NATIONAL INSTITUTE FOR HEALTH AND CARE EXCELLENCE

Guideline

Acute kidney injury: prevention, detection and management

Draft for consultation, October 2019

This guideline covers preventing, detecting and managing acute kidney injury in children, young people and adults. It aims to improve assessment and detection by non-specialists, and specifies when people should be referred to specialist services. This will improve early recognition and treatment, and reduce the risk of complications and death in people with acute kidney injury.

Who is it for?

- Healthcare professionals
- Commissioners and providers
- People with or at risk of acute kidney injury and their families and carers

We have reviewed the evidence on preventing acute kidney injury in adults having iodinated contrast agents. You are invited to comment on the new and updated recommendations. These are marked as **[2019]**.

You are also invited to comment on recommendations that NICE proposes to delete from the 2013 guideline.

We have not reviewed the evidence for the recommendations shaded in grey, and cannot accept comments on them. In some cases, we have made minor wording changes for clarification.

See update information for a full explanation of what is being updated.

This draft guideline contains:

- the draft recommendations
- recommendations for research
- rationale and impact sections that explain why the committee made the 2019 recommendations and how they might affect practice
- the guideline context.

Information about how the guideline was developed is on the guideline's page on the NICE website. This includes the evidence reviews, the scope, and details of the committee and any declarations of interest.

Full details of the evidence and the committee's discussion on the 2019 recommendations are in the evidence reviews. Evidence for the 2013 recommendations is in the full version of the 2013 guideline

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Recommendations

People have the right to be involved in discussions and make informed decisions about their care, as described in your care.

Making decisions using NICE guidelines explains how we use words to show the strength (or certainty) of our recommendations, and has information about prescribing medicines (including off-label use), professional guidelines, standards and laws (including on consent and mental capacity), and safeguarding.

1.1 Assessing risk of acute kidney injury

Identifying acute kidney injury in people with acute illness

1.1.1 Investigate for acute kidney injury, by measuring serum creatinine and comparing with baseline, in adults with acute illness if any of the following are likely or present:

- chronic kidney disease (adults with an estimated glomerular filtration rate [eGFR] less than 60 ml/min/1.73 m^2 are at particular risk)
- heart failure
- liver disease
- diabetes
- history of acute kidney injury
- oliguria (urine output less than 0.5 ml/kg/hour)
- neurological or cognitive impairment or disability, which may mean limited access to fluids because of reliance on a carer
- hypovolaemia
- use of drugs with nephrotoxic potential (such as non-steroidal anti-inflammatory drugs [NSAIDs], aminoglycosides, angiotensin-converting enzyme [ACE] inhibitors, angiotensin II receptor antagonists [ARBs] and 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 may lead to obstruction
- sepsis
- deteriorating early warning scores
- age 65 years or over. **[2013]**

1.1.2 Investigate for acute kidney injury, by measuring serum creatinine 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 acute kidney injury
- oliguria (urine output less than 0.5 ml/kg/hour)
- young age, neurological or cognitive impairment or disability, which may mean limited access to fluids because of reliance on a parent or carer
- hypovolaemia
- use of drugs with nephrotoxic potential (such as NSAIDs, aminoglycosides, ACE inhibitors, ARBs and diuretics) within the past week, especially if hypovolaemic
- symptoms or history of urological obstruction, or conditions that may lead to obstruction
- sepsis
- a deteriorating paediatric early warning score
- severe diarrhoea (children and young people with bloody diarrhoea are at particular risk)
- symptoms or signs of nephritis (such as oedema or haematuria)
- haematological malignancy
- hypotension. **[2013]**

Identifying acute kidney injury in people with no obvious acute illness

1.1.3 Be aware that in adults, children and young people with chronic kidney disease and no obvious acute illness, a rise in serum creatinine may indicate acute kidney injury rather than a worsening of their chronic disease. **[2013]**

1.1.4 Ensure that acute kidney injury is considered when an adult, child or young person presents with an illness with no clear acute component and 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 acute kidney injury
- symptoms or signs of a multi-system disease affecting the kidneys and other organ systems (for example, signs or symptoms of acute kidney injury, plus a purpuric rash). **[2013]**

Assessing risk factors in adults having iodinated contrast agents

1.1.5 Before offering iodinated contrast agents to adults for non-emergency imaging, investigate for chronic kidney disease by measuring eGFR or by checking an eGFR result obtained within the past 3 months. **[2013]**

