**SHORT TITLE/ACRONYM:** **Iodine starch test use in pleuroperitoneal leak**

**IRAS: 368449**

**FULL/LONG TITLE OF THE STUDY**

Practical use of the iodine starch test to aid diagnosis of pleuroperitoneal leak in patients on peritoneal dialysis using icodextrin.

**RESEARCH REFERENCE NUMBERS**

**IRAS Number: 368449**

**SPONSORS Number: 26RE001**

**FUNDERS Number: FR-000003274/ N7161**

**OTHER RESEARCH REFERENCE NUMBERS:**

**SPONSOR:** Nottingham University Hospitals NHS Trust

**PROTOCOL VERSION NUMBER AND DATE:**

- **This protocol has been designed to ensure regard for the HRA guidance**

**Amendment History**

| Amendment No. | Protocol version no. | Date issued | Author(s) of changes | Details of changes made |
|---|---|---|---|---|
| | | | | |

List details of all protocol amendments here whenever a new version of the protocol is produced.

Protocol amendments must be submitted to the Sponsor for approval prior to submission to the REC committee.

SIGNATURE PAGE

The undersigned confirm that the following protocol has been agreed and accepted and that the Chief Investigator agrees to conduct the study in compliance with the approved protocol and will adhere to the principles outlined in the Declaration of Helsinki, the Sponsor's SOPs, and other regulatory requirement.

I agree to ensure that the confidential information contained in this document will not be used for any other purpose other than the evaluation or conduct of the investigation without the prior written consent of the Sponsor

I also confirm that I will make the findings of the study publicly available through publication or other dissemination tools without any unnecessary delay and that an honest accurate and transparent account of the study will be given; and that any discrepancies from the study as planned in this protocol will be explained.

**For and on behalf of the Study Sponsor:**

Signature: Date:

..... ...../...../.....

Name (please print):

.....

Position:

.....

**Chief Investigator:**

Signature: Date:

..... ...../...../.....

Name: (please print):

.....

## KEY STUDY CONTACTS

| | |
|---|---|
| Chief Investigator | Dr Jennifer Allen (jennifer.allen36@nhs.net) |
| Study Co-ordinator | Dr Shady Behiri (shady.behiri@nhs.net) |
| Sponsor | Nottingham University Hospitals NHS Trust<br>Research & Innovation<br>Nottingham Clinical Research Facility<br>B Floor, Medical School (accessed via West Block)<br>Queen's Medical Centre<br>Derby Road<br>Nottingham<br>NG7 2UH |
| Funder | Nottingham University Hospitals Renal Research Fund |
| Key Protocol Contributors | Patient and public involvement representative |

## STUDY SUMMARY

| | |
|---|---|
| Study Title | Practical use of the iodine starch test to aid diagnosis of pleuroperitoneal leak in patients on peritoneal dialysis using icodextrin |
| Internal ref. no. (or short title) | Iodine starch test use in pleuroperitoneal leak |
| Study Design | Observational study |
| Study Participants | Patients undergoing diagnostic/therapeutic aspiration in the pleural clinic and Renal Home Therapies Unit. |
| Planned Size of Sample (if applicable) | 30 patients (20 patients at NUH and 10 patients from 2 other UK sites) |
| Follow up duration (if applicable) | None required |
| Planned Study Period | 4-6 months |
| Research Question/Aim(s) | Evaluate the practical use of the iodine-starch test in the diagnosis of pleuroperitoneal leaks in patients on peritoneal dialysis with icodextrin, and to determine recommendations for it's use validate as a standard clinical test. |

## FUNDING AND SUPPORT IN KIND

| **FUNDER(S)**<br><br>(Names and contact details of ALL organisations providing funding and/or support in kind for this study) | **DETAILS OF FINANCIAL AND NON FINANCIAL SUPPORT GIVEN** |
|---|---|
| Nottingham Hospitals Chairty (Nephrology Research) | Grant application submitted to fund expenses related to laboratory work, photography, printing and publication/presentations.<br><br>Approved Grant Ref: FR-000003274 / N7161 (28 Oct 2025) for costs related to iodine supply, sample labelling and printing, and open access publication fees (funding up to £3,540). |

## ROLE OF STUDY SPONSOR AND FUNDER

The study sponsor will monitor the study conduct against applicable regulatory standards. The study sponsor and study funder will have no role in the design, data analysis, interpretation, manuscript writing and dissemination of the results.

