# DIAGNOSTIC IMAGING

## POLICY AND PROTOCOL FOR:

THE ADMINISTRATION OF INTRAVENOUS ANTISPASMODICS, CONTRAST MEDIA, AND SODIUM CHLORIDE 0.9% FLUSH FOR IVU, CT & MRI SCANS BY RADIOGRAPHERS

## SOP 41

<table>
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<th>Subject:</th>
<th>Policy and Protocol for the Administration of Intravenous Antispasmodics, Contrast Media and Sodium chloride 0.9% for IVU, CT Scans &amp; MRI Scans</th>
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<tr>
<td>Applicable To:</td>
<td>Radiographers working in CT &amp; MRI, and those performing IVU examinations</td>
</tr>
<tr>
<td>Date Issued:</td>
<td>November 2008</td>
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<td>Version Number:</td>
<td>5</td>
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</table>
| Reviewed By: | James Parker / Neil Sorby 2011  
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POLICY AND PROTOCOL FOR:
THE ADMINISTRATION OF INTRAVENOUS ANTISPASMODICS
CONTRAST MEDIA AND SODIUM CHLORIDE 0.9% FLUSH FOR
IVU, CT & MRI SCANS BY RADIOGRAPHERS.

Introduction

The role of the radiographer has changed significantly in recent years with some practices traditionally performed by radiologists now being done by suitably trained radiographers. This is partly as a result of radiographers desire to develop and expand their roles but also due to the serious shortage of doctors in clinical radiology, a nation-wide problem. Several papers have been written on the changing role of radiographers and areas where it is acceptable for them to expand their skills and knowledge. Intravenous injection of contrast media for IVU, CT & MRI scans is one such accepted practice. The Department of Diagnostic Imaging at the North Middlesex Hospital fully supports this development and has encouraged staff to receive training in IV cannulation and the injecting of antispasmodics, contrast media and sodium chloride 0.9% when required.

Aims and Objectives

The aim of this policy is to ensure that any radiographer who falls within the agreed protocol can be trained to inject antispasmodics, contrast media and sodium chloride 0.9% for IVU, CT & MRI Scans under the direction of a consultant radiologist.

The positive benefits of this will be:
- Release of radiologist time to pursue more complex procedures
- Expanding skills of radiographers
- Improved access for patients removed unnecessary waiting times.

Policy

The Policy applies to:

- The administration of *Iohexol 300 mg l/ ml and sodium chloride 0.9% for the purpose of enhancing IVU examinations and CT scans & Gadolinium based contrasts (Dotarem & Magnevist) for the enhancement of MRI Scans and flushing through with sodium chloride 0.9% when required.
- The administration of hycosine butylbromide (buscopan) for the purpose of limiting bowel motion for CT colonography and pelvic MRI and MR enterography

*(See relevant PGDs for non-medical administration protocols)
• Senior radiographers who have been permanent employees of the Trust for at least three months.

• Radiographer grades qualified for twelve months or more and who have been employed by the Trust for twelve months or more and recommended as competent by Senior Radiographers.

• The injection of antispasmodics, contrast media and sodium chloride 0.9% to patients requiring antispasmodics / contrast media whilst undergoing IVU, CT/ MRI scans referred by NMH consultants and General Practitioners by arrangement.

• Agreement of the Lead Consultant Radiologist.

Training

All staff wishing to perform IV injections must attend the in house IV cannulation training programme. Staff members who have trained elsewhere prior to joining the Trust must also attend the course in house, to establish competency.

Training will be in the form of:

• Attendance at an in-house Sharps Disposal training course.

• Attendance at and completion of the Peripheral Intravenous Cannulation course at NMUH and be assessed as competent.

• Record or Certificate of attendance to be presented to Operational Service Manager and retained in Training file.

• Proven knowledge of Departmental protocols relating to drug storage.

• Relevant Knowledge of the Medicines Policy

• Attend a lecture on the safe use and administration of Hyoscine Butylbromide given by the Clinical Lead Radiologist.
Audit

All staff must record the procedure on the Audit forms, (see Table 2-3), as well as in the patient’s medical notes. The audit forms must be kept in the CT / MRI for analysis e.g. difficulties encountered, need for radiologist intervention and reasons for intervention, numbers treated.

