# University Hospitals of Leicester

# Prevention of Post Contrast Acute Kidney Injury (PC-AKI) in Adults

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#### REVIEW DATES AND DETAILS OF CHANGES MADE DURING THE REVIEW

This document supersedes the original policy for the Prevention of Contrast induced Nephropathy (CIN) in adults written in 2013. The policy was last reviewed in 2019 and new documentation and literature now indicates new changes in current practice. The term CIN is no longer preferred terminology. Contrast enhance Acute Kidney Injury is now the preferred terminology

#### KEY WORDS

PC-AKI

Post Contrast Acute Kidney Injury

CIN

Contrast Induced Nephropathy

ICM

lodinated contrast media

#### SUMMARY

Prevention of Post-Contrast AKI in Adults Policy

This policy is designed to be a pragmatic guide to minimising the risk of CI-AKI whilst avoiding the need for unnecessary investigations and delays to patient discharge and investigations.

#### 1 INTRODUCTION

1.1 This document sets out the University Hospitals of Leicester (UHL) NHS Trusts Policy and Procedures for preventing contrast induced acute kidney injury (PC-AKI) in adults for any test or procedure where iodinated contrast is required.

The risk of contrast induced acute kidney injury is related to:

•Renal function – risk low with eGFR >30 mls min and increases proportionately with levels below this

•Dose of contrast agent – higher doses and high osmolar agents associated with greater risk

•Repeat dosing of contrast within 72 hours

•Volume status of the patient – volume depletion / dehydration increases risk In addition the following are also proven risk factors that increase the likelihood of developing CI-AKI.

# Risk Factors for PC-AKI PMH Renal transplant Single kidney CKD (eGFR <30 ms/min) DM with CKD Hypertension

#### 2 POLICY AIMS

The aim of this policy is to give guidance to Medical and Non-Medical staff on what is accepted safe practice when requesting an examination that requires lodinated contrast media and how to help reduce the risk of contrast induced nephrotoxicity in patients that the risk of injecting contrast media is outweighed by the benefits of proceeding with the investigation.

#### 3 POLICY SCOPE

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Who does this policy apply to?

- 3.1 All UHL Medical and Non-Medical Referrers, Practitioners, Radiographers, Assistant Practitioners, Radiographic Department Assistants, Nursing staff and Imaging appointments and booking clerks
- 3.2 There are no training requirements to using the policy guidance.

3.3 All UHL patients requiring an examination or procedure where lodinated Contrast Media is going to be injected intra-arterially or intravenously

#### 4 DEFINITIONS

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Emergency imaging – 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.(suspected acute stroke, pulmonary embolism, acute aortic syndrome, bowel ischemia or perforation, and other conditions)

#### 5 ROLES AND RESPONSIBILITIES

#### 5.1 **Responsibilities within the Organisation**

- a) The **Executive Lead** for this Policy is the **Chief Nurse** Divisional / Corporate Management Team
- b) The **Head of Service** is responsible for ensuring the policy is communicated across the Clinical Management Groups and that this policy is followed
- c) All UHL Medical and Non-Medical Referrers have a responsibility to provide the correct information on referral of the patient, including documenting the need for contrast if required for high risk patients.
- d) All radiologists in protocolling referrals, to ensure these guidelines are met.
- e) Line Managers / Superintendent Radiographers are responsible for:
  - Ensuring that all radiographers undertaking IV contrast medium administration are trained and assessed as competent

#### 6 POLICY STATEMENTS, PROCESSES, PROCEDURES AND ASSOCIATED DOCUMENTS

The decision to administer contrast in patients undergoing an imaging test or procedure should always be a matter of clinical judgment based on the individual circumstances of the patient and following consultation between the radiologist and the referrer. Patients with chronic kidney disease (CKD) whose estimated glomerular filtration rates are < 30 mL/min/1.73m2 may be at risk for developing post-contrast acute kidney injury, an uncommon but potentially serious form of acute kidney injury (AKI). The method of contrast delivery is also important; the incidence of post-contrast acute kidney injury is higher after intra-arterial contrast administration than after intravenous contrast administration.

