NATIONAL INSTITUTE FOR HEALTH AND   
CARE EXCELLENCE

Quality standards

Briefing paper: Acute kidney injury

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1. Introduction

This briefing paper presents a structured overview of potential quality improvement areas for acute kidney injury (AKI). It supports the discussion and prioritisation of quality improvement areas for development into draft quality statements and measures for public consultation.

This briefing paper includes a brief description of the topic, a summary of each of the suggested quality improvement areas and supporting information.

Recommendations selected from the key development sources are included to help in considering potential statements and measures.

* 1. Development sources

The key development sources referenced in this briefing paper are:

[Acute kidney injury: prevention, detection and management. NICE guideline NG148](https://www.nice.org.uk/guidance/ng148) (2019).

[Acute kidney injury. NICE clinical knowledge summary](https://cks.nice.org.uk/topics/acute-kidney-injury/) (2021)

[Acute kidney injury. The Renal Association Clinical Practice Guideline](https://ukkidney.org/health-professionals/guidelines/guidelines-commentaries) (2019). Will be reviewed in 2024.

[The communication of critical and unexpected pathology results. The Royal College of Pathologists guideline](https://www.rcpath.org/profession/guidelines/cross-specialty-publications.html) (2017)

1. Overview
   1. Focus of quality standard

This quality standard will cover preventing, detecting and managing acute kidney injury in adults, young people and children.

It will update and replace the existing [NICE quality standard for acute kidney injury](https://www.nice.org.uk/guidance/qs76) (QS76).

* 1. Definition

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 can affect anyone, but it’s more common in older people and people who are already unwell with other medical conditions. It can be caused by many things, such as dehydration, a serious infection, a blockage in the urinary tract or by taking certain medicines that can harm the kidneys. It can also happen during some scans or X-rays that use dye, for example to show blood flow in the heart or blood vessels. The kidneys stop harmful substances from building up in the body, so acute kidney injury can become life-threatening if it’s not treated quickly.

* 1. Incidence

The incidence of AKI is increasing, possibly as a result of the number of people in the population who are elderly or at-risk with multiple comorbidities. Improved detection of AKI is also likely to have contributed to this rise.

Acute kidney injury is seen in 13% to 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.

Community-acquired AKI is thought to be up to three times more common than hospital-acquired AKI [[Mesropian et al](https://www.ncbi.nlm.nih.gov/pubmed/26890822), 2016].

A [UK Renal Registry report on the nationwide collection of AKI warning test scores from 2018](https://ukkidney.org/audit-research/publications-presentations/report/acute-kidney-injury-aki-england-report-nationwide#:~:text=The%20unadjusted%20rate%20of%20AKI,32%25%20with%20hospital%20acquired%20AKI.) indicated that:

* the unadjusted rate of AKI episodes in England was 12,300 per million population, with significant variation between CCGs - 5,300 to 20,700 per million population.
* 71% of people with an AKI episode had a hospital stay - 39% with community acquired and 32% with hospital acquired AKI. Median length of stay was 12 days in hospital and was more than double in hospital acquired than in community acquired AKI.
* 18% of people with an AKI episode died within 30 days of the first alert. This increased with peak AKI stage – 13% for stage 1, 29% for stage 2 and 33% for stage 3.
* Mortality within 30 days of hospital acquired AKI was 24%. Mortality at 30 days was higher in those from lower socio-economic background and in winter (January to March).

The estimated cost of AKI-related inpatient care to the NHS in England over a one year period is around £1 billion, accounting for about 1% of the NHS budget [[Kerr et al](https://academic.oup.com/ndt/article/29/7/1362/1844079), 2014].

1. Summary of suggestions

NHS England’s Renal Services Transformation Programme has suggested a number of additional areas of care that could be included in the quality standard (see Appendix 1 for full details). These have been combined with the areas currently included in the quality standard and are summarised in table 1 for consideration.

Table 1 Summary of suggested quality improvement areas

| Area for improvement | Source |
| --- | --- |
| **Preventing acute kidney injury in people at risk**   * Raising awareness in people at risk * Monitoring and preventing deterioration in people at risk | RSTP & QS76  RSTP & QS76 |
| **Detecting acute kidney injury**   * Identifying AKI in people with an illness with no clear acute component * AKI warning stage test results | QS76  RSTP |
| **Managing acute kidney injury**   * Identifying the cause - urine dipstick test * Preventing deterioration in people with AKI * Discussion with a nephrologist * Referral for renal replacement therapy | QS76  RSTP  QS76  QS76 |
| **Post-acute kidney injury care**   * Discharge planning * Follow-up and review * Ongoing monitoring | RSTP  RSTP  RSTP |
| **Additional areas**   * Local monitoring systems * Coding of acute kidney injury * Quality improvement | RSTP  RSTP  RSTP |

Abbreviations:

* QS76, NICE quality standard 76 (acute kidney injury)
* RSTP, NHSE Renal Services Transformation Programme

1. Suggested improvement areas

Section 4 presents a summary of the suggested improvement areas, with recommendations that may support statement development and information on current UK practice.

* 1. Preventing acute kidney injury in people at risk

### Raising awareness in people at risk

It was suggested the importance of maintaining kidney health should be discussed with people who are at risk of acute kidney injury. This should include the risks of developing acute kidney injury during and after illness and the risks of drugs that can cause or exacerbate kidney injury (including over the counter NSAIDs).

The rationale for statement 1 in the current quality standard indicates that many people who develop acute kidney injury are not aware of the potential causes and how to prevent it. Acute kidney injury can be prevented by educating people about the risks and how to stop it from developing. Better education delivered in primary care settings, outpatient settings and on discharge from hospital will help to reduce the number of people developing acute kidney injury outside hospital and the number being admitted to hospital with the condition.

#### NICE’s guideline on acute kidney injury (NG148)

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 that can cause or exacerbate kidney injury (including 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 m2
* 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.

#### Current NICE quality standard for AKI (QS76)

Statement 1: People who are at risk of acute kidney injury are made aware of the potential causes.