1.1.6 Before offering iodinated contrast agents to adults, assess their risk of acute kidney injury but do not delay emergency imaging. Be aware that increased risk is associated with:

- chronic kidney disease (adults with an eGFR less than 40 ml/min/1.73 m^2 are at particular risk)
- diabetes but only with chronic kidney disease (adults with an eGFR less than 40 ml/min/1.73 m^2 are at particular risk)
- heart failure
- renal transplant
- age 75 years or over
- hypovolaemia

- increasing volume of contrast agent
- intra-arterial administration of contrast agent. **[2013]**

1.1.7 Include the risks of developing acute kidney injury in the routine discussion of risks and benefits of the imaging procedure. Follow the recommendations on shared decision making in the NICE guideline on patient experience in adult NHS services. **[2013]**

Assessing risk factors in adults having surgery

1.1.8 Assess the risk of acute kidney injury in adults before surgery. Be aware that increased risk is associated with:

- emergency surgery, especially when the person has sepsis or hypovolaemia
- intraperitoneal surgery
- chronic kidney disease (adults with an eGFR less than 60 ml/min/1.73 m^2 are at particular risk)
- diabetes
- heart failure
- age 65 years or over
- liver disease
- 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. **[2013]**

1.1.9 Include the risks of developing acute kidney injury in the routine discussion of risks and benefits of surgery. Follow the recommendations on shared decision making in the NICE guideline on patient experience in adult NHS services. **[2013]**

1.2 Preventing acute kidney injury

Ongoing assessment of the condition of people in hospital

1.2.1 Follow the recommendations in the NICE guideline on acutely ill adults in hospital on the use of track and trigger systems (early warning scores) to identify adults who are at risk of acute kidney injury because their clinical condition is deteriorating or is at risk of deteriorating. **[2013]**

1.2.2 When adults are at risk of acute kidney injury, ensure that systems are in place to recognise and respond to oliguria (urine output less than 0.5 ml/kg/hour) if the track and trigger system (early warning score) does not monitor urine output. **[2013]**

1.2.3 Consider using a paediatric early warning score to identify children and young people admitted to hospital who are at risk of acute kidney injury because their clinical condition is deteriorating or is at risk of deteriorating.

- Record physiological observations at admission and then according to local protocols for given paediatric early warning scores.
- Increase the frequency of observations if abnormal physiology is detected. **[2013]**

1.2.4 If using a paediatric early warning score, use one with multiple-parameter or aggregate weighted scoring systems that allow a graded response and:

- define the parameters to be measured and the frequency of observations
- include a clear and explicit statement of the parameters, cut-off points or scores that should trigger a response. **[2013]**

1.2.5 If using a paediatric early warning score, use one with multiple-parameter or aggregate weighted scoring systems that measure:

- heart rate
- respiratory rate
- systolic blood pressure

- level of consciousness
- oxygen saturation
- temperature
- capillary refill time. **[2013]**

1.2.6 When children and young people are at risk of acute kidney injury because of risk factors in recommendation 1.1.2:

- measure urine output
- record weight twice daily to determine fluid balance
- measure urea, creatinine and electrolytes
- think about measuring lactate, blood glucose and blood gases. **[2013]**

Preventing acute kidney injury in adults having iodinated contrast agents

1.2.7 Encourage oral hydration before and after procedures using intravenous iodinated contrast agents in adults at increased risk of contrast-induced acute kidney injury (see recommendation 1.1.6). **[2019]**

1.2.8 Consider intravenous volume expansion with either isotonic sodium bicarbonate or 0.9% sodium chloride for inpatients having iodinated contrast agents if they are at particularly high risk, for example, if:

- they have an eGFR less than 30 ml/min/1.73 m^2
- they have had a renal transplant
- a large volume of contrast agent is being used
- intra-arterial administration of contrast agent is being used.

For more information on managing intravenous fluid therapy, see the NICE guideline on intravenous fluid therapy in adults in hospital. **[2019]**

1.2.9 Consider temporarily stopping ACE inhibitors and ARBs in adults having iodinated contrast agents if they have chronic kidney disease with an eGFR less than 40 ml/min/1.73 m^2. **[2013]**

1.2.10 Discuss the person's care with a nephrology team before offering iodinated contrast agents to adults on renal replacement therapy, including people with a renal transplant. **[2019]**

To find out why the committee made the 2019 recommendations on preventing acute kidney injury in adults having iodinated contrast agents and how they might affect practice, see rationale and impact.

