# 2023 exceptional surveillance of acute kidney injury: prevention, detection and management (NICE guideline NG148)

## Surveillance proposal

We will update the NICE guideline on acute kidney injury: prevention, detection and management. The update will focus on assessing risk factors for acute kidney injury in adults having iodine-based contrast media (recommendations 1.1.5 to 1.1.7), particularly:

- The current requirement to measure eGFR or check an eGFR result obtained in the 3 months before a scan.
- The utility of a screening questionnaire to limit eGFR testing to those at greatest risk.
- Re-evaluating risk versus benefit of contrast media, particularly for patients with lower eGFRs when the risk is manageable.
- The eGFR threshold indicating increased risk (currently less than 40 ml/min/1.73 $m^2$).

Until the update publishes, we propose to temporarily suspend recommendation 1.1.5 in the NICE guideline on acute kidney injury. To mitigate the absence of recommendation 1.1.5, we will add the following text to recommendation 1.1.6 (new text in **bold**):

1.1.6 Before offering iodine-based contrast media 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 medium with first-pass renal exposure. [2013]

**For adults requiring non-emergency imaging who are assessed as being at increased risk of kidney injury, investigate for chronic kidney disease by measuring eGFR or by checking an eGFR result obtained within the past 3 months before offering iodine-based contrast media.**

## *Reason for the exceptional review*

Topic experts highlighted to us that recommendation 1.1.5 to measure eGFR in all adults before a contrast scan in the NICE guideline on acute kidney injury may lead to unnecessary cancellation of scans.

## *Methods*

The exceptional surveillance process consisted of:

- Considering the information from topic experts that triggered the exceptional review.
- Considering the development of recommendations through previous guideline updates.
- Examining related NICE guidance.
- Considering relevant information from a previous surveillance review of the guideline in 2017.
- A brief desktop search to identify relevant evidence.
- Assessing the new information against current recommendations to determine whether or not to update sections of the guideline, or the whole guideline.

For further details about the process and the possible update decisions that are available, see ensuring that published guidelines are current and accurate in developing NICE guidelines: the manual.

### *Information considered in this exceptional surveillance review*

Topic experts highlighted that recommendation 1.1.5 to measure eGFR in all adults before a contrast scan may lead to cancelled scans if patients attend the scan without a recent eGFR result. NICE diagnostics guidance DG37 does allow for the use of point-of-care devices to measure eGFR on the day of the scan if needed – this is discussed in the later section 'Other relevant NICE guidance'.

Topic experts also stated that concerns about contrast-induced acute kidney injury (CI-AKI) are reducing, especially with modern contrast agents which are much less toxic than older agents (NICE recommendations on eGFR testing for contrast scans date from 2013). The experts highlighted The Royal Australian and New Zealand College of Radiologists (RANZCR) Iodinated Contrast Media Guideline (2018) which is endorsed by the Royal College of Radiologists.

The RANZCR recommend a screening questionnaire ahead of eGFR measurement which asks if patients have known kidney disease (including kidney transplant), diabetes, or are taking a drug containing metformin. Topic experts indicated that a questionnaire-based approach might be satisfactory for most patients. Additionally, the RANZCR guideline states that risk of CI-AKI is likely to be non-existent with eGFR less than 45 ml/min/1.73 $m^2$, and very likely to be low or non-existent for eGFR 30–45 ml/min/1.73 $m^2$. A topic expert agreed that there was a need to re-evaluate the eGFR risk threshold in the NICE guideline (a suggested change was from 40 to 30 ml/min/1.73 $m^2$).

The RANZCR further state that 'Intravascular iodinated contrast media should be given to any patient regardless of renal function status if the perceived diagnostic benefit to the patient, in the opinion of the radiologist and the referrer, justifies this administration.' Topic experts agreed that balancing the diagnostic benefit of the scan against potential risks from contrast media was of key importance. They were concerned that if risk aversion is out of proportion, it may lead to poorer outcomes if patients with lower eGFRs are denied appropriate scans when the risk is manageable. Discussion of risks and benefits of the imaging procedure is already recommended by the NICE

acute kidney injury guideline, though experts were concerned that the current requirement to measure eGFR in all adults was being prioritised over other considerations.

A brief desktop search identified several other guidelines on contrast media (the position of each guideline on pre-eGFR screening and eGFR risk threshold is also stated):

- Canadian Association of Radiologists Guidance on Contrast Associated Acute Kidney Injury (2022)
  - Pre-eGFR screening: 'Do you have kidney problems or a kidney transplant?' and 'Have you seen, or are you waiting to see a kidney specialist or urologist?'
  - eGFR risk threshold: eGFR 30 ml/min/1.73 $m^2$ or less – individual patient decision to explain and balance the risks of CI-AKI against the risks and uncertainties of delayed or suboptimal imaging.

