1 Introduction:

1.1 The Main Radiology department (Duchess Building) is staffed Weekdays 08:30 – 17:30. Outside of these hours this Out of Hours policy applies.

1.2 This document includes an OVERVIEW section on who can request and who to call, and an INDICATIONS section that details what is appropriate to request.

OVERVIEW

2.1 CT/MRI/Ultrasound

N.B. Patients with suspected stroke should be requested on Order Comms and discussed directly with the CT radiographer on bleep 2312 or extension 3317/2923.

17:30 – 20:30 weekdays and 09:00 – 17:30 weekends & Bank Holidays* 
Requests should be discussed directly with the on call Consultant Radiologist in the Radiology Department (via switchboard).
*except Christmas Day when the radiologist is on-call from home 08:30 – 18:00
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20:30 – 08:30 weekdays and 17:30 – 09:00 weekends & Bank Holidays
CT and MRI Cover is provided by the Nighthawk (NH) Radiologist.
All cases except suspected Stroke should be discussed with the NH Radiologist on 03330 100999 (backup no. 03333 111999), before requesting on Order Comms (the request should include the NH reference number and any protocol instructions given by the NH radiologist) and then contacting the CT or MRI radiographer.
Requests for Ultrasound should be discussed with the duty MPH radiologist the next morning.

2.2 X-Rays
17:30 – 08:30 weekdays and 08:30 – 08:29 weekends and Bank Holidays
To be requested on Order Comms and the Queens Building Radiographer contacted on extension 2923 (or bleep 2312).

2.3 Interventional Radiology (IR)
17:30 – 08:30 weekdays & 08:30 – 08:29 weekends and Bank Holidays
There is a separate Interventional Radiologist on call rota. (see Appendix 3 on page 12 for more information).

2.4 Who may request OOH Diagnostic Radiology
Xrays – any doctor
CT/US – any doctor, including junior doctor after discussion with their registrar or above (depending on the clinical indication, see below).
MRI – registrar or above
IR – consultant only

INDICATIONS FOR SPECIFIC TESTS
N.B Requests for CT/MRI that do not come under any of the indications below may still be scanned, but require discussion between the consultant clinician responsible for the patient and the consultant radiologist.
CT

3 INDICATIONS FOR OOH CT HEAD

3.1 Stroke
- Patients with suspected stroke should be requested on Order Comms and discussed directly with the CT radiographer on bleep 2312 or extension 3317/2923.

3.2 Trauma – Adults (NICE criteria – See Appendix 1 on page 10)
- GCS less than 13 on initial assessment in the Emergency Department or GCS less than 15 at 2 hours in the Emergency Department
- Suspected open or depressed skull fracture
- Any sign of basal skull fracture (haemotympanum, ‘panda’ eyes, cerebrospinal fluid leakage from the ear or nose, Battle’s sign)
- More than one episode of vomiting
- Post-traumatic seizure
- Focal neurological deficit
- Coagulopathy (history of bleeding/clotting disorder, platelets <50, current treatment with warfarin or newer oral antiocoagulants such as dabigatran, rivaroxaban and apixaban, or treatment dose heparin) with any loss of consciousness or amnesia, significant head wound, significant mechanism of injury or neurological symptoms including headache

3.3 Trauma - Children (NICE criteria – See Appendix 2 on page 11)
- Post-traumatic seizure but no history of epilepsy
- GCS less than 14, or for a baby under 1 year GCS (paediatric) less than 15, on assessment in the emergency department
- Suspicion of open or depressed skull injury or tense fontanelle
- Any sign of basal skull fracture
- Focal neurological deficit
- If under 1 year, presence of bruise, swelling or laceration of more than 5 cm on the head.