Monitoring and preventing deterioration in people with or at high risk of acute kidney injury

1.2.11 Consider electronic clinical decision support systems (CDSS) to support clinical decision making and prescribing, but ensure they do not replace clinical judgement. **[2013]**

1.2.12 When acquiring any new CDSS or systems for electronic prescribing, ensure that any systems considered:

- can interact with laboratory systems
- can recommend drug dosing and frequency
- can store and update data on patient history and characteristics, including age, weight and renal replacement therapy
- can include alerts that are mandatory for the healthcare professional to acknowledge and review. **[2013]**

1.2.13 Seek advice from a pharmacist about optimising medicines and drug dosing in adults, children and young people with or at risk of acute kidney injury. **[2013]**

1.2.14 Consider temporarily stopping ACE inhibitors and ARBs in adults, children and young people with diarrhoea, vomiting or sepsis until their clinical condition has improved and stabilised. **[2013]**

1.3 Detecting acute kidney injury

1.3.1 Detect acute kidney injury, in line with the (p)RIFLE[1], AKIN[2] or KDIGO[3] definitions, by using any of the following criteria:

- a rise in serum creatinine of 26 micromol/litre or greater within 48 hours
- a 50% or greater rise in serum creatinine known or presumed to have occurred within the past 7 days
- a fall in urine output to less than 0.5 ml/kg/hour for more than 6 hours in adults and more than 8 hours in children and young people
- a 25% or greater fall in eGFR in children and young people within the past 7 days. **[2013]**

1.3.2 Monitor serum creatinine regularly[4] in all adults, children and young people with or at risk of acute kidney injury. **[2013]**

1.4 Identifying the cause(s) of acute kidney injury

1.4.1 Identify the cause(s) of acute kidney injury and record the details in the person's notes. **[2013]**

Urinalysis

1.4.2 Perform urine dipstick testing for blood, protein, leucocytes, nitrites and glucose in all people as soon as acute kidney injury is suspected or detected. Document the results and ensure that appropriate action is taken when results are abnormal. **[2013]**

1.4.3 Think about a diagnosis of acute nephritis and referral to the nephrology team when an adult, child or young person with no obvious cause of acute kidney injury has urine dipstick results showing haematuria and proteinuria, without urinary tract infection or trauma due to catheterisation. **[2013]**

[1] Risk, Injury, Failure, Loss, End stage renal disease, (p) refers to the paediatric classification.
[2] Acute Kidney Injury Network.
[3] Kidney Disease: Improving Global Outcomes.
[4] The 2013 guideline committee did not wish to define 'regularly' because this would vary according to clinical need but recognised that daily measurement was typical while in hospital.

Ultrasound

1.4.4 Do not routinely offer ultrasound of the urinary tract when the cause of the acute kidney injury has been identified. **[2013]**

1.4.5 When pyonephrosis (infected and obstructed kidney[s]) is suspected in adults, children and young people with acute kidney injury, offer immediate ultrasound of the urinary tract (to be performed within 6 hours of assessment). **[2013]**

1.4.6 When adults, children and young people have no identified cause of their acute kidney injury or are at risk of urinary tract obstruction, offer urgent ultrasound of the urinary tract (to be performed within 24 hours of assessment). **[2013]**

1.5 Managing acute kidney injury

Relieving urological obstruction

1.5.1 Refer all adults, children and young people with upper tract urological obstruction to a urologist. Refer immediately when one or more of the following is present:

- pyonephrosis
- an obstructed solitary kidney
- bilateral upper urinary tract obstruction
- complications of acute kidney injury caused by urological obstruction. **[2013]**

1.5.2 When nephrostomy or stenting is used to treat upper tract urological obstruction in adults, children and young people with acute kidney injury, carry it out as soon as possible and within 12 hours of diagnosis. **[2013]**

Pharmacological management

1.5.3 Do not routinely offer loop diuretics to treat acute kidney injury. **[2013]**

1.5.4 Consider loop diuretics for treating fluid overload or oedema while:

- an adult, child or young person is awaiting renal replacement therapy **or**
- renal function is recovering in an adult, child or young person not receiving renal replacement therapy. **[2013]**

1.5.5 Do not offer low-dose dopamine to treat acute kidney injury. **[2013]**

Referring for renal replacement therapy

1.5.6 Discuss any potential indications for renal replacement therapy with a nephrologist, paediatric nephrologist and/or critical care specialist immediately to ensure that the therapy is started as soon as needed. **[2013]**

1.5.7 When an adult, child or young person has significant comorbidities, discuss with them and/or their parent or carer and within the multidisciplinary team whether renal replacement therapy would offer benefit. Follow the recommendations on shared decision making in the NICE guideline on patient experience in adult NHS services.