ROLES AND RESPONSIBILITIES OF STUDY MANAGEMENT COMMITTEES/GROUPS & INDIVIDUALS

**Patient and public involvement**

Patient and public representatives were invited to review the study design and participant materials to ensure they are clear, relevant and acceptable to patients. A dedicated meeting was scheduled for 15th October 2025, during which a PPI representative provided feedback on the proposed study and associated documents (including the patient information sheet and consent form).

All feedback was recorded and considered in refining the study design and documentation before submission. The same representatives will also be engaged later in the project to advise on how best to disseminate the study findings.

## Protocol contributors

Aim: To describe all the contributors to the protocol. The protocol should list contributors to the protocol and describe what support has been given. This should include the PPI contributors.

| **CONTRIBUTOR(S)**<br><br>(Names and contact details of ALL individuals providing contribution to the protocol) | **DETAILS OF CONTRIBUTION GIVEN** |
|---|---|
| Dr Jennifer Allen | Protocol authorship |
| Dr Shady Behiri | Protocol authorship |
| Patient and public involvement representative – Katie Best | Review the study design and documents provide recorded feedback to inform revisions and advise on dissemination of the study findings. |

**KEY PHRASES:**

- Iodine-starch test
- Icodextrin (EXTRANEAL)
- Peritoneal dialysis
- Pleural effusion
- Pleuroperitoneal leak
- Pleuroperitoneal communication

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STUDY FLOW CHART

Schematic representation of the study design outlining both the laboratory and clinical observational components.

**Part 1 – Clinical Observational Study**

- Recruitment of minimum of 15 pleural clinic patients and up to 5 patients on peritoneal dialysis presenting with pleural effusion.
- Collection of small surplus pleural fluid samples.
- Application of iodine at predetermined diagnostic concentration.
- Photography of samples.

Recording of biochemistry and aetiology.
Samples frozen at -80 in order to allow comparison of samples

↓

**Part 2 - Validation of the test in 2 other UK centres**

- Collection of pleural fluid samples from 5 patients each from at two other UK centres on peritoneal dialysis presenting with pleural effusion.

↓

**Part 3 Analysis and Dissemination**

- Determination of optimal iodine concentration and preparation.
- PPI feedback and involvement in dissemination.
- Publication and presentation of findings.

**STUDY PROTOCOL**

Practical use of the iodine starch test to aid diagnosis of pleuroperitoneal leak in patients on peritoneal dialysis using icodextrin (proof of concept study).

## 1. BACKGROUND

Pleural effusions can develop in patients undergoing peritoneal dialysis as a result of dialysate leaking into the pleural cavity through a defect in the diaphragm, a condition known as a pleuroperitoneal leak or communication. This complication affects approximately 1.6–10% of patients receiving peritoneal dialysis[1, 2] and may lead to discontinuation of therapy in nearly half of these cases[2]. The phenomenon was first described in 1967[3].

In many instances, the diagnosis can be made based on clinical presentation and imaging findings; however, biochemical analysis of pleural fluid is often necessary when diagnostic uncertainty remains. Typically, in the presence of a leak, the aspirated pleural fluid shares biochemical characteristics with the peritoneal dialysis fluid, particularly elevated glucose levels. In cases where the patient is using icodextrin, which is a starch-based dialysis solution, this correlation is lost, as icodextrin dialysate does not elevate glucose levels, making confirmation of a leak more challenging.

Iodine is known to react with starch to produce a dark blue or black colour[4], a principle called the iodine-starch test. Several case reports have described the use of this simple chemical reaction to detect the presence of icodextrin in pleural aspirates, suggesting a potential diagnostic application for identifying pleuroperitoneal leaks. No literature exists to determine how the test should be performed in clinical practice. Other innovative approaches, such as “biochemical fingerprinting” and comparative pleural and peritoneal fluid analysis[5], have also been explored and reported in the literature.

To date, no studies have defined the optimal iodine formulation or concentration required for reliable detection of icodextrin in pleural fluid.

## 2. RATIONALE

The study team performed a laboratory experiment at Nottingham City Hospital to demonstrate that iodine (Iodine and potassium iodide also known as Lugol's iodine) causes a colour change in icodextrin that is not reproduced in other peritoneal dialysis solutions. We added iodine and potassium iodide at widely commercially available concentrations of 2% and 15%, to 10mL icodextrin in incremental concentrations by adding 0.1mL, 0.2mL, 0.3mL, 0.4mL, 0.5mL, 1mL, 2mL, 3mL, 4mL and 5mL iodine to each 10mL sample (10 x samples). Each sample was photographed to demonstrate change in colour. The same experiment was conducted with Vantive Physioneal 1.36% (10 x samples), Nutrineal (10 x samples). and

Fresenius Staysafe Balance 1.5% (10 x samples). Each of these samples was photographed along side the icodextrin samples.

