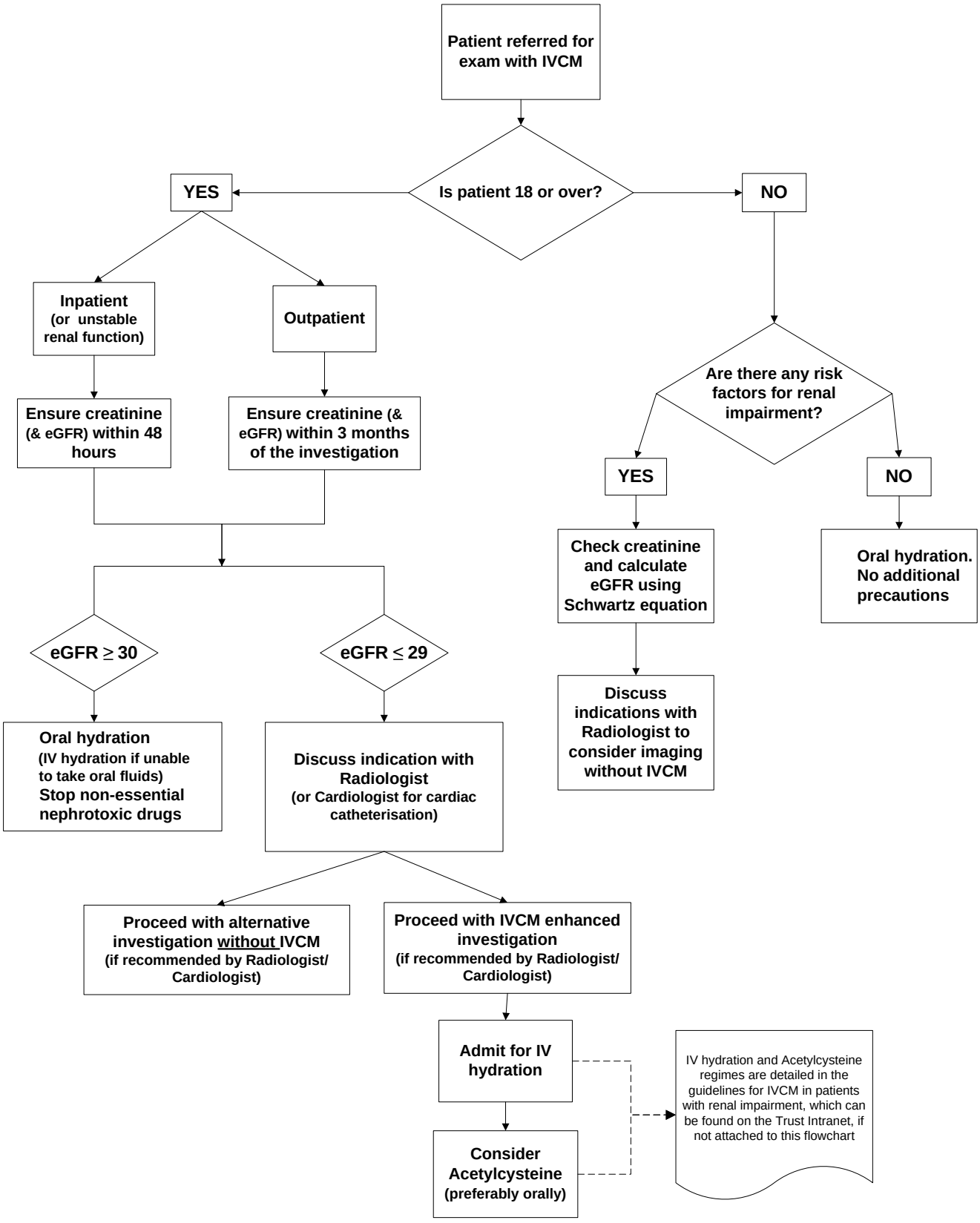
Musgrove Park Hospital	Trust Protocol Diagnostic Imaging Department
Title: Use of iodinated intravascular contrast (IVCM) in patients with renal impairment	
Authors: Dr Danial Fox, Consultant Radiologist, Nigel Ankcorn, Senior Pharmacist	
Policy Lead: Dr Danial Fox, CT Lead	
Ratified by: PRG	**Active date**: 10th February 2010
Ratification date: 13th January 2010	**Review date**: 10th February 2012
Applies to: All patients receiving IVCM for radiological or cardiological test/procedures	**Exclusions:** Nil
Purpose: To identify patients with renal impairment and detail appropriate measures to reduce the risk of them developing Contrast Induced Nephropathy.	

CLINICIANS GUIDE FOR USE OF IODINATED INTRAVASCULAR CONTRAST MEDIUM (IVCM) IN PATIENTS WITH RENAL IMPAIRMENT



Use of iodinated intravascular contrast (IVCM) in patients with renal impairment.

1 Background:

1.1 Contrast induced nephropathy (CIN) is an increasing cause of morbidity and mortality with increasing use of IVCM (particularly for computed tomography (CT) scans and interventional radiology and cardiology) in an ageing population. CIN is defined as an increase in serum creatinine of 25% over baseline within 48 hours of receiving IVCM without an alternative explanation.

2.2 Pre-existing renal impairment is the major recognised risk factor for CIN.

2 Aim:

2.1 To identify and stratify patients with renal impairment in order to take appropriate measures to reduce the risk of developing CIN.

