney injury.

Identifying acute kidney injury in adults with acute illness

- 1 Investigate for AKI (by measuring serum creatinine concentration and comparing with baseline) in adults with acute illness if any of the following are likely or present:
 - > chronic kidney disease (adults with an eGFR <60 ml/min/1.73 m² are at particular risk)
 - > heart failure
 - > liver disease
 - > diabetes
 - > history of AKI
 - > oliguria (urine output <0.5 ml/kg/h)
 - > neurological or cognitive impairment or disability, which might mean limited access to fluids because of reliance on a carer
 - > hypovolaemia
 - > use of drugs with nephrotoxic potential (eg NSAIDs, aminoglycosides, ACE inhibitors, ARBs or diuretics) within the past week, especially if hypovolaemic
 - > use of iodinated contrast agents within the past week
 - > symptoms or history of urological obstruction or conditions that might lead to obstruction
 - > sepsis
 - > deteriorating early warning scores
 - > age ≥65 years.

Identifying AKI in children and young people with acute illness

- 2 Investigate for AKI (by measuring serum creatinine concentration and comparing with baseline) in children and young people with acute illness if any of the following are likely or present:
 - > chronic kidney disease
 - > heart failure
 - > liver disease
 - > history of AKI
 - > oliguria (urine output <0.5 ml/kg/hour)
 - > young age or neurological or cognitive impairment or disability, which might mean limited access to fluids because of reliance on a parent or carer
 - > hypovolaemia
 - > hypotension
 - > severe diarrhoea (children and young people with bloody diarrhoea are at particular risk)
 - > use of drugs with nephrotoxic potential (eg NSAIDs, aminoglycosides, ACE inhibitors, ARBs and diuretics) within the past week, especially if hypovolaemic
 - > symptoms or history of urological obstruction or conditions that might lead to obstruction
 - > sepsis
 - > deteriorating paediatric early warning score symptoms or signs of nephritis (eg oedema or haematuria)
 - > haematological malignancy.

Previous NICE guidance on the acutely ill patient in hospital (clinical guideline 50) was restricted to adults.¹⁵ It is expected that the above recommendation will encourage paediatric hospitals to use one of the available paediatric early warning scores to detect deteriorating patients and, thus, prevent AKI.

Assessing risk factors in adults having iodinated contrast agents

- 3 Before offering iodinated contrast agents to adults for emergency or non-emergency imaging, assess their risk of AKI. Be aware that increased risk is associated with:
 - > chronic kidney disease (adults with eGFR <40 ml/min/1.73 m² are at particular risk)
 - > diabetes, but only with chronic kidney disease (adults with eGFR <40 ml/min/1.73 m² are at particular risk)
 - > heart failure
 - > renal transplant
 - > age ≥75 years
 - > hypovolaemia
 - > increasing volume of contrast agent
 - > intra-arterial administration of contrast agent.

Ensure that risk assessment does not delay emergency imaging.

ACE = angiotensin converting enzyme; AKI = acute kidney injury; ARB = angiotensin II receptor blocker; eGFR = estimated glomerular filtration rate; NICE = National Institute of Health and Care Excellence; NSAID = non-steroidal anti-inflammatory drug.

(continued)

Box 1. Continued**Assessing risk factors in adults having surgery**

- 4 Assess the risk of AKI in adults before surgery. Be aware that increased risk is associated with:
- > emergency surgery, especially when the patient has sepsis or hypovolaemia
 - > intraperitoneal surgery
 - > chronic kidney disease (adults with eGFR <60 ml/min/1.73 m² are at particular risk)
 - > diabetes
 - > heart failure
 - > liver disease
 - > age ≥65 years
 - > use of drugs with nephrotoxic potential in the perioperative period (in particular NSAIDs after surgery).

Use the risk assessment to inform a clinical management plan.

Ongoing assessment of the condition of patients in hospital

- 5 When adults are at risk of AKI, ensure that systems are in place to recognise and respond to oliguria (urine output <0.5 ml/kg/hr) if the 'track and trigger system' (early warning score) does not monitor urine output.

Detecting AKI

- 6 Monitor serum creatinine regularly in all adults, children, and young people with or at risk of AKI.

Identifying AKI in patients with no obvious acute illness

- 7 Be aware that, in patients with chronic kidney disease and no obvious acute illness, an increase in serum creatinine might indicate AKI rather than a worsening of their chronic disease.
- 8 Ensure that AKI is considered as a possible diagnosis when a patient presenting with an illness with no clear acute component has any of the following:
- > chronic kidney disease, especially stage 3B, 4 or 5, or urological disease
 - > new-onset or significant worsening of urological symptoms
 - > symptoms suggesting complications of AKI
 - > symptoms or signs of disease affecting the kidneys together with other organ systems (suggesting multisystem illness).

Identifying the cause(s) of AKI

- 9 Identify the cause(s) of AKI and record the details in the patient's notes.