2 or more of the following risk factors (see flow chart in appendix). If only one risk factor, then observe for a minimum of 4 hours post head injury, and perform CT within 1 hour of GCS < 15, further vomiting or abnormal drowsiness during period of observation)

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- Dangerous mechanism of injury (high-speed road traffic accident either as pedestrian, cyclist or vehicle occupant, fall from a height of greater than 3 m, high-speed injury from a projectile or other object)
- Clinical suspicion of non-accidental injury
- Amnesia (antegrade or retrograde) lasting more than 5 minutes
- Loss of consciousness lasting more than 5 minutes (witnessed)
- Abnormal drowsiness
- Three or more discrete episodes of vomiting following head injury

3.4 **Suspected Subarachnoid Haemorrhage (SAH)**
- Symptoms classical of acute SAH
- Symptoms not classical of acute SAH, but focal neurology and/or decreased conscious level (GCS less than 15)

3.5 **Suspected Meningitis (prior to lumbar puncture)**
- Focal neurology
- Decreased conscious level (GCS less than 15)
- Seizures
- *Definite* papilloedema present
- Immunosuppressed

3.6 **TIA**
- Patients with resolved deficits (TIA) who are on anticoagulation (warfarin, dabigatran, rivaroxaban or apixaban) should have a CT within 1 hour.

4 **INDICATIONS FOR OOH CT CERVICAL SPINE**

4.1 **Adults (NICE Criteria)**
If head CT requested and there is clinical suspicion of cervical spine injury, the investigation of choice should be CT cervical spine

Adults presenting with head injury or a suspicion of cervical spine injury and one of the following:
- GCS below 13 on initial assessment
- Patient has been intubated
- Plain film series is technically inadequate (e.g. desired view unavailable), suspicious or definitely abnormal
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- Continued clinical suspicion of injury despite a normal X-ray
- A definitive diagnosis of cervical spine injury is needed urgently (for example, before surgery).
- The patient is having other areas scanned for multi-region trauma or head injury
- The patient is alert and stable, there is clinical suspicion of cervical spine injury and any of the following apply:
  - age 65 years or older
  - dangerous mechanism of injury (fall from a height of greater than 1m or 5 stairs; axial load to the head, for example, diving; high-speed motor vehicle collision)
  - rollover motor accident; ejection from a motor vehicle; accident involving motorised recreational vehicles; bicycle collision
  - focal peripheral neurological deficit
  - paraesthesia in the upper or lower limbs.

4.2 **Children (NICE Criteria)**

Requests for CT cervical spine in children of 15 years or under must first be discussed with the on-call A&E, paediatric or orthopaedic/spinal consultant.

For children presenting with a head injury or suspicion of a cervical spine injury perform a CT cervical spine scan only if any of the following apply (because of the increased risk to the thyroid gland from ionising radiation and the generally lower risk of significant spinal injury):

- GCS less than 13 on initial assessment.
- The patient has been intubated.
- Focal peripheral neurological signs.
- Paraesthesia in the upper or lower limbs.
- A definitive diagnosis of cervical spine injury is needed urgently (for example, before surgery).
- The patient is having other body areas scanned for head injury or multi-region trauma.
- There is strong clinical suspicion of injury despite normal X-rays.
- Plain X-rays are technically difficult or inadequate.
- Plain X-rays identify a significant bony injury.
5 INDICATIONS FOR OOH TRAUMA CT

5.1 Whole Body CT
Requests for whole body CT must be made by or have been discussed with the duty consultant clinician responsible for the patient.

Emergency whole body CT is indicated if one or more criteria of the criteria below are met from at least 2 separate categories.

**A: High Risk Mechanism of Injury (any one of the following):**
- RTC with death of another passenger in the same vehicle
- RTC with ejection of casualty from vehicle
- RTC with prolonged extrication (>15mins) of casualty from vehicle
- Pedestrian/Cyclist/Motorcyclist vs. vehicle
- Fall > 2 metres / flight of stairs

**B: Anatomical (any one of the following):**
- Visible injury to >2 body regions (head/neck/chest/abdomen/pelvis/long bones)
- Hard signs of vascular injury (expanding haematoma, deep laceration over arterial course)
- Hard signs of spinal cord injury

**C: Physiological (any one of the following):**
- GCS < 12 or intubated or surgical airway
- Systolic BP <90 mmHg in the ED
- Respiratory rate <10 or >30 per minute
- Pulse > 120 bpm in the ED
- Age > 65 years
- Anticoagulated patient

N.B.
*Whole body CT requests for patients whose injuries do not meet these criteria will still be considered, but only after discussion between the duty consultant responsible for the patient and the duty radiology consultant.*
5.2 **Neck Angio CT**
Indications for urgent aortic arch to circle of Willis CT angiogram in trauma patients are listed below.