#### Current UK practice

[Analysis of NHS Business Services Authority prescription data to support national indicator development for chronic kidney disease](https://www.nice.org.uk/standards-and-indicators/qofindicators/the-percentage-of-patients-excluding-those-on-the-ckd-register-prescribed-long-term-chronic-oral-non-steroidal-anti-inflammatory-drugs-nsaids-who-have-had-an-egfr-measurement-in-the-preceding-12-months) indicated that there were 496,092 long-term users of oral non-steroidal anti-inflammatory drugs (NSAIDS) in England in 2021 (people who had oral NSAIDS prescribed for 12 or more months in the previous 24 months). This equates to 1% of the adult population registered with a GP. People over 65 years were more likely to be long-term users of NSAIDS, with 1.7% of the registered population aged 65+ in this category.

The analysis also considered increased risk of acute kidney injury from concurrent prescribing, long-term users of oral NSAIDs who are also prescribed diuretics and ACE inhibitors or Angiotensin II receptor blockers. The prescribing data indicated that in 2021, 8.2% of long-term NSAID users were also prescribed diuretics and ACE inhibitors or Angiotensin II receptor blockers for at least one month in the previous 24, 4.5% for at least 12 months in the previous 24 and 0.9% for all of the previous 24 months.

### Monitoring and preventing deterioration in people at risk

The rationale for statement 3 in the current quality standard indicates that acute kidney injury can be a 'silent' condition with no external signs or symptoms. Because many episodes of acute kidney injury are preventable, identifying people who are at risk and monitoring their clinical condition is important. Changes in serum creatinine level and urine output are indicators of risk, and it is important that these biomarkers are monitored alongside a 'track and trigger' system. Recognising and responding to these changes will ensure appropriate and quick intervention to prevent acute kidney injury developing.

It was also suggested that advice about optimising medicines and drug dosing should be available to those who are at risk of acute kidney injury.

#### NICE’s guideline on acute kidney injury (NG148)

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.

1.2.6 When children and young people are at risk of acute kidney injury because of risk factors listed in the recommendation in the section on identifying acute kidney injury in people with acute illness:

* 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.

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.

1.3.2 Monitor serum creatinine regularly in all adults, children and young people with or at risk of acute kidney injury. Frequency of monitoring should vary according to clinical need, but daily measurement is typical while in hospital.

#### NICE’s clinical knowledge summary on acute kidney injury

For people at risk of acute kidney injury (AKI):

* Use clinical judgement to decide the frequency of creatinine monitoring, taking into account the individual circumstances.
  + Regularly monitor renal function in people with chronic diseases including chronic kidney disease, heart failure, liver disease, and diabetes.
  + Closely monitor renal function in people with acute illness, especially if there is vomiting and/or diarrhoea, or signs of dehydration.
* Review regular medication and, if possible, avoid drugs that are potentially harmful to the kidneys. Advise the person to seek medical advice in the event of acute illness (for example diarrhoea or vomiting) to discuss temporarily stopping medications that may increase the risk of AKI such as angiotensin converting enzyme inhibitors, angiotensin II receptor blockers, and diuretics.
  + For more information, seek advice from a pharmacist about optimizing medicines and drug dosing.

#### Renal Association guideline on acute kidney injury

We recommend that:

* in-patients deemed at high risk of AKI should be closely monitored for AKI, particularly if there has been a new exposure. Urine output should be monitored and serum creatinine tested daily (for adults) or regularly (for paediatric patients, reflecting the potential burden of venepuncture) until at least 48 hours after the period of increased risk has elapsed
* out-patients deemed at high risk of AKI should be closely monitored for AKI if there has been a new exposure. This should include regular monitoring of the serum creatinine until at least 48 hours after the period of increased risk has elapsed. For paediatric patients, monitoring should be undertaken by secondary care but may be in an out-patient or in-patient setting depending on clinical circumstances.
* a documented review is undertaken of all medications in those at risk of or with identified AKI, in order to withhold medications which may adversely affect renal function.
* therapeutic drug dosing must be adapted to altered kinetics in AKI.
* regular re-evaluation of drug dosing is undertaken as renal function changes and as renal support is initiated, altered or discontinued.

#### Current NICE quality standard for AKI (QS76)

Statement 3: People in hospital who are at risk of acute kidney injury have their serum creatinine level and urine output monitored.

#### Current UK practice

[An audit to determine the incidence of acute kidney injury in non-critically ill hospitalised children](https://adc.bmj.com/content/102/Suppl_1/A174.2) indicated that 97% of children at risk in one hospital had their SCr measured as per NICE guidance. A retrospective evaluation indicated that 1 in 50 non-critical inpatients in paediatric wards had AKI, however there was significant under-diagnosis.

[A study of the incidence of paediatric acute kidney injury in six English hospitals](https://www.frontiersin.org/articles/10.3389/fped.2020.00029/full) concluded that the incidence of AKI was 10.8% with most patients under the age of 6 years and with AKI stage 1. Recognition and management of AKI was seen in just over 25% children. The study suggested that there is a need to improve recognition of AKI in hospitalised children in the UK.

### Issues for consideration

* Should prevention of acute kidney injury be prioritised for inclusion in the quality standard?
* What is the priority for improvement?
* Should we focus on a specific population or setting?
* Is data readily available to measure progress?
  1. Detecting acute kidney injury

### Identifying acute kidney injury in people with an illness with no clear acute component

The rationale for statement 2 in the current quality standard indicates that people with acute kidney injury may present with no obvious signs or symptoms of this condition in primary or secondary care settings. Early assessment for acute kidney injury when making decisions about treatment for people who are at risk may prevent delays in treating the condition, leading to improved outcomes. It is important for healthcare professionals to be aware of when it is necessary to assess the risk of acute kidney injury so that a diagnosis is not missed.

#### NICE’s guideline on acute kidney injury (NG148)

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 as shown in table1, 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).

#### Current NICE quality standard for AKI (QS76)

Statement 2: People who present with an illness with no clear acute component and 1 or more indications or risk factors for acute kidney injury are assessed for this condition.

#### Current UK practice

No published studies on current practice were highlighted for this suggested area for quality improvement; this area is based on stakeholder’s knowledge and experience.

### AKI warning stage test results

The importance of timely and effective communication of AKI warning stage test results to primary care was highlighted. It was suggested that communication should be tailored based on severity with stage 2 or 3 results communicated within 2 hours, usually by telephone, and stage 1 results within 24 hours.

It is also important for there to be a timely and effective response to AKI warning stage test results in primary care. It was suggested that this should be tailored based on severity and clinical context.

