Guideline for the Administration of IV Contrast Media in Patients at Risk of Contrast Induced Nephrotoxicity (CIN)

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Version	Date	Author	Reason/Change
V6.0	05/2020	Consultant Radiologists	Time from eGFR test and outpatient CT amended from 3 months to 6 months. Several changes aimed at streamlining process for outpatients and ensuring that outpatients are not sent away unnecessarily. References updated
V7.0	05/2024	Consultant Radiologists	Time from eGFR test and outpatient CT amended from 6 months to 3 months. NICE guidelines have recently updated their guideline in September 2023. Other changes in the document have been highlighted **in bold type**.

Previous Titles for this Document:

Previous Title/Amalgamated Titles	Date Revised
Administration of IV Contrast Media in Patients at Risk of CIN	May 2024

Distribution Control

Printed copies of this document should be considered out of date. The most up to date version is available from the Trust Intranet.

Consultation

The following were consulted during the development of this document:
Consultant Radiologists

- Consultant Nephrologists
- Radiology SpRs
- CT Radiographers
- PACS staff
- Radiology Governance Committee
- Radiology departmental administrative staff

Monitoring and Review of Procedural Document

The document owner is responsible for monitoring and reviewing the effectiveness of this Procedural Document. This review is continuous however as a minimum will be achieved at the point this procedural document requires a review e.g., changes in legislation, findings from incidents or document expiry.

Relationship of this document to other procedural documents

This document is a clinical guideline applicable to the Norfolk and Norwich University Hospital.