These are the outlined considerations:

ESTIMATED GFR (ml/min/1.73 m²)	Guidelines for Contrast Administration and Hydration	
≥30	Low risk. At the current time, there is very little evidence that intravenous iodinated contrast material is an independent risk factor for AKI in patients with eGFR $\ge$ 30 mL / min/1.73m2.	
	Higher risk. This cohort of patients appears to be at greatest risk for post-contrast acute kidney injury after administration of intravenous iodinated contrast. <i>Contrast should not be administered</i> unless the patient is on dialysis and anuric, or if contrast is considered diagnostically imperative and the benefits of contrast outweigh the risk of post-contrast acute kidney injury. If the patient meets these criteria, the referring consultant should document the need for contrast and that the benefit of contrast outweighs the risk of post-contrast acute kidney injury in the patient's medical notes.	
	Dialysis for contrast removal is not considered anymore in any situation.	
<30	There is a lack of evidence of the benefit of volume expansion. Departments may choose best suited practices for their local practices.	
	At UHL pre-procedural prophylaxis again post-contrast acute kidney injury with intravenous hydration therapy may be considered. The optimal IV volume protocol is unknown and ideally should be tailored to the patient's volume status and medical conditions, which may necessitate discussion between the referring consultant and the radiology team. Suggested protocols:	
	Inpatients – 0.9% normal saline at 100 mL/hr IV beginning 6-12 hours prior to contrast administration and continuing 4-12 hours afterwards	
	Outpatients – 0.9% normal saline 500 mL IV bolus prior to contrast administration. Additionally, post-exposure oral hydration (1 cup of water per hour for 8 hours) should be considered provided the patient is not under fluid restriction for medical reasons	

Other considerations to reduce the incidence in patients and are deserving of further mention:

The European Society of Urogenital Radiology Guidelines 2018 recommends 4 hours between injections of iodine and gadolinium based contrast, in patients with normal or moderately reduced renal function. Patients with egfr <30 should have 7 days between injections of iodine and gadolinium.

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### **Contrast Administration in Routine Elective Outpatients**

Studies (McDonald *et al* 2013, Wilhelm Lees *et al* 2017, Aycock *et al* 2018) employing statistical methods to account for confounding variables (propensity score-matched analyses) suggest that the incidence of AKI linked to contrastenhanced CT scans is not significantly higher than that with unenhanced CT scans (see table above). While negative propensity score studies do not negate the existence of CI-AKI, they do imply that its occurrence is considerably lower than previously believed.

We therefore feel that for routine outpatients with no suspected history of renal dysfunction, it is sufficient to administer iv contrast if the patient answers 'no' to the following two questions:

- 1. "Do you have kidney problems or a kidney transplant?"
- 2. "Have you seen, or are you waiting to see a kidney specialist or urologist (kidney surgeon)?"

If the patient answers 'yes', to either of the questions above, a baseline renal function should be considered prior to the administration of iv contrast. If there is already a baseline eGFR on the system within 6 months, and the eGFR is  $\geq$  30, the patient can proceed to have contrast.

#### Contrast administration in emergency patients

In June 2023, Joint Advisory Statement between the RCR and the RCEM regarding Emergency Computed Tomography scans and the use Intravenous Iodinated Contrast Agents released a statement in line with recent evidence.

Patients requiring emergency iodinated intravenous contrast CT imaging should proceed to scanning without delay.

Specifically:

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Measurement of renal function should not be considered a pre-requisite prior to scanning (the electronic requesting system should reflect this).

Pre-existing renal disease, diabetes mellitus or medication such as metformin should not delay scanning (the electronic requesting system should reflect this).

Age is not an independent risk factor for CI-AKI and should not delay scanning

Intravenous fluid administration should not be considered a pre-requisite prior to scanning.