#### The Royal College of Pathologists guideline on the communication of critical and unexpected pathology results

Rapid communication within 2 hours, usually by telephone, for serum creatinine results greater than or equal to 354 umol/L. Agree, by local consensus, higher thresholds for phoning results in patients with known kidney disease including those on dialysis. Specific local cut points likely to be required for babies and neonates.

Pathology providers have a responsibility to put mechanisms in place that allow the identification and rapid communication of critical and unexpected laboratory test results. It would also be expected that pathology providers negotiate with secondary care clinicians, GPs, other members of the clinical team and out-of-hours primary care providers to ensure robust mechanisms are in place so that appropriate action is taken following rapid communication of such results.

#### NICE’s clinical knowledge summary on acute kidney injury

Respond to AKI warning stage test results within an appropriate timescale using clinical judgment, bearing in mind that certain clinical features will prompt an earlier review, for example, poor urine output, evidence of hyperkalaemia, previous AKI, known CKD stage 4 or 5 or renal transplant, frailty, chronic disease such as diabetes or heart failure, suspected intrinsic kidney disease or urinary tract obstruction. As a guide:

* If AKI warning stage 1 (current creatinine 1.5 or more times the baseline level or creatinine rise more than 26 micromol/L or greater within 48 hours) and there is a:
  + Low pre-test probability of AKI (stable clinical context), consider clinical review within 72 hours of the result.
  + High pre-test probability of AKI (in the context of acute illness), consider clinical review within 24 hours of the result.
* If AKI warning stage 2 (current creatinine two or more times the baseline level) and there is a:
  + Low pre-test probability of AKI (stable clinical context), consider clinical review within 24 hours of the result.
  + High pre-test probability of AKI (in the context of acute illness), consider clinical review within 6 hours of the result.
* If AKI warning stage 3 (current creatinine three or more times the baseline level, or creatinine 1.5 times baseline and more than 354 micromol/L) and there is a:
  + Low pre-test probability of AKI (stable clinical context), consider clinical review within 6 hours of the result.
  + High pre-test probability of AKI (in the context of acute illness), consider immediate admission.

#### Current UK practice

NHS England’s patient safety team highlighted that the 2014 [patient safety alert](https://www.england.nhs.uk/patientsafety/wp-content/uploads/sites/32/2014/06/psa-aki2.pdf) on standardising the early identification of Acute Kidney Injury based on the [national algorithm](https://www.england.nhs.uk/akiprogramme/aki-algorithm/) remains an [enduring standard](https://www.england.nhs.uk/patient-safety/patient-safety-alerts/enduring-standards/standards-that-remain-valid/cross-specialty-safety/) that organisations should adhere to. The algorithm should be integrated into organisations’ local laboratory information systems and test results sent to local patient management systems. The original patient safety alert confirmed that the approach to communicating the AKI test result would be developed locally depending on resources and systems available. The [GIRFT national speciality report on Renal Medicine](https://www.gettingitrightfirsttime.co.uk/medical-specialties/renal-medicine/) 2021 reported that more than 90% of English laboratories now generate automatic warning reports for AKI stages.

[A study of the impact of the NHS electronic-alert system on the recognition and management of AKI in acute medicine](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6454355/) in 2016 in the West Midlands indicated that 73% of AKI cases had a documented diagnosis. Stage 1 AKI was the least likely to be documented. Stage 2 and 3 were documented in approximately 90% of cases.

Issues for consideration

* Should detection of acute kidney injury be prioritised for inclusion in the quality standard?
* What is the priority for improvement?
* Could we focus on a specific population or setting?
* Is data readily available to measure progress?
  1. Managing acute kidney injury

### Identifying the cause - urine dipstick test

The rationale for statement 4 in the current quality standard indicates that understanding the cause of acute kidney injury by testing the urine for blood and protein is important for guiding further specialised investigations and appropriate treatments. Urine dipstick testing is a simple, effective and inexpensive diagnostic test to identify underlying conditions that can be treated to either prevent acute kidney injury or reduce its severity, thus avoiding more serious consequences.

#### NICE’s guideline on acute kidney injury (NG148)

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.

#### Current NICE quality standard for AKI (QS76)

Statement 4: People have a urine dipstick test performed as soon as acute kidney injury is suspected or detected.

#### Current UK practice

The [NEPHwork National AKI Audit](https://ukkidney.org/audit-research/projects/nephwork) (2019) found that 42% of people hospitalised with AKI stage 2 or 3 (989 episodes) had a urinalysis test recorded. Compliance was lower when the admitting speciality was Surgery (32%).

[A study of the impact of the NHS electronic-alert system on the recognition and management of AKI in acute medicine](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6454355/) in 2016 indicated that 50% of AKI cases had urinalysis.

[A study of the incidence of Paediatric Acute Kidney Injury Identified Using an AKI E-Alert Algorithm in Six English Hospitals](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7026188/) published in 2020 compared management of children where AKI was recognised and not recognised. 50% of children with recognised AKI had a urine dipstick compared with 14% of those where AKI was not recognised.

#### **Preventing deterioration in people with AKI**

The importance of effective clinical management of people with heart failure with worsening renal function or acute kidney injury was highlighted. It was suggested that there should be careful consideration of risks and benefits before renin-angiotensin-aldosterone system inhibitors (RAAS) are stopped in people with heart failure with reduced left ventricular ejection fraction (HFrEF).

#### NICE’s clinical knowledge summary on acute kidney injury

For people with Stage 1 acute kidney injury, who do not have an indication for admission, referral, or specialist input:

* Consider stopping potentially nephrotoxic medications (for example angiotensin-converting enzyme inhibitors, angiotensin II receptor antagonists, nonsteroidal anti-inflammatory drugs, and diuretics) or adjusting the doses of medication in relation to renal function. Seek specialist advice if unsure.
  + For more information, see the Think Kidneys documents [Acute kidney injury - potentially problematic drugs and actions to take in primary care](https://www.thinkkidneys.nhs.uk/aki/wp-content/uploads/sites/2/2016/07/Primary-Care-Advice-for-medication-review-in-AKI-.pdf) and [Guidelines for medicines optimisation in patients with acute kidney injury](https://www.thinkkidneys.nhs.uk/aki/wp-content/uploads/sites/2/2015/06/Medicines-optimisation-toolkit-for-AKI-FINAL.pdf).
  + Information on dose adjustment in renal impairment is available from the British National Formulary ([BNF](https://bnf.nice.org.uk/)) or the manufacturers' Summary of Product Characteristics (available at [www.medicines.org.uk/emc](file:///\\nice.nhs.uk\data\H&SC\QS\Work%20programme\1.%20QS%20in%20development\Acute%20Kidney%20Injury\5.%20QSAC%20prioritisation%20meeting\www.medicines.org.uk\emc)).