PROTOCOL FOR THE SUPPLY AND ADMINISTRATION OF INTRAVENOUS ANTISPASMODICS, CONTRAST MEDIA AND SODIUM CHLORIDE 0.9% FOR IVU, CT AND MRI SCANS.

1. The request form for a scan signed by a recognised medical practitioner and compliant with the Diagnostic Imaging protocol for IVU, CT & MRI referrals must be checked prior to the investigation.

2. Patient’s details must be clearly identified on the x-ray request form and identification of the patient made as per the Diagnostic Imaging Patient Identification procedure, IR01. The pregnancy status of female patients should be determined.

3. Contrast media should only be administered if the routine protocol for the examination requested requires it. If the CT or MRI protocol includes antispasmodics, the supervising radiologist / clinician must be informed that the injection is to take place prior to the procedure.

4. The patient’s medical history must be checked before administration to ascertain any contraindications:
   a) Does the patient suffer from any known allergies?
   b) Do they have asthma? If so is it well controlled?
   c) Is there a history of previous contrast reaction?
   d) Do they have renal problems?
   e) Is the patient diabetic?
   f) Are they taking metformin?
   g) Is the patient pregnant?
   h) Has the patient any thyroid problem/thyroid cancer?

   a) Allergies

   “Individuals with multiple well documented allergies or a single severe allergy are at increased risk of a reaction from contrast”

   (RCR guidelines 2010).
Refer to the supervising radiologist prior to scan to see if a suitable alternative to requested scan is available, or if an unenhanced scan would be sufficient.

If the radiologist wants to proceed with a contrasted study document this on the request form and on RIS. The patient should then remain cannulated and in the department for 30 minutes following the scan.

The RCR guidelines (2010) state that there is NO known benefit to the prophylactic giving of steroids prior to the administration of contrast.

b) Asthma

“Asthmatics are at an increased risk of severe contrast reactions by a factor of six with low or iso-osmolar non ionic contrast agent”

(SCR guidelines2010).

Well controlled asthma

If the patient reports that their asthma is well controlled and they have no other contraindications, contrast may be administered but:

- Maintain close medical supervision
- Leave the cannula in situ and observe the patient for 30 minutes following the scan.
- Be ready to treat any adverse reaction promptly and ensure that emergency drugs and equipment are available.

Poorly controlled asthma

If the patient reports that their asthma is poorly controlled or they are wheezy on the day of their scan, an assessment should be made by the Radiologist as to whether a diagnostic scan could be achieved without contrast, with guidance given by the referring team.

If contrast is essential the scan should be deferred and the patient referred back for medical therapy.

c) Previous contrast reaction.

Ask patient about: the type of previous reaction, type of examination, type of contrast used.

Refer to supervising radiologist, to determine whether unenhanced scan or another type of examination would be of use. The radiologist/referring team should assess the risk-benefit ratio of the procedure. Document the outcome of this assessment on the form and on RIS.
If the injection is deemed necessary, we should:
- Maintain close medical supervision
- Leave the cannula in place and keep the patient under observation for 30 mins after the procedure.
- Be ready to treat any adverse reaction promptly and ensure that emergency drugs and equipment are available.

d&e) Renal Problems and Diabetes
If the patient has an eGFR below 60ml/min/1.73m² it suggests a degree of renal impairment.
It is important to have a recent eGFR (within the last 7 days prior to the scan), for all patients requiring contrast with a history of renal disease or Diabetes.

The combination of renal impairment and diabetes carries significant risk.

Other factors that increase the risk of Contrast Induced Nephroxicity (CIN) are:
Congestive heart failure
Old age (>70 years)
Concurrent administration of nephrotoxic drugs eg:
ACE Inhibitors – Blood pressure medication
ARBs - Blood pressure medication
NSAIDS
Diuretics
Metformin

If ANY patient has an eGFR of less than 60 we should:
- Ask a radiologist and the referring team to re-assess the need for a contrast enhanced investigation considering alternatives and the severity of renal impairment.
- Provide an unenhanced scan if after consultation, a Radiologist believes it is diagnostically useful. This decision should be recorded on the referral form and notes made on RIS.