# **Contrast Administration in Patients in Renal Failure Requiring Dialysis**

Imaging with ICM can be performed in patients on peritoneal or haemodialysis regardless of residual output and no change in dialysis schedule is required, provided that dialysis happens within 48 hours after administration of ICM.

There is a separate policy for patients with Diabetes Mellitus (DM) and on Metformin.

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But to summarise, stopping metformin for patients with eGFR >30 mL/min/1.73  $m^2$  is no longer recommended.

Only in patients with eGFR  $\leq$ 30 mL/min/1.73 m<sup>2</sup> or AKI, metformin should be held at the time of, or prior to, ICM administration, and should not be restarted for at least 48 hours and only then if kidney function remains stable (<25% increase compared with baseline creatinine) and the ongoing use of metformin has been re-assessed by the patient's clinical team.

#### 7 EDUCATION AND TRAINING REQUIREMENTS

- All Imaging staff have this policy in their reading list upon induction.
- All Radiographers that inject must have completed the eUHL PGD course.
- All clinicians, nurses, AHP's that request Imaging need to understand this document for guidance.

#### 8 COMPLIANCE MONITORING

What will be measured to monitor compliance	How will compliance be monitored	Monitoring Lead	Frequency	Reporting arrangements
Audit once per year	<ol> <li>Audit number of calls made to hub ST's and co-ordinators regarding contrast queries that fall within the guidelines.</li> <li>These calls should not be required, unless in specific unusual clinical scenarios for which the guidelines may be ambiguous.</li> <li>Any routine queries about the contrast</li> </ol>	Dr Das, Operational lead (Gemma Coles). Modality leads (Odette Thraves) Imaging Superintendent (Pedro Correia)	Once per year	Feedback outcomes at imaging Q&S meeting or email.

Prevention of Post-Contrast AKI in Adults Policy

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V1 approved by Policy and Guideline Committee on 21 June 2024 Trust ref: B62/2024 next review: June 2026 NB: paper copies may not be the latest version. The definitive version is held in the Policy and Guideline Library

guidelines should go through the imaging superintendents or contrast leads (me and Gemma). This minimises unnecessary interruption of critically important acute work 4. Record all Datix's related to CT iodinated		
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#### 9 EQUALITY IMPACT ASSESSMENT

- 9.1 The Trust recognises the diversity of the local community it serves. Our aim therefore is to provide a safe environment free from discrimination and treat all individuals fairly with dignity and appropriately according to their needs.
- 9.2 As part of its development, this policy and its impact on equality have been reviewed and no detriment was identified.

#### 10 SUPPORTING REFERENCES, EVIDENCE BASE AND RELATED POLICIES

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6. Consensus Guidelines for the Prevention of Contrast Induced Acute Kidney injury 2022- <u>https://doi.org/10.1177/08465371221083970</u>

7. <u>https://www.rcr.ac.uk/posts/joint-advisory-statement-between-royal-college-radiologists-royal-college-emergency-medicine</u>

8. McDonald RJ, McDonald JS, Bida JP, et al. Intravenous contrast material-induced nephropathy: causal or coincident phenomenon? *Radiology*. 2013;267:106-118.

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9. Wilhelm-Leen E, Montez-Rath ME, Chertow G. Estimating the Risk of Radiocontrast-Associated Nephropathy. *J Am Soc Nephrol*. 2017;28:653-659.

10. Aycock RD, Westafer LM, Boxen JL, Majlesi N, Schoenfeld EM, Bannuru RR. Acute Kidney Injury After Computed Tomography: A Meta-analysis. *Ann Emerg Med*. 2018;71:44-53.

## 11 PROCESS FOR VERSION CONTROL, DOCUMENT ARCHIVING AND REVIEW

This document will be uploaded onto SharePoint and available for access by Staff through INsite. It will be stored and archived through this system.

This document will be reviewed by Imaging in 2024.

# Appendices

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Intravenous iodinated contrast in patients undergoing emergency imaging



#### Intravenous iodinated contrast in elective out-patients



#### Intravenous iodinated contrast in non emergency in-patients