#### Renal Association guideline on acute kidney injury

We recommend that:

* a documented review is undertaken of all medications in those at risk of or with identified AKI, in order to withhold medications which may adversely affect renal function.
* therapeutic drug dosing must be adapted to altered kinetics in AKI.
* regular re-evaluation of drug dosing is undertaken as renal function changes and as renal support is initiated, altered or discontinued.

#### Current UK practice

The [NEPHwork National AKI Audit](https://ukkidney.org/audit-research/projects/nephwork) (2019) found that 81% of people hospitalised with AKI stage 2 or 3 (989 episodes) had a medication review (dose adjustments and discontinuation) within 6 hours of admission.

[A study of the impact of the NHS electronic-alert system on the recognition and management of AKI in acute medicine](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6454355/) in 2016 indicated that 81.5% of people with AKI who were taking nephrotoxic medication had it stopped.

### Discussion with a nephrologist

The rationale for statement 5 in the current quality standard highlights that input from nephrologists to the management of acute kidney injury is needed as soon as possible for people who are at risk of their condition worsening or of adverse outcomes. This helps to ensure that people get the specialist care they need to help their condition improve and to prevent it from deteriorating further.

#### NICE’s guideline on acute kidney injury (NG148)

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 as shown in table 1.

#### Current NICE quality standard for AKI (QS76)

Statement 5: People with acute kidney injury have the management of their condition discussed with a nephrologist as soon as possible, and within 24 hours of detection, if they are at risk of intrinsic renal disease or have stage 3 acute kidney injury or a renal transplant.

#### Current UK practice

The [NEPHwork National AKI Audit](https://ukkidney.org/audit-research/projects/nephwork) (2019) indicated that 62% of renal services had communication guidance to local hospitals to ensure prompt access to renal specialists to discuss cases; including written criteria to ensure safe transfer. In addition, 88% of renal services indicated that there was communication guidance with local primary care to ensure prompt access to renal specialists to discuss cases.

### Referral for renal replacement therapy

The rationale for statement 6 in the current quality standard indicates that it is important to ensure that people with acute kidney injury who need treatment receive it in the right care setting (such as an intensive care unit or renal unit) at the right time, and that delays in treatment that put people at risk are avoided. This can be achieved through immediate referral supported by effective referral and transfer protocols that prioritise people with the greatest need. Prompt treatment offers potential benefits that include preventing further deterioration of renal function, improving chances of renal recovery, shorter hospital stays, lower mortality and better long‑term outcomes.

#### NICE’s guideline on acute kidney injury (NG148)

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.

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.

#### Current NICE quality standard for AKI (QS76)

Statement 6: People with acute kidney injury who meet the criteria for renal replacement therapy are referred immediately to a nephrologist or critical care specialist.

#### Current UK practice

[GIRFT](https://www.gettingitrightfirsttime.co.uk/medical-specialties/renal-medicine/) has identified significant delays in the transfer of patients with advanced AKI from referring hospitals to renal centres:73% of renal centres report delays in transfer of more than 24 hours. This is supported by HES data which indicates a significant variation in the time from admission to first dialysis in AKI: 4.3 days for those patients admitted directly to a hospital with a renal centre compared with an average 9.2 days for patients initially admitted to a referring hospital. Factors contributing to inappropriate delay include lack of bed access in trusts with renal centres and lack of an agreed inter-hospital transfer standard: only 58% of renal centres reported a written transfer protocol.

Issues for consideration

* Should managing AKI be prioritised for inclusion in the quality standard?
* What is the priority for improvement?
* Could we focus on a specific population or setting?
* Is data readily available to measure progress?
  1. Post-acute kidney injury care

### Discharge planning

There was a suggestion that, before and after discharge, it is important to involve people with acute kidney injury and their family and carers in planning their follow-up care. This should include providing information about maintaining kidney health as well as arrangements for follow-up reviews and support. Ideally the person should receive a person focussed/friendly copy of their discharge details rather than a copy of the details sent to the GP to empower them to take ownership of their care.

The accuracy of discharge hand over to GPs was highlighted, including confirmation of a diagnosis of acute kidney injury. Key information should include: AKI stage and reason, degree of kidney recovery, baseline and discharge serum creatinine (SCr), is SCr stable or improving, reasons for medication changes and evidence of communication with person with AKI and family or carers. It was suggested that it is important to ensure realistic timescales that reflect constraints in primary care are included in the discharge arrangements e.g. requests for repeat bloods and home visits.

It was suggested that the heart failure hospital team should be notified of discharge of people with heart failure, particularly when medication has been reduced or stopped.

#### NICE’s guideline on acute kidney injury (NG148)

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.

#### NICE’s clinical knowledge summary on acute kidney injury

Ensure that any mention of AKI in a person's hospital discharge letter is documented in their notes to alert healthcare professionals to the increased risk of further episodes of AKI and of developing chronic kidney disease.

Offer written information about AKI and its implications, for example, the leaflet on [Understanding acute kidney injury](https://www.thinkkidneys.nhs.uk/aki/wp-content/uploads/sites/2/2017/12/LR-AW-Kidney-Care-UK-KCL001-Acute-Kidney-Injury-updated-logo.pdf) from Kidney Care UK.