The same experiment was conducted using 10mL samples of icodextrin diluted with physioneal fluid at concentrations of 1:9, 2:8, 3:7, 4:6, 5:5, 6:4, 7:3, 8:2, 9:1.

The same experiment was conducted using Betadine® (povidone-iodine) and icodextrin (130 x samples per product, as described above). Betadine® is widely available in hospital but may not generate a positive iodine starch test because iodine is complexed with povidone, preventing it from forming the necessary polyiodide complex with starch to produce the expected blue-black colour.

We demonstrated that icodextrin is turned blue black by the addition of Iodine and potassium iodide at 2 different concentrations. This was not reproducible in other formulations of peritoneal dialysis solution or with povidone-iodine. We were able to determine the diagnostic concentration of the iodine required to identify icodextrin in a 10mL sample of fluid up to 8:10 dilution was 0.1mL of 2% of Iodine and potassium iodide. These results have not been published.

The clinical study is based on the results of a laboratory proof of principle experiment which we performed in the NUH BioResource and Research & Innovation Laboratory in November 2025. Using the results of the laboratory experiments, this clinical study will demonstrate that iodine can be used as a practical bedside test, and that false positive results will not occur in patients with pleural effusions of other eitiology.

## 3. THEORETICAL FRAMEWORK

This study is grounded in the principle that biochemical characteristics of icodextrin dialysate can provide diagnostic clues to identify pleuroperitoneal leaks in patients receiving peritoneal dialysis. Current diagnostic biochemical approaches for other glucose-based dialysate solutions rely on detecting elevated glucose in pleural fluid, but this fails when icodextrin, a starch-based dialysis solution, is used.

The proposed approach applies the established iodine-starch chemical reaction (a qualitative test for the presence of starch) as a practical diagnostic tool in this context. By systematically evaluating different iodine formulations and concentrations, the study aims to define a reliable, practical method for detecting icodextrin in pleural fluid.

## 4. RESEARCH QUESTION / AIM(S)

To determine whether the iodine-starch test can be used in a practical way to reliably identify icodextrin in pleural fluid, to differentiate this from other causes of pleural effusion and help diagnose pleuroperitoneal leaks in patients on peritoneal dialysis.

### 4.1. Objectives

1. To assess whether the iodine-starch test produces any false positive results when applied to pleural fluid samples from non-dialysis patients.
2. To assess whether the iodine-starch test can be used in practice to positively identify icodextrin in the pleural fluid of patients with a pleuroperitoneal leak.

### 4.2. Outcome

To demonstrate that the iodine can be used clinical in clinical practice to diagnose pleuroperitoneal leaks with icodextrin.

## 5. STUDY DESIGN AND METHODS OF DATA/SAMPLE COLLECTION AND DATA/SAMPLE ANALYSIS

The study is based on the results of a laboratory proof of principle experiment which we performed in the NUH BioResource and Research & Innovation Laboratory in November 2025, using non-clinical samples of standard peritoneal dialysis fluid to determine how much and what type of iodine is able to differentiate icodextrin from glucose or amino acid based peritoneal dialysis fluids.

This has allowed us to determine a clinical test in order to undertake an observational study of both non-dialysis patients who present to the pleural clinic (controls) and patients on peritoneal dialysis presenting with effusions to the renal unit, to ensure the iodine starch can be used in practice and that the test does not produce false positive results in patients with pleural effusions of other causes.

We will perform an observational control study (part 1 in flow diagram) in order to ensure that false positive results do not occur in pleural fluid of other causes. We will consent 15 patients undergoing diagnostic or therapeutic pleural aspiration in the NUH pleural clinic. The sample size is an estimate based on the typical incidence of different pleural fluid types obtained in the NUH pleural clinic, and is expected to be sufficient to ensure we obtain samples of transudative, exudative and blood-stained effusion samples. However, more patients may be recruited to aim for equivalent number of each pleural fluid type. This will be supported by NUH respiratory physicians.