3 Method:

3.1 Estimation of renal function:

- All patients greater than 18 years of age who may require IVCM should have a recent date estimation of renal function, The clinician requesting the investigation should ensure that a serum creatinine is measured within 3 months of the investigation if well outpatient, or 2 days of the scan if inpatient/unwell, *specifically requesting eGFR in addition to creatinine*.
- In an extremely ill patient, the radiologist/cardiologist may rarely agree to give IVCM before an up to date creatinine is available, if any delay would be life threatening.

- Estimated glomerular filtration rate (eGFR) (in mL/min/1.73 m2) is a more accurate estimate of renal function than serum creatinine. In patients greater than 18 years of age, eGFR is calculated from the serum creatinine using a local modification of the modification of diet in renal disease (MDRD) formula, and can be requested from the Biochemistry department at the same time as the creatinine.

- eGFR should be interpreted with particular caution in acute renal failure, pregnancy, oedematous states, muscle wasting states, amputees, and malnourished patients.

- In paediatric patients (less than 18 years), serum creatinine level need only be measured if there is known renal disease or risk factors for renal impairment. eGFR should be calculated in paediatric age group using the Schwartz equation:

http://www.kidney.org/professionals/kdoqi/gfr_calculatorPed.cfm. Where there are risk factors for renal impairment, the Indications for IVCM should be discussed with the consultant radiologist responsible for performing the test, once the eGFR is known.

3.2 General measures to reduce risk of CIN in all patients

- The referring clinician should try to ensure that non-essential nephrotoxic drugs e.g. Non-steroidal anti-inflammatory drugs (NSAIDs), loop diuretics) are discontinued 48 hours before scan
- The referring clinician should ensure all patients receive hydration before and after IVCM (see instructions for eGFR ranges and hydration options in box below)
- It is the referring clinician's responsibility to prescribe fluids and/or Acetylcysteine if instructed to do so by the Radiology / Cardiology department
- Repeat IVCM should be avoided within 48 hours where possible

3.3 Adult Patients with eGFR: ≥ 60

- Oral hydration (substitute intravenous (IV) for in-patients who are unable to take oral fluids)
- No additional precautions

3.4 Adult patients with eGFR: 45-59

- Oral hydration (substitute IV for in-patients who are unable to take oral fluids)
- Consider reduced dose of Ultravist (e.g. 75mls for CT scans)

3.5 Adult patients with eGFR: 31-44

- Oral hydration (substitute IV for in-patients who are unable to take oral fluids)
- Use isomolar contrast (Visipaque). Consider reduced dose (e.g. 75mls for CT scans)

3.6 Adult patients with eGFR: ≤ 30

- Radiologist/ cardiologist to consider alternative test without IVCM or discuss risks:benefits of IVCM with the requesting consultant
- If IVCM is given:
    - Iso-osmolar contrast (Visipaque) at reduced dose if possible
    - IV hydration, preferably with Sodium chloride regime in box below (if scan can be delayed to next day)

Use of iodinated intravascular contrast (IVCM) in patients with renal impairment.

- Radiologist / Cardiologist may consider Acetylcysteine (preferably using the oral route). There is conflicting evidence on the benefits of Acetylcysteine, but its safety profile is very good. Studies should not be delayed or cancelled if Acetylcysteine has not been given. Suitable regimes for its use in adults are given in the box below.
- eGFR should be rechecked 48 hours after IVCM is given

3.7 Paediatric patients

- See section 3.1

Hydration Regimes (Adults)

ORAL

1 litre water before scan (unless already receiving oral water/milk as prep for CT abdomen), and 2 litres water in 24 hours after scan.

IV

Either (for next day scan)

Sodium chloride 0.9% by IV infusion 1 mL per Kg per hr for 12 hr before and 12 hr after IVCM administration

Or (if same day scan)

Sodium bicarbonate 1.26% 3ml per Kg per hour for 1 hour before IVCM and 1ml per Kg per hour for 6 hours post IVCM

NEXT DAY SCAN

600mg Acetylcysteine orally (unlicensed product available) twice daily the day before and on the day of the scan

SAME DAY SCAN

Acetylcysteine by intravenous infusion: 150mg per Kg in 500mL sodium chloride 0.9% over 30 minutes immediately before contrast, followed by 50mg per Kg in 500mL sodium chloride 0.9% over 4 hours)

Use of iodinated intravascular contrast (IVCM) in patients with renal impairment.

Audit:

Availability of up to date eGFR results for IVCM enhanced CT scans to be audited.

References:

Canadian Association of Radiologists: Guidelines for the Prevention of Contrast Induced Nephropathy 2007

http://www.car.ca/Files/Nephropathy.pdf

Pannu et al: Prophylaxis Strategies for Contrast-Induced Nephropathy. JAMA 2006;295:2765-2779

JAMA -- Prophylaxis Strategies for Contrast-Induced Nephropathy, June 21, 2006, Pannu et al. 295 (23): 2765

Royal College of Radiologists: Standards for Iodinated Intravascular Contrast Agent Administration to Adult Patients 2005

http://www.rcr.ac.uk/docs/radiology/pdf/IVcontrastPrintFinal.pdf

Goldfarb et al: Contrast-Induced Acute Kidney Injury: Specialty-Specific Protocols for Interventional Radiology, Diagnostic Computed Tomography Radiology, and Interventional Cardiology. Mayo Clin. Proc., February 1, 2009; 84(2): 170 - 179.

Contrast-Induced Acute Kidney Injury: Specialty-Specific Protocols for Interventional Radiology, Diagnostic Computed Tomography Radiology, and Interventional Cardiology — Mayo Clinic Proceedings