- American College of Radiology Manual on Contrast Media (2023)
  - Pre-eGFR screening: Based on risk factors i.e. personal history of renal disease, including: known chronic kidney disease, remote history of acute kidney injury, dialysis, kidney surgery, kidney ablation, albuminuria; history of diabetes mellitus (optional); metformin or metformin-containing drug combinations.
  - eGFR risk threshold: '[…] if a threshold for CI-AKI risk is used at all, 30 ml/min/1.73 $m^2$ seems to be the one with the greatest level of evidence.'

- European Society of Urogenital Radiology Guidelines on Contrast Agents (2018)
  - Pre-eGFR screening: Measure eGFR either (a) In all patients, or (b) In patients who have a history of: renal disease (eGFR less than 60 ml/min/1.73 $m^2$), kidney surgery, proteinuria, hypertension, hyperuricemia, diabetes mellitus.
  - eGFR risk threshold: Less than 45 ml/min/1.73 $m^2$ before intra-arterial contrast medium administration with first-pass renal exposure or in ICU

patients; less than 30 ml/min/1.73 $m^2$ before intravenous contrast medium or intra-arterial contrast medium administration with second pass renal exposure.

- Swedish Society of Radiology – Contrast agent (2022)
  - Pre-eGFR screening: Based on risk factors i.e. over 65 years and non-renal risk factors (diabetes mellitus, chronic heart failure, NYHA III/IV, NSAID, nephrotoxic drugs, dehydrated – vomiting, diarrhoea, ileus).
  - eGFR threshold: Risk increases with decreasing GFR, especially below 30 ml/min/1.73 $m^2$.

Given that none of these external guidelines are UK-based and the approach differs slightly between them, it is unlikely that an update of the acute kidney injury guideline can be developed by adopting or adapting any external recommendations. However, there is broad agreement among these external guidelines to use a screening element before measuring eGFR. There is also some consensus among these external guidelines that an eGFR below 30 indicates higher risk.

The brief desktop search also identified relevant evidence, including a systematic review and meta-analysis (Obed et al. 2022) of 21 studies of patients undergoing contrast-enhanced CT compared to propensity score–matched controls (i.e. contrast-unenhanced CT). Among the 169,455 patients, there was no evidence for increased risk for AKI, dialysis or mortality after contrast-enhanced CT among patients with eGFR of 45 ml/min/1.73 $m^2$ or more. Multivariable logistic regression found a significant association between eGFR of 30 ml/min/1.73 $m^2$ or less and greater risk of post-contrast AKI, though the absolute increase in risk with exposed versus unexposed patients was relatively low (19% versus 15%).

### *Information considered when developing the guideline*

The NICE guideline on acute kidney injury was originally developed in 2013 and the recommendations on eGFR testing and other risk factors to consider before a contrast scan originate from this date. The review question looked for risk assessment tools rather than evidence on individual risk factors and 5

cohort studies of 2 tools were included. The evidence was very low to low quality and recommendations were based on risk factors highlighted in the tools alongside clinical experience.

The guideline was updated in 2019 around preventing acute kidney injury in adults having iodine-based contrast media. Recommendation 1.2.8 which was made during this update states consider intravenous volume expansion in patients at particularly high risk. One of the risk factors is 'an eGFR less than 30 ml/min/1.73 $m^{2'}$, which is lower than the eGFR risk threshold of less than 40 ml/min/1.73 $m^2$ in recommendation 1.1.6. Additionally, a research recommendation was made: 'Can risk of contrast-induced acute kidney injury (CI-AKI) be stratified by eGFR thresholds?'. The appropriate study design for future research was deemed to be prospective cohort studies (the meta-analysis discussed above by Obed et al. 2022, which found that risk of CI-AKI was linked to an eGFR of 30 ml/min/1.73 $m^2$ or less, comprised cohort studies).

### *Information considered in previous surveillance of this guideline*

A 2017 surveillance review of the acute kidney injury guideline found 9 relevant studies which identified various risk factors for CI-AKI. The surveillance review concluded that most risk factors were already captured by existing recommendations. There was some evidence on biomarkers which were not included in current recommendations, though this was not deemed to impact the guideline because there was no evidence of any effect on subsequent management.