We will concurrently perform an observational study of patients on peritoneal dialysis who undergo diagnostic pleural aspiration (usually to investigate a possible pleuroperitoneal leak). We will recruit five patients on peritoneal dialysis who present with pleural effusion to the Renal Home Therapies Unit. Up to five patients on peritoneal dialysis will also be recruited from two other UK centres.

Patients will consent for us to collect 20mL of pleural fluid that is surplus to that required for clinical purposes. This will not require any changes to practice as it is standard clinical practice to remove larger volumes of fluid to relieve patients symptoms, and discard the waste fluid. We add the pre-determined volume of Iodine and potassium iodide 2% (0.1mL) to 10mL of pleural fluid. We will photograph the samples in the BioResource and Research & Innovation Laboratory using a standard iPhone camera on an NUH provided work iPhone, and then discard the samples. The remaining10mL will be frozen at -80$^{o}$Cin the BioResource and Research & Innovation Laboratory to allow comparison of samples taken at different times, and reproducibility verification or collaborative validation with the other two renal units in the UK. Frozen samples will be kept for 2 years.

Following consent patients will be allocated a study number and pseudonomysed for completion of CRF. We will collect demographic data (age, sex) and relevant past medical history (chronic kidney disease, chronic obstructive pulmonary disease, diabetes, heart failure, ischaemic heart disease, hypertension)from each recruit, results of biochemical tests conducted in NUH laboratories as part of their standard care, and diagnostic information.

We predict high consent rates based on similar observational studies conducted within the renal unit at NUH, which had a 100% consent rate[6].

Based on the outcome of the clinical study and the background laboratory studies we will be able to validate recommendations about the volume and type of iodine needed to identify the presence of icodextrin in a pleural aspiration sample, which were demonstrated in the laboratory experiment.

## 6. STUDY SETTING

**NUH Pleural Clinic (respiratory medicine service) and Renal Home Therapies Unit (RHTU)**

This setting will support the observational clinical phase of the study.
Participants will be adult patients attending the pleural clinic or RHTU for diagnostic or therapeutic pleural aspiration. Eligible patients will be approached by the clinical team, and consent will be sought to use a small surplus pleural fluid sample for the iodine-starch test. Samples will be collected by the treating clinician, and transferred to the researcher at the time of sample collection. One 10mL sample will be tested, photographed and immediately discarded after testing with a second 10mL sample taken by the researcher to the BioResource and Research & Innovation Laboratory (on the same site) where it is frozen and stored. A laboratory record will be kept to document the sample being deposited in the laboratory freezer. Clinical data (pleural fluid type and aetiology) will be recorded from the patient's electronic patient record.

The pleural clinic and RHTU are appropriate settings as they provide access to diverse pleural effusion samples and routine fluid analysis leading on to correlate with effusion type and aetiology.

## 7. SAMPLE AND RECRUITMENT

### 7.1. Eligibility Criteria

#### 7.1.1. Inclusion criteria

- Adults (aged ≥18 years) attending for diagnostic or therapeutic pleural aspiration.
- Able and willing to provide written informed consent for use of a small surplus pleural fluid sample for research purposes.
- Sufficient pleural fluid volume (demonstrated on routine pre-procedure thoracic ultrasound scan) available to allow safe collection of at least an additional 10 mL sample without affecting routine clinical testing (clinical samples would require a minimum of 10mLs but common clinical practice is to remove larger volumes in in order to allow symptomatic relief).

#### 7.1.2. Exclusion criteria

- Under 18 years of age.
- Unable to give informed consent (e.g. due to cognitive impairment or lack of capacity).

### 7.2. Sampling

In the observational clinical phase of the study, all pleural fluid samples will be obtained as surplus material from already indicated and planned elective pleural procedures.

#### 7.2.1. Size of sample

We aim to recruit 15 patients undergoing diagnostic or therapeutic pleural aspiration at the NUH pleural clinic, of which at least 5 should have an exudative and 5 a transudative effusion. If fewer than five transudative or exudative effusions sampled additional participants may be included to reach this target. The sample size of 15 should allow for adequate numbers of both effusion types, based on typical presentations to the pleural clinic.

We aim to recruit five patients receiving peritoneal dialysis who present to the renal service with pleural effusion. As presentation of such cases is extremely variable, the study period

may be extended for up to 12 months to allow sufficient time to obtain these samples. We will obtain ethics approval to complete the same recruitment at 2 other UK centres.