#### Renal Association guideline on acute kidney injury

We recommend that:

* the discharge summary should include a record of AKI detected whilst in hospital, its maximum stage, aetiology, the need for renal support (temporary / ongoing), and discharge renal function, if dialysis-independent
* the discharge summary should include specific recommendations on the need for immediate, post-discharge monitoring of renal function, advice on drug therapy that may have been implicated in the episode (e.g. avoidance, scope for re-introduction, future sick day guidance), and information offered to the patient, relatives and / or carers
* the discharge summary should link to relevant local guidelines, advise on the need for documentation of the AKI in the primary care record and note the need for registration on the primary care CKD register if residual CKD exists at the time of discharge

#### Current UK practice

[The UK Renal Registry Acute Kidney injury in England report](https://ukkidney.org/audit-research/publications-presentations/reports) (2018) identified for each hospital the percentage of AKI episodes that were associated with hospitalisations that were coded in HES using the International Classification of Diseases diagnostic code for AKI (N17). HES coding was better the higher the stage of AKI and there was no clear difference between HES coding for renal and acute non-renal hospitals. Generally, HES coding for AKI was poor in paediatric hospitals.

The [2021 GIRFT report on Renal Medicine](https://www.gettingitrightfirsttime.co.uk/medical-specialties/renal-medicine/) indicated that when AKI alerts are compared with clinical coding practice in English trusts, 81% of AKI3 cases have an N17 code (range 57% –98%), 69% of AKI2 (range 43%–97%) and 47% of AKI1 (range 19%–94%). There is no evidence that trusts with a renal centre code with any greater accuracy. An NHS England Commissioning for Quality and Innovation (CQUIN) promoted reporting of AKI in discharge summaries, and it is likely that this has led to improvement of AKI coding.

The [NEPHwork National AKI Audit](https://ukkidney.org/audit-research/projects/nephwork) (2019) found that AKI was mentioned on the discharge letter for 72% of people hospitalised with AKI stage 2 (357 episodes) and 87.7% of people hospitalised with AKI stage 3 (325 episodes). The discharge letter included GP instructions regarding medicine and blood tests when applicable for 66% of people hospitalised with AKI stage 2 or 3 (553 episodes). Follow-up of unresolved renal function was mentioned on the discharge letter when applicable for 62% of people hospitalised with AKI stage 2 or 3 (370 episodes).

An [NIHR report on Primary Care Management of Acute Kidney Injury in NHS Bury CCG](https://arc-gm.nihr.ac.uk/media/Resources/Kidney%20Health/Primary%20Care%20Management%20of%20Acute%20Kidney%20Injury%20in%20NHS%20Bury%20CCG%20April%2019%20-%20Final%20Version.pdf) indicated that in 2017-18 72% of episodes of admissions complicated by AKI had AKI noted in the discharge summary. Following a range of support and education activities in GP practices between 2016 and 2018, 50% of episodes of AKI reported on discharge summaries in 2017-18 were read coded in the electronic patient record, with significant variation across GP practices.

### Follow-up and review

The importance of follow-up review for all people with acute kidney injury was emphasised. Timing is likely to vary depending on other health conditions and needs. It was suggested that this should be arranged prior to discharge if there are clinical concerns, or a risk of a delay and it should be clear if follow-up is with a GP or the hospital.

The importance of reviewing medication following AKI was also highlighted. It is important to understand why drugs were stopped or altered and when or if drugs can be restarted. It was suggested that management of medication during end-of-life care for people with heart failure and acute kidney injury should focus on symptom control.

#### NICE’s clinical knowledge summary on acute kidney injury

Review the need for long-term medications stopped during an episode of AKI.

* For more information see the [Think Kidneys document When or if to restart ACEI, ARB, diuretics and other antihypertensive drugs after an episode of AKI](https://www.thinkkidneys.nhs.uk/aki/wp-content/uploads/sites/2/2016/02/When-to-restart-drugs-stopped-during-AKI-final.pdf).

#### Renal Association guideline on acute kidney injury

We recommend that:

* formal post-discharge nephrology review should be arranged:
  + within 90 days for those with residual CKD stage G4 at hospital discharge
  + within 30 days for those with residual CKD stage G5 (non-dialysis-requiring) at hospital discharge
  + within 30 days for those with ongoing dialysis requirements at the time of hospital discharge

#### NICE’s quality standard on medicines optimisation (QS120)

Statement 5: People discharged from a care setting have a reconciled list of their medicines in their GP record within 1 week of the GP practice receiving the information, and before a prescription or new supply of medicines is issued.

#### Current UK practice

An [NIHR report on Primary Care Management of Acute Kidney Injury in NHS Bury CCG](https://arc-gm.nihr.ac.uk/media/Resources/Kidney%20Health/Primary%20Care%20Management%20of%20Acute%20Kidney%20Injury%20in%20NHS%20Bury%20CCG%20April%2019%20-%20Final%20Version.pdf) indicated that in 2017-18

* 44% of those admitted to hospital with a complication of AKI had a medication review in primary care within 1 month of discharge (71% where AKI was Read coded on the patient record).
* 72% of those admitted to hospital with a complication of AKI had serum creatinine checked within 3 months (90% where AKI was Read coded on the patient record).
* 46% of those admitted to hospital with a complication of AKI received written information about AKI (83% where AKI was Read coded on the patient record).

### Ongoing monitoring

People who have had AKI are at risk of recurrence and of progressive chronic kidney disease. It was suggested that tailored and timely monitoring of kidney function is important and that that urine ACR should be checked at 3 months. The importance of liaising with nephrology if kidney recovery is poor was also highlighted.

#### NICE’s clinical knowledge summary on acute kidney injury

Following an episode of acute kidney injury (AKI), care should become focused on monitoring and prevention of further episodes.

If a person already has chronic kidney disease and has had one or more episodes of AKI, refer to a nephrologist (if not already done), even if renal function returns to the person's baseline level.

In a person who has recovered from an episode of acute kidney injury:

* Monitor serum creatinine. Frequency of monitoring should be based on the stability and degree of renal function at the time of discharge (if they have been in hospital).
* Consider referral to a nephrologist when estimated glomerular filtration rate (eGFR) is 30 mL/min/1.73 m2or less.
* If there is residual renal impairment, manage according to local chronic kidney disease guidelines.
* Monitor people for the development or progression of CKD for at least 3 years after acute kidney injury (longer for people with acute kidney injury stage 3) even if eGFR has returned to baseline.

#### Renal Association guideline on acute kidney injury

We recommend that:

* all patients re-starting potential culprit drugs after an episode of AKI should have their serum creatinine and potassium re-measured 1-2 weeks after this and after any subsequent dose titration

#### NICE’s quality standard on chronic kidney disease in adults (QS5)

Statement 1: Adults with, or at risk of, chronic kidney disease (CKD) have eGFRcreatinine and albumin:creatinine ratio (ACR) testing at the frequency agreed with their healthcare professional.