The guideline development group noted that AKI is a syndrome, not a specific diagnosis, and the cause of the syndrome must be identified.

Ultrasonography

- 10 When adults, children and young people have no identified cause of their AKI or are at risk of urinary tract obstruction, offer urgent ultrasonography of the urinary tract (to be performed within 24 hours of assessment).

This recommendation indicates that ultrasonography is not required for all cases of AKI, and such a 'shotgun' approach is now discouraged.

Referring to nephrology

- 11 Discuss the management of AKI with a nephrologist or paediatric nephrologist as soon as possible and within 24 hours of detection when one or more of the following is present:
- > a possible diagnosis that might need specialist treatment (eg vasculitis, glomerulonephritis, tubulointerstitial nephritis or myeloma)
 - > AKI with no clear cause
 - > inadequate response to treatment
 - > complications associated with AKI
 - > stage 3 AKI
 - > a renal transplant
 - > chronic kidney disease stage 4 or 5 (eGFR <30 ml/min/1.73 m²).

Information and support for patients and carers

- 12 Give information about long-term treatment options, monitoring, self management and support to patients who have had AKI (or their parent or carer if appropriate) in collaboration with a multidisciplinary team appropriate to the person's individual needs.

ACE = angiotensin converting enzyme; AKI = acute kidney injury; ARB = angiotensin II receptor blocker; eGFR = estimated glomerular filtration rate; NICE = National Institute of Health and Care Excellence; NSAID = non-steroidal anti-inflammatory drug.

full set of recommendations can be found on the NICE website (<http://guidance.nice.org.uk/CG169>).

Limitations of the guideline

It must be recognised that the NICE AKI guideline is not a comprehensive textbook of every aspect of AKI and does not include recommendations regarding aspects of RRT beyond the decision on its initiation. The guideline covers those topics that were included in the scope and which were prioritised by stakeholders as being the key areas where guidance was needed. The guideline is based on systematic reviews of the best available evidence and explicit consideration of the cost effectiveness. When there is insufficient evidence available, the recommendations are based upon the experience and opinion of what the guideline development group considered as good practice. The topic of the prevention and management of AKI with intravenous fluid therapy was not within the scope and is covered in the NICE intravenous fluid therapy in adults in hospital clinical practice guideline.¹⁰ A separate NICE guideline on intravenous fluid therapy in children is also being developed.

Implications for implementation

Over the past few years, and particularly since the publication of the NCEPOD report,⁷ there has been a concerted effort across the UK to raise awareness and improve health care professionals' understanding of AKI. It is anticipated that implementation of the NICE AKI guideline will further support this and improve patient safety and outcomes. Implementation will require a coordinated national approach and dedicated AKI clinical leads at the local level. There needs to be increased emphasis on multiprofessional AKI education at both an undergraduate and postgraduate level covering primary and secondary care. The Academy of Royal Medical Colleges has developed an AKI core competency framework that describes the training required for different healthcare professionals in identifying patients at risk of AKI and those who are developing it with a recommended response.¹¹ NICE have developed a set of implementation and audit tools (Box 2) and will be publishing further educational online learning modules, which are aimed at nurses,

Box 2. Additional tools from the National Institute for Health and Care Excellence.

The following key tools for implementation are currently available on the NICE website (<http://guidance.nice.org.uk/CG169>):

- > clinical audit tools for adults and children
- > baseline assessment tool
- > costing statement
- > an interactive guideline recommendations pathway which links to other related guidelines.

NICE = National Institute of Health and Care Excellence.

healthcare assistants and non-renal practitioners. NICE is also committed to increasing awareness in primary care and is working collaboratively with the Royal College of General Practitioners on a joint AKI communications and awareness raising plan. Electronic learning also includes e-learning packages available at the BMJ¹² and an AKI app, free to download from the website of the Royal College of Physicians of Edinburgh (RCPE).¹³ The Royal College of Physicians is also developing an AKI toolkit.

Patients with risk factors for AKI should be identified in primary and secondary care, and drug holidays should be considered if they become acutely ill. The detection of AKI will be facilitated by the national development of electronic AKI alerts, as advised by the RCPE AKI Consensus Conference¹⁴ and the validation of AKI risk factor calculators. There will be implications for the provision of radiology services to National Health Service (NHS) hospitals and patient pathways should be developed and overseen by AKI networks.¹⁵ The NICE guideline also recommends key areas where research should be focused that include long-term outcomes following AKI and the effect of rapid referral to renal services should be focused.

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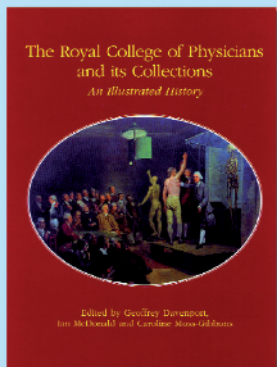
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