If contrast is deemed essential:
- Authorisation should be given by the requesting consultant who should sign in the “Approved by” box on the CT request form. This would also be documented on RIS.
- Outpatients should be rebooked on a date provided by the clinical team to allow for prophylactic hydration to occur prior to the scan.
• The patient should be well hydrated before and after the procedure either orally or intravenously, following the National Kidney Injury protocol (included in appendix).
• Consultation with radiologist is required to determine the most suitable volume of contrast media needed for diagnostic examination result.

Dialysis patients.
• We should determine the days that the patient has dialysis.
• Their CT appointment should be within 24 hours of their next dialysis.

f) Metformin
Renal function should be known in patients who are taking metformin. There is no need to stop metformin if the creatinine level is normal and the eGFR is above 60. If the eGFR is below 60 a radiologist should be consulted to determine if an unenhanced scan would be diagnostically useful.
If contrast is deemed essential:
• Authorisation should be given by the requesting consultant who should sign in the “Approved by” box on the CT request form. This would also be documented on RIS.
• Outpatients should be rebooked on a date provided by the clinical team to allow for prophylactic hydration to occur prior to the scan.
• The patient will also need to stop taking their metformin and any other nephrotoxic drugs such as ACE inhibitors or ARBs for 48 hours before and after the scan.
• The patient should be well hydrated before and after the procedure either orally or intravenously, following the Acute Kidney Injury protocol (included in appendix).
• Consultation with radiologist is required to determine the most suitable volume of contrast media needed for diagnostic examination result.

g) Pregnancy
“If contrast is given during pregnancy there is a small theoretical risk of thyroid suppression in the foetus. It is recommended that thyroid function of the foetus should be measured in the first week after birth.”
(RCR guidelines 2010)
We should give this information to the requesting team, and also write this statement into the patient’s notes, beneath the sticker documenting the administration of contrast.

h) Thyroid problems
If the request form states that the patient is hyperthyroid, IV contrast should NOT be given.
If the patient has thyroid cancer MRI should be the preferred staging method as if the patient has a CT scan with IV contrast, it will prevent them having therapeutic radio-iodine treatment for 2 months after the CT scan. Isotope thyroid imaging should also be avoided for 2 months following IV contrast.

5. All patients for contrasted examinations must have an eGFR result dated within the last 3 months.
Acceptable levels are:

- Omnipaque eGFR should be >60.
- Dotarem eGFR should be >30

Acute patients/ inpatients or out patients with diabetes or renal problems should have a result within the last 7 days prior to the scan.

Particular care should be taken in patients who are acutely or severely unwell such as with hypotension or hypovolaemia. These scans are likely to be carried out on an urgent or emergency basis and the potential risks of contrast use must be weighed against the potential benefits by senior members of the requesting team.

6. Appropriate antispasmodics / Contrast Media must be used for the examinations indicated by Diagnostic Imaging protocols and in accordance with manufacturers licensed indications.

7. All CT contrast media must be stored in the heating cabinet located in the staff side of the CT scanning room and reached an optimum temperature of 30 degrees Centigrade, before administration.

8. The member of staff drawing up the antispasmodics / contrast and / or sodium chloride 0.9% must check the details on the medicine bottle and have this checked by a second member of staff prior to drawing up the solution.
9. The details of the injection must be recorded on the patient’s x-ray request form or MRI Screening form and audit forms in the CT and MRI departments. (see appendix)

10. Administration of an IV bolus can be administered via a cannula using the automatic injector, or butterfly (if using a hand injection). Picc and Hickman lines CANNOT be used. Central lines can be used.

11. If two attempts at cannulation are unsuccessful, ask a senior colleague to come and review.

12. If the patient has a Power port Portocath inserted at this hospital by Dr Safar-Aly, radiographers who have received training and assessment from Dr Safar-Aly are permitted to use this for the administration of IV contrast.

13. Once cannula is in situ flush with 5ml Saline prior to injection of contrast.

14. During the injection the patient should be monitored for any signs of reaction including:
   - Mild / Severe Urticaria
   - Nausea / Vomiting
   - Mild wheeze
   - Hypertension with Bradycardia (Vasovagal reaction / faint)
   - Extravasation
   (See PGDs and SPC of products for full list)

   **In the event of an adverse reaction summon medical and / or nursing assistance.**
   **In the event of cardiac arrest call 2222 crash team.**

15. The patient must not be left unattended for the first 5 minutes following a contrast injection.

16. All patients should be told to drink plenty of fluids following the scan to help flush out the kidneys.

17. All patients should remain in the department for 15 minutes following the injection or 30 minutes with a cannula in situ if they are in a “at risk” category.