### *Other relevant NICE guidance*

The NICE diagnostics guidance on point-of-care (POC) creatinine devices to assess kidney function before CT imaging with intravenous contrast recommends several devices to assess eGFR to guide decisions on whether to use intravenous contrast during an outpatient CT scan in adults. It states that they should only be used when: current practice is that a recent eGFR result must be available; a person presents for a CT scan without a recent

eGFR result; and the person has risk factors for acute kidney injury. It recommends taking age, sex and ethnicity into account when assessing risk of acute kidney injury using a questionnaire-based tool, but no specific tool or risk factors were stated. Committee discussion noted 'that the risk of post contrast-AKI is very low for most people, but there may be a higher risk if eGFR is less than 30 ml/min/1.73 $m^2$.' Patient experts noted that 'when a contrast-enhanced CT scan does lead to substantial kidney damage, the effect on a person's quality of life can be considerable.'

Economic modelling was used to formulate recommendations. It found that risk factor screening followed by a POC test followed by a confirmatory laboratory test was the strategy with the highest net benefit. The next best strategy was risk factor screening followed by POC testing, without confirmatory laboratory testing. An exploratory strategy of no testing for anybody, regardless of risk factors, and giving contrast media to all produced the highest net benefit of all. However, this was not deemed an appropriate comparator for the model because it is not in line with national and international guidelines.

During their discussion, the committee further noted that regarding eGFR measurement before contrast scans, there was 'variation in clinical practice in the NHS. Some trusts need a recent eGFR result from all patients before doing a contrast-enhanced CT scan. Other trusts will do a contrast-enhanced CT scan without a recent eGFR result if there is a low risk of AKI.' The committee also stated that 'a scenario in which all referrers provide an eGFR measurement before a CT scan appointment is likely to be the optimal approach, and that this approach should be encouraged.' However, one of the topic experts who contacted NICE felt that rather than spending time improving the system so patients never present for contrast scans without an eGFR result, it would be better to introduce pre-eGFR screening (thus avoiding unnecessary blood tests in lower risk patients).

The diagnostics guidance committee also made research recommendations to better understand the level of risk of contrast-induced acute kidney injury, and to identify the most appropriate tool for identifying risk factors.

The National Institute for Health Research Health Technology Assessment (Corbett at al. 2020) underpinning the NICE diagnostics guidance noted that 'Currently, only around 10% of NHS CT departments use POC devices to get a blood test result for patients attending without a recent result.' The picture may have changed since publication of the diagnostics guidance, but a topic expert noted that in his experience POC testing was not widely used and uptake is limited.

The brief desktop search identified evidence relevant to the NICE diagnostics guidance. A cost-effectiveness analysis in an NHS setting (Shinkins et al. 2021) found that an alternative pathway (replacing pre-assessment of eGFR with a scan-day screening questionnaire for risk stratification and POC eGFR testing) had an estimated 5-year potential cost saving of £69,620 with 94% probability. The screening questionnaire asked about diabetes, metformin, kidney problems, heart failure and relevant acute illness. The authors noted that the questionnaire ruled out the need for most of the eGFR measurements specifically for the CT examination. Limitations included that the modelling was based on retrospective data from a single site.

### *Equalities*

No equalities issues were identified during the surveillance process.

An equalities and health inequalities assessment was completed during this surveillance review. See Appendix A for details.

### *Surveillance proposal*

Topic experts raised several issues relating to the NICE acute kidney injury guideline. They stated that the recommendation to measure eGFR in all adults before a contrast scan may lead to unnecessary cancellation of scans. They noted that concerns about the risk of contrast media have diminished, that not all patients require eGFR testing and this should be restricted to those at greatest risk, and that the current eGFR risk threshold is too high. NICE recommendations were developed in 2013, and since then several external guidelines have moved away from a 'test all' position to a risk stratification policy allowing more personalised consideration of the risks of contrast media

versus benefits for the individual patient from the scan. Some recent evidence has shown that contrast media may only pose a risk for patients with an eGFR of 30 ml/min/1.73 $m^2$ or less, and that screening questionnaires before measuring eGFR may be cost saving. After considering the evidence and other intelligence, we will update the recommendations on assessing risk factors for acute kidney injury in adults having iodine-based contrast media. The update will integrate the NICE diagnostics guidance on point-of-care creatinine devices to assess kidney function before CT imaging with intravenous contrast. Until the update is completed, we propose to temporarily withdraw recommendation 1.1.5 and add text about high risk people undergoing non-emergency scans to recommendation 1.1.6.