1.5.8 Refer adults, children and young people immediately for renal replacement therapy if any of the following are not responding to medical management:

- hyperkalaemia
- metabolic acidosis
- symptoms or complications of uraemia (for example, pericarditis or encephalopathy)
- fluid overload
- pulmonary oedema. **[2013]**

1.5.9 Base the decision to start renal replacement therapy on the condition of the adult, child or young person as a whole and not on an isolated urea, creatinine or potassium value. **[2013]**

1.5.10 When there are indications for renal replacement therapy, the nephrologist and/or critical care specialist should discuss the treatment

with the adult, child or young person and/or their parent or carer as soon as possible and before starting treatment. Follow the recommendations on shared decision making in the NICE guideline on patient experience in adult NHS services. **[2013]**

Referring to nephrology

1.5.11 Refer adults, children and young people with acute kidney injury to a nephrologist, paediatric nephrologist or critical care specialist immediately if they meet criteria for renal replacement therapy in recommendation 1.5.8. **[2013]**

1.5.12 Do not refer adults, children or young people to a nephrologist or paediatric nephrologist when there is a clear cause for acute kidney injury and the condition is responding promptly to medical management, unless they have a renal transplant. **[2013]**

1.5.13 Consider discussing management with a nephrologist or paediatric nephrologist when an adult, child or young person with severe illness might benefit from treatment, but there is uncertainty as to whether they are nearing the end of their life. **[2013]**

1.5.14 Refer adults, children and young people in intensive care to a nephrology team when there is uncertainty about the cause of acute kidney injury or when specialist management of kidney injury might be needed. **[2013]**

1.5.15 Discuss the management of acute kidney injury 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 may need specialist treatment (for example, vasculitis, glomerulonephritis, tubulointerstitial nephritis or myeloma)
- acute kidney injury with no clear cause
- inadequate response to treatment
- complications associated with acute kidney injury
- stage 3 acute kidney injury (according to (p)RIFLE, AKIN or KDIGO criteria)

- a renal transplant
- chronic kidney disease stage 4 or 5. **[2013]**

1.5.16 Monitor[5] serum creatinine after an episode of acute kidney injury. Consider referral to a nephrologist or paediatric nephrologist when eGFR is 30 ml/min/1.73 m^2 or less in adults, children and young people who have recovered from an acute kidney injury. **[2013]**

1.5.17 Consider referral to a paediatric nephrologist for children and young people who have recovered from an episode of acute kidney injury but have hypertension, impaired renal function or 1+ or greater proteinuria on dipstick testing of an early morning urine sample. **[2013]**

1.6 Information and support for patients and carers

1.6.1 Discuss immediate treatment options, monitoring, prognosis and support options as soon as possible with people with acute kidney injury and/or, if appropriate, their parent or carer. Follow the recommendations on patient views and preferences and shared decision making in the NICE guideline on patient experience in adult NHS services. **[2013]**

1.6.2 Give information about long-term treatment options, monitoring, self-management and support to people who have had acute kidney injury (and/or their parent or carer, if appropriate) in collaboration with a multidisciplinary team appropriate to the person's individual needs. **[2013]**

1.6.3 Give information about future care to people needing renal replacement therapy after discharge following acute kidney injury. This should include information about the frequency and length of dialysis sessions and the preparation needed (such as having a fistula or peritoneal catheter). **[2013]**

1.6.4 Discuss the risk of developing acute kidney injury, particularly the risk associated with conditions leading to dehydration (for example, diarrhoea and vomiting) and drugs with nephrotoxic potential (including

[5] The frequency of monitoring should be based on the stability and degree of renal function at the time of discharge.

over-the-counter NSAIDs), with people who are at risk of acute kidney injury, particularly those who have:

- chronic kidney disease with an eGFR less than 60 ml/min/1.73 m^2
- neurological or cognitive impairment or disability, which may mean limited access to fluids because of reliance on a carer.

Involve parents and carers in the discussion if appropriate. **[2013]**

Terms used in this guideline

This section defines terms that have been used in a particular way for this guideline. For other definitions see the NICE glossary.