#### 7.2.2. Sampling technique

Participation involves no additional procedures beyond the patient's standard care. A 10 mL surplus sample of pleural fluid, taken during the routine aspiration, will be used for the iodine-starch test. The sample will be photographed immediately after testing by a study doctor using a Trust iPhone, and the photos will be stored on the renal shared drive.The used samples will then be discarded in accordance with the Trust clinical waste protocol. A second 10 mL surplus sample of pleural fluid will be frozen in a universal container and stored at -80. These samples would be used should an alternative formulation of iodine need to be tested in the future due to changes in availability.

### 7.3. Recruitment

Potential participants will be identified from patients attending the pleural clinic and RHTU for routine diagnostic or therapeutic pleural aspiration. All recruitment will be carried out by the study investigators and supported by the pleural clinic or renal team.

#### 7.3.1. Sample identification

Participants will be identified from patients attending the NUH pleural clinic and RHTU for routine diagnostic or therapeutic pleural aspiration.

Identification will be carried out by members of the patient's usual pleural clinical or renal team along with a study doctor. A study doctor will confirm eligibility against the study inclusion and exclusion criteria. Patients meeting these criteria will be provided with a Patient Information Sheet and invited to discuss the study with a member of the research team if they express interest in participating. The consent needs to take place on the day of the clinic visit due to the clinical needs of the patient, and it will not be possible to allow for a minimum of 24 hours notice for the patient to take part. The patients will have the duration of the clinical visit to decide on consent as the study requires no changes to standard care during the visit.

No external researchers, Patient Identification Centres (PICs) or public advertisements (e.g. posters, leaflets, or websites) will be used for recruitment. All patient identification will occur within the pleural clinic or RHTU using information already available to the clinical team as part of routine care.

The researchers will not access identifiable patient information until after informed consent has been obtained.

No financial payments will be made to participants. As the study involves no additional visits or procedures beyond standard care, no travel expenses or reimbursements are required.

#### 7.3.2. Consent

Patients meeting the inclusion criteria will be provided with a Patient Information Sheet outlining the purpose of the study, what participation involves and their rights to withdraw at any time. Those willing to take part will be given an opportunity to ask questions before signing a written informed consent form.

## 8. END OF STUDY DEFINITION

The end of the study will be defined by the completion of data collection and analysis the clinical pleural fluid samples.

Following this, validation of the iodine-starch test with our study recommendations will be undertaken collaboratively with two additional UK renal centres to assess reproducibility.

## 9. ETHICAL AND REGULATORY CONSIDERATIONS

This study has no theoretical risk to participants, as no additional procedures are performed beyond those required for their routine clinical care. The research uses a small surplus sample of pleural fluid that would otherwise be discarded, and no interventions or changes to clinical management are introduced.

Ethical approval will be sought via IRAS with NUH R&I as sponsor.

### 9.1. Assessment and management of risk

This is a minimal-risk study using surplus pleural fluid samples obtained during routine care.

The risk of lack of data confidentiality will be minimised using pseudonymisation.

Any safeguarding concerns identified during recruitment will be escalated to the patient's clinical team and managed according to NUH safeguarding policies.

### 9.2. Research Ethics Committee (REC) review & reports

Before commencing the study, ethical approval will be sought from an NHS Research Ethics Committee via the Integrated Research Application System (IRAS). Approval will cover the study protocol, participant information sheet and consent form.

No study activities will begin until a favourable REC opinion has been received, along with sponsorship and R&D approval from NUH Research & Innovation.

Any substantial amendments to the protocol or other documents will be submitted to the REC and R&I for review. Amendments will not be implemented until a favourable opinion and local approvals have been granted.

All correspondence with the REC will be retained.

### 9.3. Peer review

This study ihas undergone independent and expert peer review in accordance with NUH Research & Innovation standards.

The study has been peer reviewed by a national expert in peritoneal dialysis, with significant research experience in this field. Formal Peer Review Form has been completed.

In addition, the initial study proposal was reviewed internally within the Nottingham Renal and Transplant Unit as part of the NUH Renal Research Fund application process.

### 9.4. Patient & Public Involvement

This study design and documentation has been reviewed by patient and public representative at a meeting on 15th October 2025. Feedback was recorded and used to make constructive improvements to the study materials. The same patient and public representatives will be consulted on dissemination of the study findings.

### 9.5. Regulatory Compliance

Before recruitment begins, the Chief Investigator has made contact with the NUH R&I and will apply for Health Research Authority approval.

Any substantial amendments to the protocol will be reviewed by the Chief Investigator. The Sponsor will be notified of proposed amendments, and submissions to the regulatory departments will be made as required.