18. Extravasation
In cases of extravasation, halt injection immediately noting the amount of contrast that has been injected.
Remove the cannula.
Elevate the affected limb
Apply ice packs to the affected area.
Document in patient’s notes (if in-patient)/ RIS record/audit sheet.
Give patient the extravasation information sheet. (see appendix)
Complete incident form on Datix system.
See extravasation protocol in appendix.

Exclusions

Non-medical staff cannot administer contrast media or sodium chloride 0.9% to any of the following category of patients:

**Paediatric patients (under 18 years)**
**Patients with previous reactions to contrast media**
**Patients with heart problems as specified in product SPCs.**
**Patients who are hyperthyroid.**
**Patients with thyroid cancer.**
**Patients with Myasthenia Gravis**

Non-medical staff cannot administer Buscopan to the following groups of patients

**Paediatric patients (under 18 years)**
**Patients with Acute low angle Glaucoma**
**Patients with tachycardia**
**Patients with enlarged prostate**
**Patients with Myasthenia Gravis**
**Patients with megacolon**
References

1 The Royal College of Radiologists/College of Radiographers (1998) (Inter-professional Roles and Responsibilities in a Radiology Service.

2 The Royal College of Radiologists (1996)(Advice on Delegation of Tasks in Departments of Clinical Radiology).

3 The Royal College of Radiologists (1999) (Skills mix in Clinical Radiology)

4 The Royal College of Radiologists (2010) (Standards for intravascular contrast agent administration to adult patients, Second Edition)

Other relevant documents:

Intravenous Drug Administration Policy

Medicines Policy

Extravasation Policy

AKI Policy.
**Table 1**

**RADIOGRAPHERS COMPETENT IN INTRAVENOUS CANNULATION**

The following radiographers have attended the relevant Intravenous Cannulation course at NMUHT and have been assessed as competent to inject Omniate 300, Buscopan 20mg/ml and Sodium chloride 0.9% for IVU and CT scans and Dotarem, Magnevist, Buscopan 20mg / ml and Sodium Chloride 0.9% for MRI scans:

***************Section Removed listing Names of Individuals***************
AKI Guidelines for Contrast Induced Nephropathy (CIN) and Prophylaxis
(Taken from North Central London Acute Kidney Injury Network Clinical
Guidelines and Patient Pathways)

ASSESS RISK
↓

RENAL FAILURE - eGFR <60
(confers 5-10x risk CIN, diabetic nephropathy highest risk)
also
Dehydration
Heart failure
Nephrotoxins (NSAIDS, aminoglycosides)
Hyperuricaemia
Cirhosis
Nephrotic syndrome
NB RISK FACTORS MULTIPLICATIVE
↓
↓

IS CONTRAST PROCEDURE NECESSARY?
↓
YES
↓
↓

RESUSCITATE TO EUVOLAEMIA
↓
↓

GIVE PROPHYLAXIS
IV Na bicarbonate 1.26% 3mls/Kg/hr for 1 hour pre-procedure and 6 hours post
or
IV 0.9% normal saline 1ml/kg/hr 12 hours pre and 12 hours post procedure
↓
↓
Minimise contrast, use low or iso-osmolar contrast
There is no proven role for dialysis/CVVH to remove contrast postdoseage)
↓
Monitor function to 72 hours
If oliguria or rising creatinine early referral AKI registrar 07908422116
STAFF RESPONSIBILITIES WHEN CONTRAST EXTRAVASATION OCCURS

Many examinations within the diagnostic imaging department require the intravenous administration of radiographic contrast. In some cases extravasation occurs, and contrast goes into the soft tissues surrounding the cannula site rather than into the vein.

Radiographers working with contrast should be:

- Aware of the risk of extravasation.
- Know how to minimise the chance of it occurring.
- Know the symptoms and signs of extravasation.
- Able to provide treatment to the patient if extravasation occurs.

STAFF RESPONSIBILITIES

Treatment for the extravasation of radiographic contrast.