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Quick reference

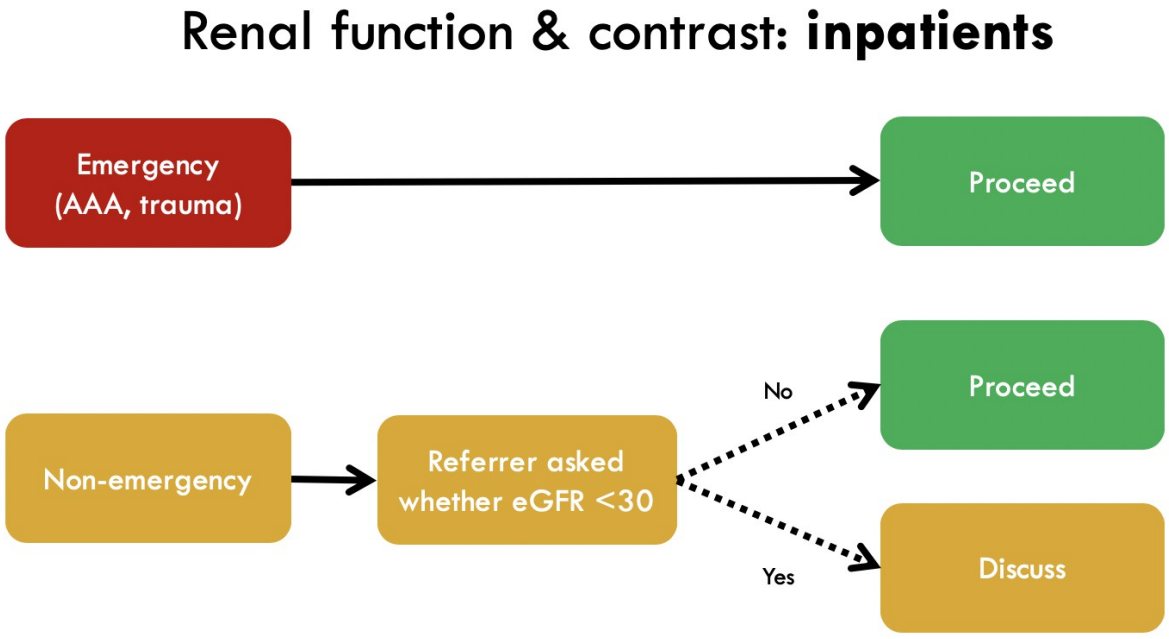

Figure 1 – Inpatient flow chart

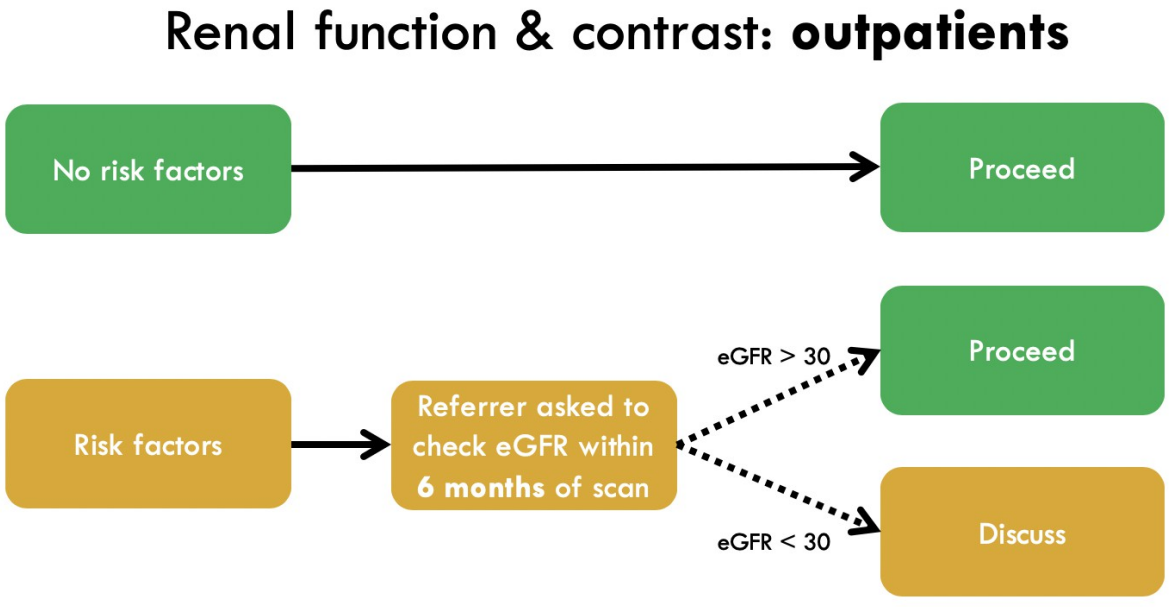

Figure 2 – Outpatient flow chart

1. Introduction

The National Institute for Health and Care Excellence (NICE) updated their guidance on prevention, detection, and management of acute kidney injury (NG148) in September 2023. The updated guidance now specifies a 3 month threshold prior to scanning outpatients who are deemed at increased risk of kidney injury.

The guidance is summarised below:

Two important papers on CIN were published in *Radiology*, also in 2013. McDonald et al demonstrated that rates of acute kidney injury (AKI) following CT were independent of whether or not IVCM had been administrated in a large cohort (>5000 patients) which included both inpatients and outpatients. Another study by Davenport et al suggested that IVCM was a risk factor for AKI in inpatients, but that this risk was mostly concentrated in those with eGFR <30 mL/min/1.73 m^2 and confined entirely to those with eGFR <45 mL/min/1.73 m^2.

The overall trend is towards a view of IVCM as more often a coincident rather causal phenomenon in AKI. This update reflects this trend, as well as new NICE, Royal College of Radiologists (RCR) and trust guidance.

Key updates throughout the document have been highlighted **in bold type**.

1.1. Rationale

- CIN is a rare, but potentially serious complication of the administration of IVCM.
- CIN does not have a universally agreed definition; however, it is generally defined as between a 25 – 50% increase in serum creatinine 48-72h post exposure to IVCM. In severe cases it has been linked to the development of irreversible severe renal failure leading to dialysis dependence and possibly death.
- There is a lack of good data on the prevalence of CIN due to a lack of controlled trials carried out in the appropriate setting (i.e., IV cf. IA administration)
- However, there is evidence that the IV administration of contrast media can still cause serious harm in high risk patients, particularly those with chronic kidney disease (CKD) or diabetes mellitus.
- For the purposes of practicality, we have defined at risk patients as those with eGFR < 60 mL/min/1.73m^2. Other risk factors include diabetes, heart failure, renal transplants, age >75 years, increasing volume of contrast, intra-arterial contrast and hypovolaemia.
- Patients with very poor renal function (eGFR < 30 mL/min/1.73m^2) are at highest risk, especially if they are diabetic.

- Multiple interventions have been suggested to reduce the risk of CIN, however there is no consensus. There is agreement that the principal strategy should be avoiding exposure of patients at high risk of CIN to IVCM.
- Ensuring adequate hydration before and after the examination is also generally agreed to help reduce risk of CIN. This may require IV administration of fluids in particularly high risk patients.
- The administration of IVCM enhances the diagnostic quality of many CT examinations. In most cases, it should be presumed that the risk of non-diagnostic examination outweighs any risk of CIN.

This guideline is intended to operate alongside, but not supersede protocol RADCT 14 (Administration of Contrast Media in CT) and Trust guideline on Acute Kidney Injury Trustdocs ID No: 1345.