### 9.6. Protocol compliance

All study activities will follow the approved protocol. Any accidental protocol deviations will be documented and reported promptly to the Chief Investigator and Sponsor. Serious breaches will be reported to the Sponsor, REC, and HRA as required. Repeated or systematic non-compliance will prompt immediate investigation and corrective action.

### 9.7. Amendments

All amendments will be managed in line with HRA and NUH R&I procedures. The Chief Investigator will determine whether amendments are substantial or non-substantial. Substantial amendments will be submitted to the REC, HRA and R&I departments for review

before implementation. An amendment log with version control will be maintained to ensure only current approved documents are used.

### 9.8. Adverse Events

This is a purely observational study that involves no intervention or alteration to participants' routine clinical care. The study uses only surplus pleural fluid samples obtained during standard diagnostic or therapeutic procedures, and therefore no adverse events are anticipated.

By design, participants will not be clinically followed up by the researchers after sample collection. Any adverse events arising during or after the pleural procedure will be managed as part of normal clinical care by the responsible respiratory or renal teams and not attributed to the research study. As such, no formal adverse event reporting is required within this study.

### 9.9. Data management

#### 9.9.1. Data collection

This study will include minimal patient data. Consent will be obtained on paper, scanned into the patients electronic patient record and stored in the site file in a locked office in the Renal and Transplant Unit at NUH.. Clinical data will be recorded on a password protected excel spreadsheet. Only the CI and study coordinators will have access to the spreadsheet. Data will be pseudonymised at the point of collection and recording. Patient demographics, reason for attending, dialysis details and common comorbidities will be recorded. Details of standard pleural fluid analysis performed by pleural clinic will be recorded, along with diagnosis of cause of pleural effusion. No other data will be recorded. Patients will not be followed up after pleural clinic results available. Clinical outcomes will not be followed up. Laboratory data will be collected from the NUH "Nervecentre" IT system.

#### 9.9.2. Data quality

Data will be inputted by 2 researchers, with data quality checked by the second researcher and review by Chief Investigator. Clinical data will be obtained directly from NUH electronic clinical systems utilising existing clinical data quality measures.

#### 9.9.3. Data storage

All data will be stored electronically on an excel spreadsheet which will be stored on the renal shared area at NUH in a password protected format. All clinical data will be pseudonymised. Data will be stored for a minimum of 5 years. Consent forms will be scanned into electronic patient records.

#### 9.9.4. Data transfer (if applicable)

No clinical data will be transferred. Data from collaborating centres validating the laboratory test will be transferred electronically via NHS email using a password protected document on completion of recruitment at each site.

#### 9.9.5. Data protection

All investigators and study site staff will comply with the requirements of the General Data Protection Regulation 2018 and Data Protection Act 2018 with regards to the collection, storage, processing and disclosure of personal information and will uphold the Regulation's/Act's core principles.
The Data Custodian for the study is the Chief Investigator.

### 9.10. Indemnity

The study is being conducted within Nottingham City Hospital using existing facilities and governance structures. The clinical study affords no risk to patients as it is purely observational using excess clinical samples, no additional indemnity considerations exist.

### 9.11. Access to the final study dataset

The full study dataset will be accessible only to the Chief Investigator, study coordinators and authorised NUH research team members.

### 9.12. Dissemination policy

All data arising from this study will be the property of Nottingham University Hospitals NHS Trust as the study Sponsor. The Chief Investigator and authorised research team members will have rights of access to the data.

Results will be disseminated in medical journals, at regional, national and international meetings, and to our PPI contributor after preliminary and final results are reviewed and collated. There will be appropriate acknowledgement of NUH Renal Research Fund.

### 9.13. Authorship eligibility guidelines and any intended use of professional writers

Authorship of publications and the final study report will follow the criteria set out by the International Committee of Medical Journal Editors (ICMJE). Individuals will qualify for authorship if they have:

- Made a substantial contribution to the study's conception, design, data collection, analysis, or interpretation
- Been involved in drafting or critically revising the manuscript for important intellectual content
- Approved the final version to be published

- Agreed to be accountable for all aspects of the work

The study coordinator will be listed as the lead author, with co-authorship offered to team members who meet the ICMJE criteria.

No professional medical writers or editorial assistance will be required.

All authors will declare any conflicts of interest, and acknowledgements will include funding from the NUH Renal Research Fund.

## 10. REFERENCES

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## 11. APPENDICES

11.1 Table of study documents

| | |
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