- As soon as extravasation occurs stop the injector and stop the CT scanner.
- Elevate the extravasation site above the level of the heart.
- Apply cold compress (Koolpak).
- Remove cannula from injection site.
- Inform radiology nurses and radiologist / clinician covering the session.
- Keep limb elevated for as long as possible if you have to continue with the radiographic examination using an alternative injection site.
- Note down the amount of contrast injected from the injector screen, before you reload.
- Note appearance of extravasation site.
- Once examination is complete sit the patient outside of the CT scanner keeping the cold compresses in situ and the limb elevated as much as possible. Reassess with patient as to the pain/ discomfort level at the extravasation site.
- For Out patients, assess the extravasation site. If the patient feels ok to go home give them an information sheet (see appendix) to take with them. If
the patient complains of worsening pain contact the referring team and take the patient to casualty.

- For In patients, document details of the incident in the notes, inform the ward staff and the referring team to ensure that follow up care is given when patient returns to the ward. Include copy of information sheet in notes.

Complete an incident form.
- For all patients an incident form should be completed using the datix system including all the information shown on the audit sheet included in the appendix. If you are mid session when the extravasation occurs, temporarily put data onto sheet and add to datix at end of session.

1) Audit sheet
2) Patient information sheet.
Appendix 1

Extravasation of intravenous radiographic contrast.

<table>
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<th>Patient details/sticker</th>
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<tbody>
<tr>
<td>Radiological Examination</td>
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<tr>
<td>Date/Time of examination</td>
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<tr>
<td>Type of contrast used</td>
<td></td>
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<tr>
<td>Rate injected</td>
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<tr>
<td>Volume of contrast extravasated</td>
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<tr>
<td>Site of extravasation</td>
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<tr>
<td>Size of cannula used for injection</td>
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<tr>
<td>Patient signs and symptoms</td>
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<tr>
<td>Treatment given</td>
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<tr>
<td>Information sheet given.</td>
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<tr>
<td>Ward informed</td>
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</table>
Appendix 2

Patient advice following the injection of contrast media during a CT scan examination

The injection that we give you for the scan can sometimes leak into the surrounding tissues and not stay in the vein as intended. We call this tissueing or extravasation. This has caused a lump under your skin. It is normal to experience, swelling and discomfort where the cannula was sited, and the area may become bruised. This should have no long term side effects.

We will give you a cool pack which you should place on the affected area to help reduce the inflammation or irritation. Then we will keep you in the department for a brief time following the scan with your arm elevated to monitor the injection site.

When you return home keep your arm elevated in a way that is comfortable for you. The swelling and discomfort should settle.

If you experience any of the following having elevated and rested your arm please contact your GP or go to your nearest Accident and Emergency Department for further assessment. Inform them that you had a CT scan with IV contrast.

- Site getting warmer
- Site changing colour i.e. becomes blue or white
- Increased pain after 2-4 hours (severe, deep and constant).
- Experience tingling in your fingers or notice your fingers change colour.
- Increase in size of skin bruising
- Skin blistering

CT department
Table 2

Audit of Intravenous Injection of
Gadoteric Acid (Dotarem) 279.32 mg / ml, Gadopentetic Acid (Magnevist) 469.01 mg / ml, Hyoscine Butylbromide (Buscopan) 20 m / ml, Sodium Chloride 0.9%

For each patient to whom you administer contrast media, buscopan or saline, please complete injection details in comments box and contrast / saline / buscopan information in the box provided with the initials of the person administering them

<table>
<thead>
<tr>
<th>Date:</th>
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Once completed please keep the form in the MRI dept. The forms will be analysed on a regular basis and discussed with the Chief Pharmacist or a designated Pharmacist and data presented at the Departmental audit meeting.
**Table 3**

Audit of Intravenous Injection of Iohexol (Omnipaque) 300 mg / ml, Hyoscine Butylbromide (Buscopan) 20 mg / ml, Sodium Chloride 0.9%

*For each patient to whom you administer contrast media, buscopan or saline, please complete injection details in comments box and contrast / saline / buscopan information in the box provided with the initials of the person administering them*

<table>
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<tr>
<th>PATIENT DETAILS</th>
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<th>OPERATOR:</th>
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**Contrast sticker**

Attempts x  By : Saline

Comments

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Attempts x  By : Saline

Comments

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