It is the responsibility of the senior clinician responsible for the patient to request Neck Angio CT where an initial CT shows any of the findings below that indicate increased risk of vascular injury.

- Arterial haemorrhage (neck)
- Cervical bruit
- Expanding cervical hematoma
- Focal neurologic deficit
- Findings from neurological examination incongruous with head CT scan findings
- Ischaemic stroke on secondary CT scan
- High-energy transfer mechanism with Le Fort II or III fracture
- Cervical spine fracture patterns
  - Subluxation
  - Fractures extending into the transverse foramen
  - Fractures of C1-C3 vertebrae
- Basilar skull fracture with carotid canal involvement
- Diffuse axonal injury with GCS score < 6
- Near hanging with anoxic brain injury

5.3 **Other Trauma scans**
- Indicated at the discretion of the MPH/NH radiologist
- Long bone CT for fracture delineation presenting after 20:30 will be scanned next morning.
- Caution should be used when considering CT in children due to radiation risk.

6 **INDICATIONS FOR OOH CTPA**

6.1 17:30 – 20:30 weekdays and 09:00 – 20:30 weekends
- Patients with suspected PE may be scanned (according to Trust protocol) if CXR has excluded alternative diagnoses such as pneumothorax, heart failure and pneumonia.
6.2 20:30 – 08:30 weekdays and weekends
   • Most CTPA patients presenting after 20:30 should be admitted, treated with Clexane and scanned next day.
   • Indications for urgent CTPA
     o Haemodynamic compromise (thrombolysis being considered)
     o Bleeding diathesis (or other contraindication to anticoagulation)

6.3 Ambulatory Care patients
   • Some patients presenting with suspected PE after 20:30 may be deemed safe to be treated with Clexane and sent home to return the next morning. These scans will need to be requested the next morning after review on the post-take ward round. The radiology department will scan the patient as early as practicable. There are now no reserved ambulatory care slots.

7 INDIICATIONS FOR OOH AORTIC DISSECTION
   • This will usually be indicated if concern for acute dissection and appropriate involvement of middle grade clinician or consultant.

8 INDIICATIONS FOR OOH RENAL COLIC
   • Cases presenting after 20:30 will be scanned next morning.

9 INDIICATIONS FOR OOH CT ABDO/PEVIS
   Indicated for urgent out of hours CT within 2 hours for the following indications:
   • Acute abdomen with suspected peritonitis
   • Ischaemic bowel
   • Suspected AAA rupture
     o All patients with suspected AAA rupture MUST be discussed with the vascular registrar or vascular Consultant on call immediately the diagnosis is suspected. NEVER request a CT in isolation and wait for the result before referral. Lives have been lost due to unnecessary delay in a senior clinical assessment.
     o N.B a normal calibre abdominal aorta on previous CT/US, particularly in the last 2 years makes AAA rupture extremely unlikely.
   CT NOT indicated overnight for the following indications:
   • Abdominal pain without peritonitis (e.g. acute cholecystitis, uncomplicated diverticulitis / appendicitis)
   • Suspected malignancy
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MRI

10 INDICATIONS FOR OOH MRI

All requests must be referred by registrar or consultant level and discussed directly with the MPH or Nighthawk radiologist (as appropriate).

10.1 SPINE

Any request between 21:00 - 08:00 must have been first discussed by the referring clinical team with the consultant spinal surgeon who has agreed that the scan cannot wait to be done before the following working day.

- Query cord compression or cauda equina compression (i.e. trauma, tumour, disc, abscess, haematoma).

10.2 BRAIN

Should only be considered in very exceptional circumstances and only if:

- The clinical question cannot be answered with CT
- Imaging cannot wait until early the following working day
- The referring team have discussed the case with the regional neurosurgical unit who require the scan
- The referring team have discussed the case with their consultant who requires the scan

This Protocol will be reviewed every 3 years unless there is a significant change in the system.
Algorithm for Selection of Adults for Trauma CT Head Scan

Adults presenting to the emergency department who have sustained a head injury

Are any of the following risk factors present?