#### Current UK practice

No published studies on current practice were highlighted for this suggested area for quality improvement; this area is based on stakeholder’s knowledge and experience.

Issues for consideration

* Should post-AKI care be prioritised for inclusion in the quality standard?
* What is the priority for improvement?
* Could we focus on a specific population or setting?
* Is data readily available to measure progress?
  1. Additional areas

### Summary of suggestions

The improvement areas below were suggested as part of the stakeholder engagement exercise. However, they were felt to be either unsuitable for development as quality statements, outside the remit of this particular quality standard referral or need further discussion by the committee to establish potential for statement development.

There will be an opportunity to discuss these areas at the end of the workshop.

Table 2 Summary of information available for additional areas

| Suggested area for improvement | Within remit of NICE QS | In scope | Guideline recs | Relevant  existing QS |
| --- | --- | --- | --- | --- |
| Local monitoring systems | yes | yes | yes (consider only) | no |
| Coding of acute kidney injury | no | no | yes | no |
| Quality improvement within Integrated Care Systems | no | no | no | no |

### Local monitoring systems

There was a suggestion that it is important to establish local monitoring systems to prevent deterioration in people with or at high risk of acute kidney injury. Although there are recommendations on electronic clinical decision support systems in the NICE guideline on acute kidney injury, they are ‘consider’ recommendations and therefore unlikely to be suitable as a quality statement.

### Coding of acute kidney injury

Accurate coding of acute kidney injury in hospitals and primary care was suggested as it is important to identify risk and the need for ongoing monitoring and review. Quality statements focus on actions that demonstrate high quality care or support, not clinical coding. However, accuracy of coding of diagnosis may be referred to in the data sources for quality measures. There is an existing NICE indicator (NM152) suitable for use in the Quality and Outcomes Framework (QOF) on establishing and maintaining a register of all people who have had an episode of acute kidney injury.

### Quality improvement within Integrated Care Systems

The importance of prioritising quality improvement within integrated care systems was highlighted including case note review templates to provide a structured approach and shared learning across primary care networks. Quality statements focus on actions that demonstrate high quality care or support, rather than quality improvement approaches. However, the quality standard overall may provide a focus for local quality improvement initiatives.

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# Appendix 1: Suggestions from RSTP