Stages of chronic kidney disease

Stage	eGFR (ml/min/1.73 m^2)	Description	Qualifier
1	≥ 90	Kidney damage, normal or increased GFR	Kidney damage (presence of structural abnormalities and/or persistent haematuria, proteinuria or microalbuminuria) for ≥ 3 months
2	60-89	Kidney damage, mildly reduced GFR	
3A	45-59	Moderately reduced GFR ± other evidence of kidney damage	GFR < 60 ml/min for ≥ 3 months ± kidney damage
3B	30-44		
4	15-29	Severely reduced GFR ± other evidence of kidney damage	
5	< 15	Established kidney failure	

Recommendations for research

As part of the 2019 update, the guideline committee made 2 new research recommendations:

Risk stratification for contrast-induced acute kidney injury

Can risk of contrast-induced acute kidney injury be stratified by eGFR thresholds?

To find out why the committee made the research recommendation see rationale and impact.

Different oral fluids and oral fluid regimens

What is the relative effectiveness and cost effectiveness of different oral fluids and different oral fluid regimens, both with and without oral N-acetylcysteine, at preventing contrast-induced acute kidney injury?

To find out why the committee made the research recommendation see rationale and impact.

Rationale and impact

This section briefly explains why the committee made the recommendations and how they might affect practice. It links to details of the evidence and a full description of the committee's discussion.

Preventing acute kidney injury in adults having iodinated contrast agents

Recommendations 1.2.7, 1.2.8 and to 1.2.10

Why the committee made the recommendations

For adults undergoing procedures with intravenous iodinated contrast agents, the evidence showed that oral fluids were as good as intravenous fluids at preventing contrast-induced acute kidney injury. The evidence did not show that any particular type of oral or intravenous fluids is most effective. The committee agreed that intravenous fluids are not necessary for outpatients, who are usually at a lower risk of contrast-induced acute kidney injury. It also agreed that only inpatients at particularly high risk needed intravenous fluids. Most of the risk factors were taken from recommendation 1.1.6 of the 2013 guideline, apart from the level of eGFR which was based on the committee's clinical knowledge and experience.

For inpatients at particularly high risk of contrast-induced acute kidney injury, the economic modelling showed that intravenous volume expansion with a regimen containing intravenous sodium chloride 0.9% and/or intravenous sodium bicarbonate provides best value.

Based on the evidence, the committee decided that intravenous volume expansion should be used only for adults at particularly high risk and that oral hydration should

be encouraged in all other adults at increased risk of contrast-induced acute kidney injury.

The committee agreed that more research on estimating the risk of contrast-induced acute kidney injury would help to inform future guidance, so made a research recommendation on the use of eGFR thresholds to stratify risk.

Although the committee agreed that oral hydration regimens were non-inferior to intravenous hydration regimens at preventing contrast-induced acute kidney injury, there was not enough comparative data to enable them to be clear about which oral fluid (if any) was most effective. Therefore, they also made a research recommendation on different oral fluids and different oral fluid regimens.

The committee agreed that it was important to discuss the person's care with a nephrology team before offering iodinated contrast agent to adults on renal replacement therapy, including people with kidney transplant. The committee members did not consider it necessary to routinely have this discussion about people with other contraindications to intravenous fluids, because they agreed that this decision was better made by individual healthcare professionals. Therefore, the committee decided to update the 2013 recommendation accordingly.

How the recommendations might affect practice

The recommendations may result in lower resource use for outpatient procedures because people will not need to be admitted to hospital to be given intravenous fluids for volume expansion before they are given a contrast agent.

The recommendation on intravenous volume expansion reflects current practice so there should be no change in practice for inpatients who are at particularly high risk of contrast-induced acute kidney injury. There may be reduced resource use for lower risk inpatients who will not need intravenous fluids.

Full details of the evidence and the committee's discussion are in evidence review A: preventing contrast induced acute kidney injury.

Return to recommendations

Context

Acute kidney injury, previously known as acute renal failure, encompasses a wide spectrum of injury to the kidneys, not just kidney failure. The definition of acute kidney injury has changed in recent years, and detection is now mostly based on monitoring creatinine levels, with or without urine output. Acute kidney injury is increasingly being seen in primary care in people without any acute illness, and awareness of the condition needs to be raised among primary care health professionals.