- GCS < 13 on initial assessment
- GCS < 15 at 2 hours after injury on assessment in the emergency department
- Suspected open or depressed skull fracture
- Any sign of basal skull fracture
- Post-traumatic seizure
- Focal neurological deficit
- More than one episode of vomiting since the head injury

Yes

Perform CT head scan within 1 hour of risk factor being identified.

No

Current anticoagulation

Is there loss of consciousness or amnesia since the head injury?

Yes

No imaging required/ further imaging required.

No

A provisional written radiology report should be made available within 1 hour of the CT taking place.

Are any of the following risk factors present?

- Age ≥ 65 years
- A history of bleeding or clothing disorder
- Dangerous mechanism of injury (a pedestrian or cyclist struck by a motor vehicle, an occupant ejected from a motor vehicle or a fall from height of > than 1 metre or 5 stairs)
- More than 30 minutes' retrograde amnesia of events immediately before the head injury

Yes

No
Algorithm for Selection of Children for Trauma CT Head Scan

Selection of children for CT head scan

Children presenting to the emergency department who have sustained a head injury

Are any of the following risk factors present?

- Suspicion of non-accidental injury
- Post-traumatic seizure, but no history of epilepsy
- On initial assessment GCS <14, or for children under 1 year GCS (paediatric) <15
- At 2 hours after the injury GCS <15
- Suspected open or depressed skull injury or tense fontanelle
- Any sign of basal skull fracture (haemotympanum 'panda' eyes, cerebrospinal fluid leakage from the ear or nose, Battle’s sign)
- Focal neurological deficit
- For children under 1 year, presence of bruise, swelling or laceration of more than 5cm on the head

Perform CT scan within 1 hour of risk factor being identified. A provisional written radiology report should be made available within 1 hour of the CT head scan taking place.

Are any of the following risk factors present?

- Witnessed loss of consciousness > 5 minutes
- Abnormal drowsiness
- 3 or more discrete episodes of vomiting
- Dangerous mechanism of injury (high speed, road traffic accident either as a pedestrian, cyclist or vehicle occupant, fall from height of > 3 metres, high speed injury from an object
- Amnesia (antegrade or retrograde) lasting > 5 minutes (assessment not possible in pre- verbal children and unlikely in any child <5 years).

Observe for a minimum of 4 hours post head injury.

Current anticoagulation

Perform CT scan within 8 hours of the injury. A provisional written radiologist’s report should be made available within 1 hour of the CT head scan taking place

No imaging required. Use clinical judgement to determine when further observation is required.
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Appendix 3

Interventional Radiology Emergency (MPH NDDH/YDH)

IN HOURS (08:30 – 17:00)
Referring Consultant Clinical, call 01823 344757 (IR Recovery)

- Discuss case with Interventional Radiologist on-call
- Local imaging review
- Agrees to procedure
- IR Team mobilised by Interventional Radiologist

OUT OF HOURS (17:00 – 08:30 + WEEKEND)
Referring Consultant Clinical Call 01823 333444 (MPH Switchboard)

- Discuss case with Interventional Radiologist on-call

Referring Consultant Clinician arranges transfer of care to reciprocal clinician at MPH, and arranges transport accompanied by Medical/Nursing staff as appropriate

YDH NDDH Only

Patient arrives at SAU/MAU @ MPH

MPH receiving team assessment/resuscitation as necessary

IR Suite/Emergency Theatre accompanied by appropriate medical/nursing staff

IR treatment

Return to SAU/MAU/Referring hospital as appropriate

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## Appendix 4

### CONTACT DETAILS

<table>
<thead>
<tr>
<th>Role</th>
<th>Contact Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT Radiographer</td>
<td>bleep 2310 or extensions 3317/2923</td>
</tr>
<tr>
<td>MRI Radiographer</td>
<td>via Switchboard</td>
</tr>
<tr>
<td>Queens Building Radiographer</td>
<td>bleep 2312 or extension 2923</td>
</tr>
<tr>
<td>Consultant General Radiologist</td>
<td>via Switchboard</td>
</tr>
<tr>
<td>Nighthawk Radiologist</td>
<td>03330 100999 (backup no. 03333 111999)</td>
</tr>
<tr>
<td>Consultant Interventional Radiologist</td>
<td>via Switchboard</td>
</tr>
</tbody>
</table>