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Overarching guiding principles:**  Treat the person, not the test result - Placing AKI in clinical and social context is important to improve outcomes  AKI-related care entails timely and effective communication, coordination, coding, medicines management and monitoring  ‘Appropriate systems and safety net arrangements should be in place in primary and secondary care’ (NHS Discharge Standards, 2016)  Quality standards and indicators need to support individuals and organisations (to make adjustments) to deliver timely and effective recommended care  AKI provides a lens to shift away from a single disease framework and to drive quality improvements in:  medication safety; safer transitions of care; & safety for vulnerable patient groups | | | | | | |
|  | **Key Principles** | **Recommended Actions** | **Evidence-based Guidelines** | **Quality Standards & Statements** | **Quality Indicators**  **(metrics)** | **Tools & Resources** |
| **AKI Risk, Recognition & Response** | **Principle 1a**  Communicate with patients (and carers) the relevance of maintaining kidney health | Discuss the relevance of maintaining kidney health with people at higher risk of AKI including:   * the risks of developing acute kidney injury during and inter-current illness * the risks of drugs that can cause or exacerbate kidney injury (including the over the counter NSAIDs),   Seek advice from a pharmacist about optimising medicines and drug dosing at risk of AKI | **NICE NG148 (2019)**  **1.6 Information and support for patients and carers**  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 that can cause or exacerbate kidney injury (including the 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/1.73m2 * 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]  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] | NICE QS 1: Raising awareness in people at risk | For development in partnership with NICE (see Table A)  For consideration:  - Coding of evidence of communication for high risk groups  -Repeat prescribing of oral NSAIDS in high risk groups |  |
| **Principle 2a**  Timely and effective communication of AKI Warning Stage Test Results to primary care  (tailored according to AKI severity) | New AKI Warning Stage Test Result Stages 2 or 3:  Laboratories to provide rapid communication to primary care within 2 hours, usually by telephone  Do the labs have a ‘backdoor’ way of getting through to GP surgeries> It can take 40 mins through the usual route and that will affect compliancy.  New AKI Warning Stage Test Result Stage 1: Laboratories should provide communication within 24 hours to GP/GP OOHs service if AKI Stage 1 and K > 6.0 mmol/L. | **Royal College of Pathologists guidance 2017** | NICE QS 2: Identifying acute kidney injury in people with no obvious illness.  (partly relevant but not comprehensive QS) | For development in partnership with NICE (see Table A)  For consideration:  Evidence of timeliness in communication based on RCPath guidance  Timeliness will depend on access to GP receptionists – having an easier way to get through to GP surgeries rather than through the main number. |  |
| **Principle 3a**  Timely and effective primary care response to AKI Warning Stage Test Results (tailored according to AKI severity and Clinical Context) | Table 1 outlines recommended response times to AKI Warning Stage Test Results for Adults in Primary Care | **NHSE Think Kidneys Best Practice guidance 2016** | NICE QS 2: Identifying acute kidney injury in people with no obvious illness.  (partly relevant but not comprehensive QS) | For development in partnership with NICE (see Table A)  For consideration:  Evidence of timeliness in communication based on NHSE Think Kidneys guidance (Table 1) |  |
| **Principle 4a**  Timely and effective clinical management of people with AKI/Worsening Renal Function and heart failure | Clinical assessment of the individual patient is key.  In all cases consider original indication for RAAS inhibitor. Major prognostic benefit: HFrEF, post MI and left ventricular systolic dysfunction (LVSD), CKD and albuminuria. No/little prognostic benefit: hypertension (other drug options available) and HFpEF.  While decline in renal function is important and may require drugs to be stopped, that should only be after very careful consideration of the risks and benefits to the individual patient  **Inter-current illness:**  In patients on a RAAS inhibitor, intercurrent illness commonly causes AKI, but there is no evidence that stopping the RAAS inhibitor is beneficial.  If a patient with HFrEF develops hyperkalaemia:   * Potassium ≥5.5mmol/L, monitor closely, medication review and consider suspending RAAS inhibitor(s). * Potassium ≥6.0mmol/L, stop RAAS inhibitor(s).   If the patient with HFrEF has a rise in creatinine during intercurrent illness:   * By less than 30%, continue RAAS inhibitor(s) but monitor closely. * Can include alerts that are mandatory for healthcare professionals to acknowledge and review [2013] | **Change in renal function associated with drug treatment in heart failure: national guidance**  Clark AL, Kalra PR, Petrie MC, et al. Heart 2019;105: 904–910.  See Table 2 |  | For development in partnership with NICE (see Table A)  For consideration:  Evidence of timely clinical assessment in primary care for people with AKI/WRF and heart failure |  |
|  | **Principle 5a**  Establish robust systems in primary care to reduce AKI risk and improve AKI recognition & response | Establish systems that optimising the monitoring and prevention of deterioration in people with or at high risk of acute kidney injury: | **NICE NG148 (2019)**  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]  1.2.11 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 |  | For development in partnership with NICE (see Table A) |  |
|  | **Key Principles** | **Recommended Actions** | **Evidence-based Guidelines** | **Quality Standards & Statements** | **Quality Indicators**  **(metrics)** | **Tools & Resources** |
| **Post-AKI Care** | **Principle 1b**  Communication  Place AKI in clinical and social context | Before and after discharge, involve all patients (and where appropriate their families, carers, care coordinators and keyworkers) in planning follow-up care.  Key elements of post-AKI care include:  • Timely clinical review of reason(s) for admission  • Identify and address social needs  • Understand AKI and the relevance of kidney health  • Ensure timely drugs review and kidney monitoring  • Support during future episodes of acute illness  Ensure discharging team make reasonable requests for AKI FU – ie, do not ask for repeat bloods in 4 days as the timeframe is too short for this to be actioned. GPs often do not read e-discharges for 1-2 weeks post discharge. If patient needs a home visit, this can take at least a week to action. The secondary care team need to be aware of the constraints in primary care.  It would be good if a patient receives a 'patient focussed/friendly’ copy of their e-discharge, rather than a copy of the one intended for the GP. It should be addressed to the patient so they are clear what follow-up they need. That way it would empower the patient to take some ownership and seek out follow-up in a timely fashion so that the delays in follow-up are minimised. | **NICE NG148 (2019)**  **1.6 Information and support for patients and carers**  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  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 that can cause or exacerbate kidney injury (including the 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/1.73m2 * 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]  Use AKI-specific literature if possible (UK Kidney Care for example). Sick Day rules? | **NICE QS 1**:  Raising awareness in people at risk  **NHSE DS 1**:  Clinicians should ensure all patients (and where appropriate their families, carers, care coordinators and key-workers) understand why their involvement in the safe handover of diagnostic test information at discharge is important, and reassure them that their involvement is valued and welcomed. | For development in partnership with NICE (see Table A)  Need to consider development of indicators that drive improvements across systems of care  For consideration: Evidence of communication/post-discharge (kidney) health plan that takes into account:  -Inter-current illness  -Medicines -Management  -Monitoring  -Social needs | RCGP AKI Toolkit  Kidney Health and AKI: Information for patients, carers, and healthcare staff  [Insert hyperlink to resources] |