Acute kidney injury is seen in 13–18% of all people admitted to hospital, with older adults being particularly affected. These people are usually under the care of healthcare professionals practising in specialties other than nephrology, who may not always be familiar with the optimum care of people with acute kidney injury. The number of inpatients affected by acute kidney injury means that it has a major impact on healthcare resources. The costs to the NHS of acute kidney injury (excluding costs in the community) are estimated to be between £434 million and £620 million per year, which is more than the costs associated with breast cancer, or lung and skin cancer combined.

There have been concerns that suboptimal care may contribute to the development of acute kidney injury. In 2009, the National Confidential Enquiry into Patient Outcome and Death (NCEPOD) reported the results of an enquiry into the deaths of a large group of adults with acute kidney injury. This described systemic deficiencies in the care of people who died from acute kidney injury: only 50% of these had received ‘good’ care. Other deficiencies in the care of people who died of acute kidney injury included failures in acute kidney injury prevention, recognition, therapy and timely access to specialist services. This report led to the Department of Health’s request for NICE to develop its first guideline on acute kidney injury in adults and also, importantly, in children and young people.

This guideline emphasises early intervention and stresses the importance of risk assessment and prevention, early recognition and treatment. It is primarily aimed at the non-specialist clinician, who will care for most people with acute kidney injury in a variety of settings. The recommendations aim to address known and unacceptable

variations in recognition, assessment, initial treatment and referral for renal replacement therapy. The inpatient mortality of acute kidney injury varies considerably, depending on its severity, setting (intensive care or not), and many other patient-related factors, but in the UK might typically be 25–30% or more. In view of its frequency and mortality rate, prevention or amelioration of just 20% of cases of acute kidney injury would prevent a large number of deaths and substantially reduce complications and their associated costs.

In 2017, new evidence was identified by the NICE surveillance team on preventing contrast-induced acute kidney injury. Topic experts, including those who helped to develop the 2013 guideline, agreed that a significant new study could have an impact on the recommendations. This evidence has been reviewed and the recommendations in this area updated.

Finding more information and resources

To find out what NICE has said on topics related to this guideline, see our web page on acute kidney injury.

Update information

We have reviewed the evidence on preventing acute kidney injury in adults having iodinated contrast agents.

Recommendations are marked **[2019]** if the evidence has been reviewed.

Recommendations that have been deleted or changed

We propose to delete some recommendations from the 2013 guideline. Table 1 sets out these recommendations and includes details of replacement recommendations. If there is no replacement recommendation, an explanation for the proposed deletion is given.

In recommendations shaded in grey and ending **[2013]**, we have not reviewed the evidence. In some cases, minor changes have been made – for example, to update links, or bring the language and style up to date – without changing the intent of the recommendation. Minor changes are listed in table 2.

1 See also the previous NICE guideline and supporting documents.

2 **Table 1 Recommendations that have been deleted**

Recommendation in 2013 guideline	Comment
Offer intravenous volume expansion to adults having iodinated contrast agents if: they are at increased risk of contrast-induced acute kidney injury because of risk factors in recommendation 1.1.6, or they have an acute illness. Offer either isotonic sodium bicarbonate or 0.9% sodium chloride. (1.2.7)	Replaced by: Encourage oral hydration before and after procedures using intravenous iodinated contrast agents in adults at risk of contrast-induced acute kidney injury (see recommendation 1.1.6). (1.2.7) Consider intravenous volume expansion with either isotonic sodium bicarbonate or 0.9% sodium chloride for inpatients having iodinated contrast agents if they are at particularly high risk, for example, if: • they have an eGFR less than 30 ml/min/1.73 m^2 • they have had a renal transplant • a large volume of contrast agent is being used • intra-arterial administration of contrast agent is used. (1.2.8)
Discuss care with a nephrology team before offering iodinated contrast agent to adults with contraindications to intravenous fluids if: • they are at increased risk of contrast-induced acute kidney injury, or • they have an acute illness, or • they are on renal replacement therapy (1.2.10)	Replaced by: Discuss the person's care with a nephrology team before offering iodinated contrast agents to adults on renal replacement therapy, including people with a renal transplant. (1.2.10)

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Table 2 Minor changes to recommendation wording (no change to intent)

Recommendation numbers in current guideline	Comment
1.6.5	Important information on ensuring that emergency imaging is not delayed by risk assessment was moved from the end of the recommendation to the main body of the recommendation. This was done to make the information more prominent and ensure that it would not be missed.