1.2. Objective

To minimise the risk of contrast induced nephrotoxicity (CIN) following the administration of intravenous contrast media (IVCM) in CT examinations.

1.3. Scope

This document outlines the guidelines for the Administration of IV contrast in patients at risk of Contrast Induced Nephrotoxicity (CIN), to ensure that IV contrast may be administered safely, and identifies the time frames in which eGFR results are required prior to the administration of IV contrast media.

1.4. Glossary

The following terms and abbreviations have been used within this document:

Term	Definition
CT	Computed Tomography
SpRs	Specialist registrars
PACS	Picture Archiving Communication System
IVCM	Intravenous Contrast Media
CIN	Contrast Induced Nephrotoxicity
eGFR	estimated glomerular filtration rate

2. Responsibilities

It is the responsibility of the referring clinician to ensure there is an up to date eGFR available for patients that are at risk of CIN, the radiographer performing the CT scan will check the eGFR and discuss with radiologist as required.

3. Processes to be followed

3.1. Guidelines - Outpatients

- All patients should have a recorded eGFR prior to CT examinations involving IVCM.
- Patients without risk factors for CIN (as assessed by the referrer) do not require an up to date eGFR measurement.

- Radiographers/assistants/clerical staff are not required to check renal function prior to CT with IVCM if the referrer has stated that there are no risk factors.
- All patients with risk factors for CIN (as assessed by the referrer) should have an up to date eGFR performed within **3 months** of their examination.
- At the time of ICE request, the referrer will be asked if there are risk factors for contrast induced nephropathy. For a full discussion of these risk factors, they will be referred to the excellent Trust guideline on Acute Kidney Injury Trustdocs ID No: 1345.
    - If the clinician answers "Yes"
        - The following is displayed:
        - This text includes a hyperlink taking the user to the trust guideline on AKI.
    - If the clinician answers "No"
        - The following is displayed:

Prevention of CIN - Outpatients

If NO risk factors present (RIS - [Radiology Contrast Induced Nephropathy] No)

- Proceed with examination as per standard CT protocol (see 'CT Protocols'). No specific additional action required. No pre-procedure eGFR check required.

If risk factors present (RIS - [Radiology Contrast Induced Nephropathy] Yes)

- Up to date eGFR desirable at time of examination (within preceding **3 months**).
- In certain circumstances where no recent eGFR is available, if the examination will clearly be of limited diagnostic use without the use of IVCM (e.g., CT angiography), the scan may proceed with the use of IVCM at radiographer and radiologist discretion.
- If up to date eGFR available, and eGFR >30mL/min/1.73m^2, proceed with examination as per standard CT protocol. **Referrers should consider temporarily stopping ACE inhibitors and ARBs in adults having iodine-based contrast media if they have chronic kidney disease with an eGFR less than 40 ml/min/1.73 m2**
- If up to date eGFR is available, and eGFR <30mL/min/1.73m^2, then this should be discussed between radiographer and radiologists. Consideration should be given to the risks of losing valuable diagnostic information vs. small risk of CIN, especially in patients with stable low eGFR. In certain circumstances, the benefits of administering IVCM to patients with eGFR <30mL/min/1.73m^2 will outweigh the risks.

In such cases the referrer may also wish to take appropriate preventative action, including stopping nephrotoxins where clinically possible, consideration of pre-hydration and appropriate post-scan monitoring of urea and electrolyte levels.

If NO risk factors present, but no prior eGFR available

- eGFR desirable at time of examination
- In certain circumstances, the benefits of administering IVCM to patients with no previous eGFR may outweigh the risks (e.g., a CT examination which would be of limited use without IVCM in a young patient with no renal risk factors). The examination can proceed with the use of IVCM at the discretion of the radiographer and radiologist.

3.2. Guidelines - Inpatients

- An up to date eGFR is desirable for all inpatients undergoing CT examinations with the administration of IVCM. This should be achievable in all but the most urgent situations (e.g., polytrauma). In such urgent circumstances the benefit of administering IVCM will generally outweigh the risk of CIN and it is acceptable to proceed without knowledge of the patient's eGFR.
- At the time of ICE request, the referrer will be asked if most recent eGFR is < 30 mL/min/1.73 m^2 or if there is significant acute kidney injury (AKI).
    - If the answer is no, the request is processed, and we proceed as for outpatients without risk factors for CIN
    - If the answer is yes, the following message is displayed to the referrer:

In this setting, IVCM will only be administered following discussion with the Radiology department. Clinicians will be directed to the Trust guideline on Acute Kidney Injury, particularly the following section which summarises the guidance on preventing CIN:

- CIN may be caused by iodinated contrast
- Risk factors include:
- CKD (especially if eGFR < 40mL/min/1.73m2), diabetes, heart failure, renal transplant, age >75 years, hypovolaemia, increasing volume of contrast, intra-arterial contrast. Clinicians should consider if the test is absolutely necessary, could it be deferred or is there an alternative imaging modality without the need for contrast? In an emergency, intravenous fluid administration should not be considered a pre-requisite to contrast administration. Emergencies refer to patients who potentially have a condition which could be considered a risk to 'life or limb' or in whom a delay in diagnosis will delay the commencement of immediate definitive therapy with potentially adverse consequences.
- In a non-emergency, high risk patients or those with an acute illness, the referring team should assess the volume status of the patient, and, if

hypovolaemic, rehydration with intravenous 0.9% sodium chloride should be performed.

- **If eGFR <40mL/min/1.73m2, referrers should consider withholding ACEi/ARBs for 48hrs post procedure.**
- U&Es should be checked 48-72 hours post-contrast to screen for CIN; delay re-introducing high risk medications if an AKI is confirmed.
- If high risk or acutely ill patients have a contraindication to pre-hydration, please discuss with senior member of clinical team responsible for the patient prior to procedure.
- Dialysis has not been shown to have a role in preventing contrast-induced nephropathy. As such, patients on dialysis can go ahead with IV contrast administration without confirming next dialysis session. For patients with significant renal dysfunction (either acute or chronic), there is no role for dialysis in reducing the risk of contrast nephropathy.

4. References

National Institute for Health and Care Excellence (2023) NG148: Acute kidney injury: prevention, detection, and management. NICE, London

The Royal Australian and New Zealand College of Radiologists (2018) Iodinated Contrast Media Guideline. RANZCR, Sydney. https://www.ranzcr.com/college/document-library/ranzcr-iodinated-contrast-guidelines

Davenport, M. S. *et al.* (2020) Use of Intravenous Iodinated Contrast Media in Patients with Kidney Disease: Consensus Statements from the American College of Radiology and the National Kidney Foundation. *Radiology,* 294, 660 – 668.

5. Clinical Audit Standards

The following will be audited on an annual basis:

- Time taken from most recent measurement of eGFR to CT scan in outpatients attending for CT with IVCM with risk factors for CIN.

  Target: 100% to have had eGFR measurement within preceding 3 months.

- Number of outpatients per month attending for CT with IVCM with no prior measurement of eGFR.

  Target: 0 patients to attend without prior eGFR measurement available.

Key elements	Process for Monitoring	By Whom (Individual / group /committee)	Responsible Governance Committee /dept	Frequency of monitoring
Time taken from most recent measurement of eGFR to CT scan in	**Target: 100% to have had eGFR measurement within preceding 3**	CT Team	Radiology Clinical Governance Committee	Annually

outpatients attending for CT with IVCM with risk factors for CIN.	**months.**			
Number of outpatients per month attending for CT with IVCM with no prior measurement of eGFR.	**Target: 0 patients to attend without prior eGFR measurement available.**	CT team	Radiology Clinical Governance Committee	Annually

The audit results are to be discussed at the Radiology Clinical governance meetings review the results and recommendations for further action.

6. Appendices

There are no appendices for this document.

7. Equality Impact Assessment (EIA)

Type of function or policy	Existing

Division	Clinical Support Services	**Department**	Radiology
Name of person completing form	Louise Reilly	**Date**	02/05/24

Equality Area	Potential Negative Impact	Impact Positive Impact	Which groups are affected	Full Impact Assessment Required YES/NO
Race	No impact	No impact	None	No
Pregnancy & Maternity	No impact	No impact	None	No
Disability	No impact	No impact	None	No
Religion and beliefs	No impact	No impact	None	No
Sex	No impact	No impact	None	No
Gender reassignment	No impact	No impact	None	No
Sexual Orientation	No impact	No impact	None	No
Age	No impact	No impact	None	No
Marriage & Civil Partnership	No impact	No impact	None	No
EDS2 – How does this change impact the Equality and Diversity Strategic plan (contact HR or see EDS2 plan)?				

- **A full assessment will only be required if: The impact is potentially discriminatory under the general equality duty**
- **Any groups of patients/staff/visitors or communities could be potentially disadvantaged by the policy or function/service**
- **The policy or function/service is assessed to be of high significance**

IF IN DOUBT A FULL IMPACT ASSESSMENT FORM IS REQUIRED

The review of the existing policy re-affirms the rights of all groups and clarifies the individual, managerial and organisational responsibilities in line with statutory and best practice guidance.