|  | **Principle 2b**  Coordinate  Tailored and timely review | Coordinate follow-up for all people following AKI, with prompt and personalised care for individuals with:  • Heart failure:  • Chronic kidney disease (CKD)  • Diabetes, hypertension or established cardiovascular disease  • Other frailty or vulnerability risks  NB. Arrange follow-up appointments prior to discharge if clinical concerns or risk of delays. GP follow-up or hospital?  Ensure accurate discharge hand over:  Hospital clinical teams should have a process in place to confirm or refute the AKI diagnosis prior to discharge.  To support continuity and determine urgency of follow-up, key information to communicate to GPs include:  • AKI stage and reason(s)  • Degree of kidney recovery This is good as it rarely happens  • Baseline and discharge serum creatinine (SCr)  • Is SCr stable or improving?  • Reasons for medication changes  • Evidence of communication with patients/carers. How would they evidence this? In the d/c narrative or in a tick box? | Royal College of General Practitioners’ Guidance on the timeliness of post-discharge for adults following acute kidney injury, 2019.  See Table 3  Royal College of General Practitioners’ AKI Toolkit | **NHSE Discharge Standards 2, 3, 4 & 5** (see Table C) | For development in partnership with NICE (see Table A)  For consideration:  -evidence of appointments booked in advance of discharge for high risk patient groups to relevant care provider (secondary care post-AKI clinic; community cardiac nurse; general practice) | See Table 3 RCGP AKI Toolkit [See below and insert hyperlink] |
|  | **Principle 3b**  AKI coding in hospitals & in general practice | Accurately code AKI to reduce future AKI risk by highlighting:  • Patients who need early post-AKI review  • High risk patients that require early review when unwell  Ensure accurate coding of AKI in hospitals, with clinical diagnosis communicated and coded in general practice  Who takes responsibility to review code? This is often inaccurate and our AKI review these monthly (HES coding)  Identify the cause(s) of acute kidney injury and record the details in the person’s hospital and general practice records. | **NICE AKI [NG148], 2019**  1.4 Identifying the cause(s) of acute kidney injury | **NHSE DS 6**: Primary care teams should have a system to ensure that any discharge information they receive is seen and acted on in a timely manner by a clinician able to understand the importance of the information and able to take responsibility for taking appropriate action. | Evidence of translation of AKI Warning Stage Test Results into ICD N17 codes in hospitals  (see UKRR AKI Report, 2020)  **NICE NM152, 2017**  Indicator: NM152: The contractor establishes and maintains a register of all patients with an episode of acute kidney injury (AKI)  Evidence of cause(s) coded in conjunction with AKI diagnostic code | ICD Code: N17  Read codes for AKI 1, 2 and 3 respectively are:  k04c, k04d, and k04e  SNOMED CT codes for AKI are:  AKI Stage 1: SCTID: 85193100000010  AKI Stage 2: SCTID: 851941000000103 AKI Stage 3: SCTID: 851951000000100 |
|  | **Principle 4b**  Optimise medicines management | Why were drugs stopped/altered?  • Reduced clearance during AKI (e.g. metformin): restart if eGFR back to baseline  • Risk of hypoglycaemia – accumulation of hypoglycaemic agents (e.g. sulphonylureas) - consider monitor blood glucose levels and adjust dose as necessary  • Evidence of nephrotoxicity (e.g. interstitial nephritis): do not restart, code  • Vasoactive drugs: see Principle 6  • NSAIDs: restart only if benefits outweigh risks and no alternative  AKI and drugs affecting renin-angiotension-aldosterone system (RAAS):  Review original indication for the drug  Identify patients with clinical indication for restarting inhibitors ACE-I/ARB (unless there is a new contraindication):  • Heart failure with reduced ejection fraction  • History of myocardial infarction  • Diabetes with albumin:creatinine ratio > 3 mg/mmol  • Hypertension with albumin:creatinine ratio >30 mg/mmol  • Albumin:creatinine ratio > 70 mg/mmol irrespective of hypertension or cardiovascular disease  Heart failure with AKI:  Ensure early post-discharge clinical review:  • AKI with heart failure is associated with high rates of unplanned readmission  • Clinical assessment is key. If oedema is due to heart failure, diuretic treatment to correct congestion is justified even if it causes a rise in serum creatinine  • Reduce diuretics if there are clinical signs of hypovolaemia  • Before discharge, where available, inform the heart failure team. This is of particular importance for those heart failure patients where medication that improves prognosis (ACEI, ARB, MRA) has been stopped or dose reduced. Excellent – this does not seem to happen in reality but needs to! Patients often get discharged with their RAAS medication suspended with no clear plan of when and what to restart first.  AKI, heart failure and end of life care:  • When a patient with heart failure is approaching end of life, symptom control overrides treatment with potential prognostic impact  • Deteriorating renal function is common  • Diuretics should be titrated to prevent distress from fluid overload, irrespective of renal function | NHS England Think Kidneys. Guidelines for Medicines Optimisation in Patients with Acute Kidney Injury. 2016  NHS England Think Kidneys When or if to re-start ACEI, ARB, diuretics and other antihypertensive drugs after an episode of Acute Kidney Injury. 2016.  NHS Think Kidneys the Renal Association and the British Society for Heart Failure. Changes in kidney function and serum potassium during ACEI/ARB/diuretic treatment in primary care. A position statement from Think Kidneys, the Renal Association, and the British Society for Heart Failure. 2017  Change in renal function associated with drug treatment in heart failure: national guidance  Clark AL, Kalra PR, Petrie MC, et al. Heart 2019;105:904–910.  Royal College of General Practitioners’ Guidance on the timeliness of post-discharge for adults following acute kidney injury. 2019 |  | For development in partnership with NICE (see Table A)  For consideration  -Evidence of prescribing RAAS blockers according to clinical indication  -evidence of timely follow-up for patients with heart failure | NB. Need to consider guidance regarding SGLT2 inhibitors  Think Kidneys resources for primary care [provide hyperlinks] |
|  | **Principle 5b**  **Monitoring**  Coordinate monitoring of kidney function | Patients who have had AKI are at risk of recurrent AKI and of progressive CKD. Patients at greatest risk are those with: • More severe and prolonged AKI (e.g. Stage 3; SCr not back to baseline)  • Intrinsic kidney disease or post-obstructive kidney disease  • Those with other risk factors for CKD, e.g. diabetes, hypertension, vascular disease Patients require tailored and timely follow-up of their kidney function including:  • Repeat blood (electrolytes, SCr and eGFR) and urine tests (ACR)  • Align kidney monitoring with existing long-term condition reviews  • Consider liaising with nephrology if persistent poor kidney recovery and/or eGFR  Check Urine ACR at 3 months  Residual CKD following AKI represents a significant adverse outcome and is a risk factor for cardiovascular events, end-stage kidney disease and future AKI:  • Consider Urine ACR in patients at 3 months post AKI  • If albuminuria is present, development and/or progression of CKD should be monitored, coded and communicated | NICE AKI NG148, 2019  1.5.16 Monitor serum creatinine after an episode of acute kidney injury. Base frequency of monitoring on the degree of renal function at time of discharge. Consider referral to a nephrologist or paediatric nephrologist when eGFR is 30ml/min/1.73m2 or less in adults, children and young people who have recovered from acute kidney injury. [2013]  NICE CKD NG203, 2021  1.1.25 Monitor adults, children and young people for the development or progression of CKD for at least 3 years after acute kidney injury (longer for people with acute kidney injury stage 30 even if eGFR has returned to baseline.  Royal College of General Practitioners’ Guidance on the timeliness of post-discharge for adults following acute kidney injury. 2019  NICE CKD NG203, 2021  1.1.21 offer testing for CKD using eGFR creatinine and ACR to adults with any of the following risk factors:   * Diabetes * Hypertension * Previous episode of acute kidney injury * Cardiovascular disease * Structural renal disease, recurrent renal calculi or prostatic hypertrophy * Multisystem diseases * Gout * Family history of ESRD * Incidental haematuria or proteinuria   Royal College of General Practitioners’ Guidance on the timeliness of post-discharge for adults following acute kidney injury. 2019 | NHSE DS 7: Appropriate systems and safety net arrangements should be in place in primary and secondary care to ensure any follow up diagnostic tests required after discharge are performed and the results are appropriately fed-back to patients. | For development in partnership with NICE (see Table A)  For consideration:  ACR monitoring |  |
| **AKI and quality improvement** | **Principle 1c**  Embed AKI Quality Improvement into Integrated Care Systems | The RCGP case note review templates provide a structured approach to drive quality improvement in:  • Medication safety  • Safer transitions of care  • Safety for vulnerable patients  Consider shared learning within Primary Care Networks/GP Clusters and establish safety net arrangements across primary and secondary care. |  | NHSE DS 8: As part of routine quality assurance, provider organisations should monitor compliance with their policies regarding test result communication and follow-up after discharge. Results should be shared with clinicians to facilitate learning and drive care quality improvement. | For development in partnership with NICE (see Table A)  Consider development of QI module for QOF Quality Improvement Domain to improve AKI-related care across Primary Care Networks/integrated Care Systems | Provide links to range of RCGP QI resources for AKI  Toolkit page: ‘AKI and Quality Improvement’’  [insert hyperlinks] |